



THE ROLE OF TRADITIONAL ECOLOGICAL KNOWLEDGE IN NATURAL RESOURCES MANAGEMENT: A CASE STUDY OF VILLAGE COMMUNITIES IN EASTERN PART OF BOTSWANA

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Abstract:

Traditional knowledge on local biodiversity has sustained traditional economies for centuries across the world. While it is threatened by modern ecological knowledge, it remains very important in some regions, especially among poor communities in both less developed and industrialized nations. Among such communities, it is valued and treasured at varying extent throughout the year. In other communities, it is valued and utilized in seasonal livelihoods. It is therefore, treasured and passed from one generation to the next. In some cases, it almost competes with modern technological or scientific knowledge on the use and management of biodiversity. This case study is based on a research conducted in the Eastern part of Botswana among 14 villages where knowledge of species of edible and medicinal plants remains relevant. The researchers used observations, individual interviews and focus group discussions to generate data over a period of twenty months. It became apparent that local ecological knowledge is still valued, especially by poor people, who use it to enhance their wellbeing and to protect biodiversity. Some respondents said they value it since they are beneficiaries of those who possess it since they need and utilize the products sold by those who still have a wealth of knowledge of local biodiversity. Other respondents felt it (local knowledge) was as valuable as modern scientific knowledge and suggested that it should be legislated and taught in schools as it is slowly eroded or disappearing. This paper recommends the sustenance of the existing traditional ecological knowledge (TEK) while reconstructing it in preparation for curriculum development. The paper recommends that further research be carried out to document the type or nature of people who are TEK holders, the methods they use to manage and utilize local

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biodiversity products, the extent of success of their practices, up-to-date contacts of these people (communication channels) and suggest a policy to develop enabling social and economic conditions within which TEK practitioners work.

Keywords: traditional ecological knowledge (TEK), biodiversity, natural resources management, Botswana

Introduction

For the purpose of consistency in this paper, the authors will stick to the use of the concept traditional ecological knowledge (TEK) despite the fact that indigenous knowledge (IK) is “*variably termed*” (Shava, 2013: 384). This paper offers a representation of traditional ways of knowing and doing things based on local peoples’ experiences over generations as they continuously interact with the natural environment around them. To a large extent the knowledge of edible and medicinal plants accumulated and informally validated over a period of time has become part of their cultural practices. TEK is being continuously eroded due to its openness to the introduction of modern scientific knowledge. It is, however, still practiced in some isolated communities and households, especially among the poor and less western educated people. As a result of its openness, TEK is not only vulnerable to external scientific forces, but it has also become a dynamic system offering opportunities for recreation in different contexts.

The research was conducted in an area that is inhabited by pre-dominantly people of Pedi ethnic group with related traditional knowledge of biodiversity and plant uses. Although there is remarkable development in terms of modern schooling, agricultural practices and cultural diversity, people still make use of their traditional knowledge where and when necessary. This paper recognizes the value of traditional ecological knowledge and argues for its integration into the education system for the benefit of local communities and to some extent to humanity at large through traditional sustenance of biodiversity.

Statement of the Problem

To avoid losing TEK as a cultural heritage (As stated by Gapor, Daud, Said and Krishnan, 2013, page 58; see end of Literature Review section), the younger generations need to be included in the dissemination programme. The TEK discourse has to be taken to all sectors for interrogation and recreation. The modernist tradition asymmetrically views TEK as knowledge to be “*validated with the logical positivist*

epistemology of scientific institutions" (Payyappallimana, Fadeeva and O'Donoghue, 2013: 19). These authors claim that modernization has devalued TEK by "*universalizing abstract norms of action, valuing along with individualized pattern of socialization*" (ibid.p19). While subscribing to Couze and Featherstone (2006: 459) the notion that 'older knowledge may be readmitted but subject to the critical and skeptical judgment of a rational method, uncluttered by faith and dogmas' the researchers feel that TEK should not be devalued for the sake of modernization. As a result of its contribution to the well-being of the communities cherishing it and for economic growth, TEK has to be given prominence where and when applicable. TEK on indigenous food/fruit trees may be of significance in restoring biodiversity based food production and health in communities. The problem of dwindling TEK among communities is accelerated by the introduction of modern scientific knowledge. The purpose of the investigation for this paper was to establish the importance of TEK in the research site. The following research question assisted in the achievement of the research goal.

