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Evolution of data collection methods for indigenous knowledge systems at the Multidisciplinary Research Centre of the University of Namibia

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This paper describes the evolution of indigenous knowledge systems documentation at the Multidisciplinary Research Centre, University of Namibia. As awareness of the value of indigenous knowledge systems has increased it has become apparent that it is threatened with extinction and there is a need to document it. Documentation of indigenous knowledge systems is important to preserve indigenous knowledge so it continues to provide local solutions or alternatives to Western knowhow and instill pride in rural communities about their indigenous knowledge systems. There is no clearly defined approach to document indigenous knowledge systems accurately and in its entirety; such a process has to develop, evolve and improve over time. Documentation at the Multidisciplinary Research Centre at the University of Namibia has gone through several phases of refinement with lessons being learnt and efforts being made to improve the process of documentation to capture indigenous knowledge as accurately as possible. The aim of this paper is present development of the indigenous knowledge systems research at the Multidisciplinary Research Centre from the documentation of general indigenous knowledge systems practices; to data collection methods for indigenous knowledge systems baseline studies on the traditional use of medicinal plants, livestock movement, traditional food and beverages and validation of medicinal plants used to treat malaria.

1. Introduction

Indigenous knowledge (IK) can be defined as the unique, traditional, local knowledge existing within communities indigenous to a particular geographic area (Warren 1992). Indigenous knowledge systems (IKS) encompass all aspects of life within a community and are inherent to the survival and continuity of the community. IKS has many knowledge levels; common knowledge is accessible to all members of a community regardless of age, gender or social status; shared knowledge is held by many but not all; and specialized knowledge is held by a few people who might have had special training or an apprenticeship; e.g., healers or midwives (Warren 1992). A common theme is that IKS is used for the benefit of the entire community (Kaniki and Kutu 2002). People working with a community such as researchers, teachers, healthcare workers and clergy may also be sources of IKS. Furthermore, secondary sources such as published and unpublished documents, databases, Internet, videos, and photos may also be useful.

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IKS is shared and communicated orally; it is stored in people's memories (Von Lewinski 2008) and activities and is expressed in stories, songs, folklore, cultural beliefs, and rituals (Nyota and Mapara 2008). IKS provides a basis on which local people base their decisions on issues such as agriculture, health care, food preparation, education, natural resource management, and a host of other activities in rural communities (Leffers 2003). When such information is disseminated in the community, its members tend to live in harmony with their natural environment in relation to past behaviour (Mapaure and Hatuikulipi 2007). IKS is important because it provides the basis for problem-solving strategies for rural communities, especially the poor. It can contribute to local empowerment, economic and political, it preserves local cultures instilling a cultural pride and it also represents an important component of global knowledge on development issues. Although IKS consists of an integrated body of knowledge, researchers documenting them tend to focus on discrete aspects; for example Cheikhyoussef *et al*. (2011) focus on the use of herbal remedies in treatment of diseases.

IKS develops to systematically record accumulated knowledge, preventing it from becoming lost to communities (Chinsembu and Hedimbi 2010). However, as IKS is dynamic, some knowledge is lost naturally as innovations and adaptation of techniques and tools occur and some IKS becomes disused. What is of concern is the increasing rate at which it is lost due to rapid population growth, changes in educational systems, environmental degradation, and development processes all leading to lifestyle changes, modernization and cultural homogenization (IIRR 1996). As awareness of the value of IKS has increased it has become apparent that it is threatened with extinction and there is a need to document it. Documentation of IKS is important to preserve IK so it continue to provide local solutions or alternatives to Western knowhow and instil pride in rural communities about their IKS.

Documentation of existing IKS also allows for its validation and promotion for use in sustainable development to occur (Posey and Dutfield 1997). The effectiveness of IKS can be evaluated comparatively to determine the best solution to a problem or to determine its adaptability for use in other circumstances. Documentation also allows IKS practices to be acknowledged to the correct knowledge holders allowing them to hold the rights to such knowledge, its use and any benefits accruing from it (Kihwelo 2005).

There is no clearly defined approach to document IKS accurately and in its entirety, such a process has to develop, evolve and improve over time. Documentation at the Multidisciplinary Research Centre (MRC) at University of Namibia (UNAM) has gone through several phases of refinement with lessons being learnt and efforts being made to improve the process of documentation to capture IK as accurately as possible. The aim of this paper is to present development of the IKS research at the MRC from the documentation of general IKS practices; to data collection methods for IKS baseline studies on the traditional use of medicinal plants, livestock movement, traditional food and beverages and validation of medicinal plants used to treat malaria.