Research Questions

The focus of the research for this paper aimed at answering the following specific questions:

1. *What traditional ecological knowledge exists in the study area?*
2. *What are the traditional uses of plants that are found in the study area?*
3. *Is modern scientific knowledge a threat to traditional ecological knowledge systems?*

The answers to these questions offered insights for national policy makers and donor agencies charged with designing programmes to promote and protect TEK systems in Botswana.

Literature Review

The recognition of the value of TEK is historical, dating back from the UN international conventions on indigenous people and their knowledge to the global proliferations of IK literature (Shava 2013). This paper's main thrust is in the practice of TEK in the research sites, and therefore, it will not have space for the evolution of IK systems nationally and internationally or globally. However, mention deserves to be made that due to the introduction of modern scientific knowledge through western education systems, TEK is faced with a formidable force of '*validated knowledge*' offered through formal systems. In addition, there has also been the introduction of foreign religions, Christianity in particular, accompanying formal education. Religion discourages the use

of traditional medicine and this invariably leads to the decline in TEK related to flora and its medicinal uses. A shift in this direction was also influenced by political development when states such as Botswana became independent and joined the UN. Biodiversity conservation discourses around the world, especially in the 1980s, influenced TEK through biodiversity conservation management systems. The UNCED (1992), through Principle 22, confirmed the recognition of TEK and indigenous people.

Local people have accumulated knowledge that could be verified by modern scientific knowledge systems as valuable inventions for development. The potential of traditional herbal plants for economic gain has necessitated the conservation of biodiversity throughout the world. Botswana is in the process of developing a specific policy on its indigenous knowledge system. It has isolated policies on natural resources, such as the National Policy on Natural Resource Conservation and Development of 1991 and the National Policy on Culture of 2001 that are related to international policy frameworks including the Nagoya Protocol, an international agreement to combat bio-piracy and share benefits from national resources research fairly. A specific law on IK would help Botswana to protect, preserve and mainstream TEK into its formal education system and economy.

Traditional knowledge is claimed to be eroding at an alarming rate in some fast developing and developed regions with higher GDP (Payyappallimana, Fadeeva and O'Donoghue, 2013). Interestingly, areas experiencing loss of biodiversity are also experiencing loss of traditional knowledge on biodiversity.

Compounding loss of biodiversity and traditional knowledge is that there is lack of clear policies and approaches promoting governance to protect and value traditional knowledge. However, it should be noted and appreciated that sustainable development and education for sustainable development are making TEK one of the priority areas in the agendas of governments.

Payyappallimana, Fadeeva and O'Donoghue (2013: 8) noted that *"The World Health Organisation (WHO) estimates that traditional medical practices cater for a major percentage (in some regions up to 70-80%) of the world population's health requirements especially in developing countries (WHO 2008)"*. They continue to say *"Upholding and revitalizing such knowledge is seen as an important mechanism for affirming identity and social cohesion and has a vital role in local livelihoods and socioeconomic and cultural systems"*. (ibid). Payyappallimana, Fadeeva and O'Donoghue (2013: 9) posit that *"Traditional uses of plants by indigenous communities were noted and documented for commercial exploitation, most often without references to the communities that were custodians of that knowledge"*. TEK has rich local socio-ecological knowledge that protects biodiversity and does not require external expertise or specialists to teach them (locals) conservation practices. This

conclusion is supported by the Convention on Biological Diversity (CBD) that calls for the need to “... respect, preserve and maintain traditional cultures; encourage customary custodial use of biological resources in line with principles of sustainable use and conservation; and ensure equitable sharing of benefits among holders while accessing biological resources and related knowledge in line with national legislation” (Payyappallimana, Fadeeva and O’Donoghue, 2013: 10).

TEK protection is gaining ground in the contemporary intellectual property rights discourses. Payyappallimana, Fadeeva and O’Donoghue (2013: 19) posit that: “The discourse has been centered on the protection of intellectual property rights, often overlooking and neglecting a need to consider and strengthen the social and cultural processes of continuity and contemporary utility around such knowledge. Whereas the documentation and preservation of traditional knowledge (which are at the verge of extinction with the receding of language diversity) are needs of the hour, the promotion of temporarily relevant traditional knowledge and encouraging continued creativity and dynamism are vital.”

The above view illustrates the dire need for Botswana and other nations that still respect their culture and TEK to move from rhetoric to action in their policy implementation. The effort to protect TEK could add further impetus to a contested idea that promotions of TEK in certain sections of society where modern science and technology benefits are not yet available or accessible creates double standards within a society and further deepens inequity in less developed countries (Payyappallimana, Fadeeva and O’Donoghue, 2013). TEK could be integrated into younger generation educational programmes as a protection strategy: “...traditional knowledge on herbal medicine has diminished and is only guarded by aging healers. Dissemination of knowledge to the younger generation is not common, to the point of being almost non-existent. Thus, there is a danger of losing this important cultural heritage forever if it is not documented.” (Gapor, Daud, Said and Krishnan, 2013: 58).

Materials and Methods

The research methods used were based on the qualitative research paradigm as the data anticipated was largely qualitative in nature. To address the research questions the researcher documented and analyzed oral evidence from the respondents regarding knowledge and use of herbal and medicinal plants in the region. A total of thirty (30) semi-structured individual interviews were conducted with various respondents in order to expand upon the issues raised during focus group discussions. Three hundred (300) respondents were targeted and about eighty percent (80%) return rate was achieved as 239 respondents responded to interviews, focus group discussions and

observation. Questions were drafted based on the issues raised during the desk study and focus group discussions. The research questions were mainly descriptive to enable participants to talk about the social scenes they were familiar with, and structured to enable respondents to demonstrate how they organize their life experiences (Chilisa, 2012). The above types of questions were applied in interviews, observations and focused group discussions conducted during the data generation process. The researchers avoided the use of questionnaires as the majority of the respondents were either semi-literate or illiterate.

Interviews

The researchers used non-standardized or unstructured interviews to allow flexibility and probing informed by what the respondents said. The respondents were adults, mainly women. In Botswana culture, like in most African cultures, women often collect or gather wild edible and medicinal plants. The majority of the women were either semi-literate or illiterate. However, in terms of local knowledge they were knowledgeable. As Chilisa (2012) has noted, those respondents possess valuable wisdom and traditions which constitute the core, if not, essence, of traditional ecological knowledge (TEK). From this perspective, the theory of knowledge and questions about knowledge can be found in the wisdom and beliefs of wise elders of the communities, who have not been schooled in the formal education system (Kaphagawani and Malherbe, 2000). Adult women were interviewed as they are believed to have acquired traditional ecological knowledge from their elders through social interaction as they grew up and hence they were in a better position to make intellectual contribution to indigenous knowledge recreation and scholarship.

Focus group discussions

The discussions were stimulated by semi structured questions that led to some probing of the responses. Focus group discussions were conducted among groups of five (5) to seven (7) members. Focus group members were part of those who were interviewed as individuals. The small numbers of people in a group allowed the respondents to give more realistic perceptions of issues on TEK (Chilisa, 2012). This is how Chilisa (2012: 212) describes this approach:

Members within the group can, for example, challenge participants with extreme views, and thus, more realistic information is obtained on issues. Information is also checked for accuracy as members question, complement, and corroborate what others say. In addition, the researcher can cover a wide range of issues. However, it became clear during focus group discussions that some respondents were more assertive than

others. To avoid the more assertive respondents dominating the discussions, individual group members were given the opportunity to contribute to the discussions uninterrupted. This approach provided the individual with the opportunity to be heard.