2. Beginning of IKS research at the MRC

Indigenous knowledge (IK) research at the MRC began in 2004. The initial idea was to undertake a social science-based baseline study from which other disciplines can conduct specialized investigation. As a first step, pilot studies were conducted in Oshikoto (Uushona 2004), Omusati (MuAshekele 2005), Omaheke (Koujo 2005) and Kavango regions (Shapi 2004). In this effort, while studies in Oshikoto, Omaheke and Kavango regions included the use of medicinal plants in their focus, the pilot investigation in

Omusati concentrated on indigenous technology knowledge systems (ITKS), particularly on tools, metallurgy and weaving of baskets.

The studies were undertaken under the umbrella of the Science and Technology Division of the MRC. The main aim of these studies was to identify indigenous technologies with potential for value addition and commercialization. The method used in the four pilot studies was key informant interviews, with snowball as the sampling technique.

Researchers collected demographical data such as gender, education, years of experience and related such information to the respondents' trade. When the pilot studies were concluded in 2005, key informant interview as a method was reviewed and certain limitations were found. For instance, it was found that interviews, although useful, do not adequately enable a researcher to capture the full picture of IKS in that if a herbalist is describing a ritual associated with an ailment or a treatment, an interviewer will not be able to record certain gestures and their meaning in a manner that would allow other researchers to follow-up. Hence the need to utilize new technologies was considered.

In 2006, IK research was extended to include indigenous environmental knowledge, pasture choice, movement of cattle and factors influencing choice of locality for human settlement. This research undertaken in Caprivi used a combination of methods including interviews, hand-held GPS, video cameras, cameras and satellite images as well as aerial photos. In 2008, a collaborative program between the MRC and the Ministry of Education, Directorate of Research, Science and Technology was put in place. This enabled the MRC to conduct a detailed literature review of IK research in Namibia and another pilot study in Oshikoto region was undertaken and completed in 2009. In 2010 further pilot projects aimed at data collection in improving traditional food in the Karas region were conducted. Since then, several other research projects on IKS including a focus on food and beverages, malaria and movement of cattle have been undertaken with varying methodologies complemented by new technologies.

3. Data collection methods of general IKS practices in four selected Namibian regions

The identification of the respondents was done informally by discussing IKS with local people and asking them to identify people with IK in their localities with reference to the focus of the study: medicine, food, mining, construction and household's equipment. Respondents were interviewed alone in their working environment or at their respective homes. The interview was conducted informally and concentrated on ethnopharmacological knowledge, traditional food, and construction methods, tanning technology, and ethnic arts and craft. Where necessary, informants who could not be found at the houses were interviewed at their duty stations separately.

4. Data collection methods used in Oshikoto and Caprivi regions for traditional use of medicinal plant baseline studies

4.1. Oshikoto region

An ethnobotanical survey was undertaken during September and October 2008 to collect information on the indigenous knowledge (IK) related to medicinal plants uses by traditional healers in Oshikoto region, Namibia. The research team comprised of two teams: Team A covered Oniipa, Onyaanya, Onayena, Olukonda and Omuntele constituencies during September 2008, while Team B covered Okankolo, Engodi, Genius, Omuthiya and Tsumeb constituencies during October 2008. Each research team reported to the councillor

of the constituency first before they could start with data collection. The councillor himself or somebody else recommended by the councillor led the research teams to the respective healers (Shapi *et al*. 2009). Data was collected through the use of questionnaires and personal interviews during field trips in the 10 constituencies of the Oshikoto region. Geographic positioning system (GPS) coordinates for IK holders were recorded for follow-up purposes. Although no specimens were collected, GPS of most of the plants showed by the knowledge holder to researchers were recorded. The focus of the data collection instrument (questionnaire) about medicinal plants knowledge was mainly on common local name of the plant, knowledge about past and present use, mode of preparation, parts of the plants used, the methods of administration, procurement method, place of collection and habitats, threats and conservation status, season of collection and types of treated diseases with these medicinal plants (Cheikhyoussef *et al*. 2011). It is known that the ethnobotanical knowledge and practices within any culture vary by geographical origin, residence, ethnicity, religion, age, and gender (Pfeiffer and Butz 2005). The biographic characteristics of the respondents in this study include: gender, age of respondents when first starting to practice traditional healing; occupational status and sources of income.

Two statistical parameters were conducted to analyse the collected data; these two parameters are: Informant Consensus Factor (FIC) and the fidelity level (FL) (Cheikhyoussef *et al*. 2011). FIC was calculated to estimate user variability of medicinal plants (Heinrich *et al*. 1998, Canales *et al*. 2005), and this parameter's values ranged from 0.00 to 1.00. High FIC values can thus be used to pinpoint particularly interesting species for the search of bioactive compounds (Canales *et al*. 2005). FIC is calculated using the following formula (Heinrich *et al.* 1998; Canales *et al.* 2005):

$$\mathrm{FIC} = \mathrm{Nur} - \mathrm{Nt}/(\mathrm{Nur} - 1)$$

where Nur is the number of individual plant use reports for a particular illness category, and Nt is the total number of species used by all informants for this illness category.