Observations

The researchers had the opportunity to observe the respondents on several occasions collecting wild herbs for processing. The respondents identified the herbal plant, carefully harvested parts of it and explained to the researchers how they identified it and why they harvested it in the manner they did. In this manner the researchers were able to experience the respondents' thoughts and actions in an unstructured manner. The researchers recorded field notes while visiting each group and individuals in the villages and outside the villages where they identified and obtained some of the plants used as either food or herbs (or medicine). The field notes recorded were rough narratives and descriptions, detailing "*when, where, and under what conditions the observation was made*" (Wiersma and Jurs, 2005: 54). These notes were synthesized and summarized for analysis. Observations were also complemented by interviews to understand the processes as demonstrated by the respondents. Since our research was not purely ethnographic, the researchers observations were done only when and where the respondents were either found collecting the wild products from the field or when they were found processing them at either their homes or small factory belonging to the community trust. Although this approach was unstructured, it enabled the researchers to observe what was taking place before deciding on its significance for the research. The researchers were able to understand the context of TEK in natural resources management, and to be inductive and see things that might not otherwise be unconsciously missed (Cohen, Manion, and Morrison, 2007).

Data collected through the above mentioned techniques was analyzed for the purpose and process of reporting. The techniques used assisted in triangulating the information obtained. Triangulation confirmed validation and corroboration of information obtained from this research. This approach assisted the researchers to draw sound conclusions from the findings. The challenge with observations was that the researchers never knew when people would be out looking for wild products or plants for use as it was only done where and when necessary. The same applied to processing the products that was done whenever there was demand for items or products. This forced the researchers to be frequenting research sites and maintaining contacts with key informants as well as the community trust leaders to know when activities were likely to be carried out.

Document analysis

To a limited extent, data was generated through some general review of literature on TEK and related documentation. The documents reviewed included policy documents, previous research on TEK in Africa and internationally as well as reproduced material and information documents on IK systems. This assisted the researchers to reconstruct and document TEK in the research sites. Finally, document analysis helped the researchers to place their research in context as they learnt from earlier endeavors (Cohen, Manion, Morrison, 2005).

Data Analysis (Presentation) and Discussion of Findings

The findings discussed in this article are drawn from the data obtained through interviews, focus group discussions, observation and document analysis. The research was conducted in 14 villages in the central-eastern part of Botswana. The respondents identified the following food and herbal plants: *morula (sclerocarya birrea)*, *mosata (orthanthera Jasminiflora)*, *galalatshwene (myrotha mnus)*, *motlopi (boscia albitrunca)*, *mmopudu (mimusops zyheri)*, *mogorogorwana (strychyons scocculoides)*, *mmilo(vangueria infausta)*, and *megwana (griwa species)*, *mosukujane (lippia scaberrima)*, and *monepenepe (cassia abbreviata)*, respectively. The most popular food and herbal plants among these are found on Table 1. Table 1 also shows the distribution of these plants in different villages in the area under study.

Table 1: The most popular plant resources and their distribution among villages
in the study area

Villages/ natural resources	Morula (sclerocaryabirrea)	Mosata (orthanthera Jasminiflora)	Galalatshwene (myrothamnus)	Monepenepe (cassia abbreviata)	Motlopi (Boscia albitrunca)	Mmopudu (mimusops zyheri)
Tumasera	x		X		x	
Sefhare	x		X			
Goo Tau	x	x	X			
Malaka	x	x	X	x		
Chadibe	x	x	X			
Lecheng	x	x	X	x	x	
Lerala	x	x	X	x		
Ramokgonami	X					
Matlolwane	X		X			
Maunatlala	x	x				
Mokokwana	x	x	X	x		x
Lesenepole	x	x	X			
Mosweu	x	x	X	x		x
Seolwane	x	x	X	x		x

Table 1 shows that the most abundant food and herbal plant resources in the area are the ones that have the most value. They are used domestically and for commercial purposes. The respondents demonstrated common botanic knowledge by identifying the plants and determining their local uses. The majority of the respondents (62%) said that these resources are used for both consumption and for sale after processing. Some are used for medicinal purposes while others are edible and some are used for both. Those that are edible include *morula (sclerocaryabirrea)*, *mosata (orthanthera Jasminiflora)*, *motlopi (boschia albitrunca)*, and *mmopudu (mimusops zyheri)*. People eat fruit from these plants. *Mosata (orthanthera Jasminiflora)* fruits are eaten after boiling while the rest of its fruit is eaten raw. That is, the fruit is either eaten fresh or dried or both. All these resources are used locally. However, some plants have been commercialized, for example, *morula (sclerocaryabirrea)* fruit drink, *mosata (orthanthera Jasminiflora)* and dried *mmopudu (mimusops zyheri)* fruits. However, some of these plants are also used as medicine for either people or domestic animals. They use their barks, leaves or roots to treat certain ailments such as stomach ache or fever for humans or infertility in domestic animals.