The fidelity level (FL), the percentage of informants claiming the use of a certain plant for the same major purpose, was calculated for the most frequently reported diseases or ailments as following:

$$\mathrm{FL}\ (\%) = \mathrm{Np}/\mathrm{N} \times 100$$

where Np is the number of informants that claim the use of a plant species to treat a particular disease, and N is the number of informants that use the plants as a medicine to treat any given disease (Teklehaymanot 2009). Prior to the calculation of FL, reported ailments were grouped into major disease categories following the approach of Heinrich *et al.*(1998).

4.2. Caprivi region

The study was carried out in the Caprivi region from 28 November to 12 December 2010. The research team was divided into two teams; Teams A and B to cover the six constituencies of Caprivi region. Team A covered Katima Mulilo Rural, Katima Mulilo Urban and Kabe constituencies. Team B covered Sibinda, Linyanti and Kongola contituencies. Before the actual data activities were embarked upon, both research teams visited the regional council to notify them about the presence of the research team. The Regional Council referred the research team to Mr Reagan Kamwengo Kamwengo, the deputy chairman of

the Traditional Healers' Association in the Caprivi region, and further advised the teams to announce their presence and purpose in the region through Lozi NBC Radio (Du Preez *et al.* 2011). For the collection of data, the identification of the traditional healers was done with the assistance of Ms Karin and Mr Reagan, both healers, who assisted Teams A and B respectively in identifying the traditional healers to be interviewed. In addition the deputy chairman of traditional healers' association with the research assistant from the research team made use of NBC Lozi Radio service to broadcast the purpose and importance of the survey in the region to the traditional healers on 29 November 2010 at 6pm. In their announcement the presenters covered areas of traditional healing system in Namibia and its importance for the government policy to regulate this practice at a national level. This activity had a positive impact on the completion of the fieldwork in that region as most of the healers indicated they had heard that the research team was in the area, and hence of its objective.

A structured questionnaire was used for data collection. Interviews were conducted in the local language, Silozi. Only a few were done in English, in the case of a traditional healers who could both understood and spoke English. In some incidences 2–3 interviews could be conducted at a time depending on the number of traditional healers that were present at one location at the same time. GPS coordinates of the villages where interviews were held as well as medicinal plants were recorded. Plant specimens were collected and preserved in a plant press as voucher specimens and were sent to the National Botanical Research Institute (NBRI) for scientific identification. Each of the plant collected received a voucher specimen number and voucher specimen/collection forms were completed and photos were taken by digital cameras, were also documented (Du Preez *et al*. 2011). The specimens and digital images will be used to form the basis of the IKS database which is going to be based at MRC-UNAM.

5. Recording indigenous knowledge on pasture choice and movement of cattle using new technologies

The incorporation of GPS technology in the study of IK is an interesting problem. Since the GPS system was open for civilian use in 1984, new industries based on navigation systems have emerged. It is now possible to give exact locations to any object, person or process on the surface of the earth, enabling researchers and planners to produce databases that can provide real time information to aid decisions (Resources Information Standards Committee 1998). People's memory of events, vegetation changes, time and place can fade, but there are markers in the environment which can be used to relate, triangulate and validate indigenous knowledge with more exacts of forms of data derived from satellites and aerial photographs. At the MRC, through an international joint research project with the Department of Geography, University of Eastern Finland, a team of researchers deployed 14 GPS telemetry collars (Televilt Tellus Basic 5H2D v2.0) to track the movement of cattle and relate such movement to indigenous knowledge held by local bovine cattle farmers (Polojärvi *et al*. 2011).

Interviews held with 14 farmers focused on characteristics of pasture quality indicators, pasture use and change indicators, factors influencing herd concentration, time of the year, indications of animal health and deterioration, trends in animal size, indicators of risks in pastureland, land management strategies, copying strategies and general environmental factors. The team also used Bluetooth GPS and a laptop to map animal tracks. This information was then correlated with data from the GPS collars. The collars recorded the following information as well as other information:

- Time the GPS has used to obtain the fix
- Number of satellite used to obtain the fix
- Temperature at the time a location is fixed
- Distance travelled by cattle per hour
- Date, day, month and year
- Altitude and so on.

Land use and vegetation were documented using a structured inventory form and the exact coordinates were recorded using a hand-held GPS device. A laptop computer with the Intergraph Geomedia Geographical Information System (GIS), connected to a Bluetooth GPS device was used to digitize unmapped roads and animal tracks. This was often useful as navigating on the flood plain after dark was difficult. After screening, the data indicated that the daily movement of bovine cattle in the study area was related to the advancement of the dry season. The herd starts from the cattle enclosure, commonly known as the kraal, where they are kept for the night until around sunrise (5–7am GMT) and moves to the nearest pasture grounds; from there, it returns to the enclosure before dark, which is around sunset (5–6pm GMT).

6. Data collection methods in traditional foods and beverages in Karas region

The main objectives of this study was to document the IK on the Namibian traditional foods and beverages in Karas region between 26–29 July 2010, and to collect samples of these different products to conduct laboratory analysis to determine their nutritional profiles and to investigate the microbiology of traditional foods and beverages from this region (Cheikhyoussef 2011).

Structured questionnaires were administered to local respondents which focused on IK, household processing methods, and opportunities and obstacles for development and commercialization of the traditional foods and beverages. Ninety-one respondents (70 women compared to 21 men) were interviewed. Fifty-three samples were collected divided into 29 foods, 19 beverages, and 5 herb samples collected from five locations: Bethani, Tses, Ketmanshoop, Berseba, Vaalgras in Karas region.

7. Data collection for the validation of the use of medicinal plants to treat malaria

The validation of the effectiveness of medicinal plants is important for the promotion of their use. This objective of this study was to correctly identify with scientific names, medicinal plants used to treat malaria and its symptoms, and then determine their efficacy in killing the malaria parasite. It is important to note that the disease malaria is a clinical diagnosis, therefore in a strict sense, in the traditional setting the symptoms of malaria are treated not the actual disease. This emphasizes the importance of validating the treatments. Primary and secondary sources (Shapi *et al*. 2009) were used to initiate this study. For the primary source, a member of our research team identified knowledge holders from his community Eenana Village, Oshana region in northern Namibia and a farming community in Ohangwena region also in northern Namibia. The secondary source by Shapi *et al*. (2009) identified traditional healers and the ailments they treated in Oshikoto region. Two field trips were undertaken in March and November 2010 as part of this study.

For the primary source, local plants and their medicinal uses to treat malaria or its symptoms were identified using local names by interviewing community members in Oshiwambo, either in small groups or as individuals through a translator who was

a member of our research team. The community members were not traditional healers included men and women between the ages of 23 and 72 years old. The interviews were unstructured but involved prompting to get specific responses including physically identifying the medicinal plants. The coordinates of the plants were recorded using a GPS device, plant specimens (voucher specimens) were collected using a plant press for identification by the Namibia Botanical Research Institute (NBRI). Pictures were also taken with a digital camera and additional plant specimens were collected for laboratory analysis and validation. Five indigenous medicinal plants were collected using this method.

The secondary source Shapi *et al*. (2009) was used to locate, using GPS coordinates, a traditional healer in Engondi constituency, Ms Sylvia, and her assistant. The knowledge holders were interviewed in Oshiwambo, through a translator who was a member of our research team, using semi-structured questions. Questions included the ailments they treated; their knowledge of malaria; the plants they used, how herbal medicines were prepared and if they were willing to show us the plants. Voucher specimens of selected plants were collected for scientific identification at the NBRI; pictures were taken together with GPS coordinates. Plant specimens for laboratory analysis and validation were collected with the assistance of the traditional healer. Seven indigenous medicinal plants were collected using this method; the laboratory analysis is ongoing but preliminary results and progress of research has been communicated to the traditional healer orally and in pictures.

Conclusion

Pilot studies conducted by the University of Namibia so far have confirmed that Namibia is very rich in many IK practices especially in the north of the country; however this knowledge is at risk of being lost because it is not being passed on to the younger members of society. Thus, there is a real urgency to document IKS before it is lost. The documentation should not be considered an event but a process. Documentation has to be carried out over a period of time to allow trust relationships to build between the researchers and the knowledge holder; additionally it will allow researchers to get a real insight into the nuances of IKS which may not be as obvious after a single interview or observation. Throughout this study the documentation process started with informal interviews (Oshikoto, Omaheke, Omusati and Kavango 2004–2005). Semi-structured questionnaires were surveyed in Oshikoto (2008) and Caprivi (2010). In addition to that, GPS coordinates for IK holders and the medicinal plants used in the treatment were recorded. Specimen voucher numbers were assigned to the collected medicinal plants as well digital photos taken for all specimens. All specimens were sent to NBRI for verification and botanical name identification. Publicity of the study through local radio facilitated the willingness of IK holders to cooperate during data collection especially in Caprivi region. Taking pictures and videos was perceived negatively due to secrecy involved in the traditional practices. The uses of GPS technology in tracking the movement of cattle in Caprivi region and data validation of the uses of medicinal plants to treat malaria in central northern regions were of great importance for the improvement of data collection in the IKS documentation process. The MRC in collaboration with the Ministry of Education and other stakeholders is proceeding in this manner with a long-term goal of creating a national database of IKS in all of Namibia's regions.

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