The plants that are used for medicinal purposes included *Galalatshwene (myrothamnus)* and *monepenepe (cassia abbreviata)*. These plants are used, among others, for treating high blood pressure and stomach disorders in humans, respectively. *Monepenepe (cassia abbreviata)* is used in domestic animals for treating anthrax. Sixty percent (60%) of the respondents said these herbal plants are sold while only three (3) said the resources lose value when sold or commercialized. Traditionally, they are supposed to be administered for free. The results show that the uses of the most popular plant resources or products have been diversified to meet both subsistence and commercial needs. Most of the products are sold locally. For instance, *morula (sclerocaryabirrea)* fruit drink and kernels as well as *mmopudu* are sold locally. Some products such as *morula* kernel and jam, *mosata (orthanthera Jasminiflora)* dried fruits, *monepenepe (cassia abbreviata)* dried bark and powdered roots and *galalatshwene* are sold both locally and in towns and cities in Botswana. Some plants such as *motlopi (boschia albitrunca)*, *mogorogorwana (strychnonsscocculoides)*, *mmilo (vangueria infausta)*, *mosukujane (lippia scaberrima)*, and *moretologa* (sour plum) are not sold even locally but they are just gathered and eaten free when they are ripe. The researchers were also interested in the traditional processing knowledge of the respondents.

When describing how these food and herbal plants are processed for use, the respondents indicated that they know different ways of processing depending on the use of herbal plant. For instance, when asked about their knowledge on how to process *morula (sclerocaryabirrea)*, one of the respondents said: I have learnt much on how to

make *morula* traditional drink, I remove the nuts and juice into bowl, add water and steer repeatedly until satisfied that the nuts are completely washed. Then take out the nuts, squeeze them together to get juice from them. Then pour the juice into a clay pot overnight. The following day it would have started to fermented [ferment] and sweet to be taken as traditional *morula* juice. However, if it is completely fermented to alcoholic level, then it cannot be taken by children but by elderly people as an alcoholic beverage. Another respondent explained that: “*not any morula fruit is used for making a drink. Some morula fruits are smelly and sour or bitter and those are not used*”.

The respondents agreed that *morula* juice can be taken by children while it is still sweet. They explained that to make a *morula* alcoholic drink you ferment it, and keep on tasting it until it becomes ready. Traditionally, *morula* drink was just a beverage taken after meals when people were relaxed and it was not sold. They, however, regretted that because of the current economic pressures it is now sold locally. The only thing that they appreciated was that “*it is still brewed traditionally without adding any chemicals to speed up the fermentation process*”. That means: “*It is still real and tastes good*”.

The respondents identified a vegetable plant called *mosata*(*orthanthera Jasmini Flora*). *Mosata* is identified by its leaves which are green when fresh, opposite, simple, linear-elliptic to narrowly ovate, stiff and leathery, rough to the touch (Hyde, Wursten, Ballings, and Palgrave, 2015). The fruits exist or appear in paired follicles and distinctly beaked and are used as a vegetable, or relish in some parts of Botswana. The respondents explained that the fruits are picked, cooked while still fresh, dried and packaged and kept in a dry place for use during the dry season, in particular. The respondents had acquired this knowledge from their elders. They also explained that traditionally, *mosata* fruits are not collected when dry, claiming the fruits do cook well when they are fresh as when they are already dry they do not taste good. The fruits are allowed to split and drop seeds for the next season. By avoiding over-harvesting of dry *mosata* fruit, they also promote conservation of this vegetable plant. Most of the respondents said that “*mosata is cooked and dried to make meat, especially biltong-like meat (i.e. dried meat)*”.

Galalatshwene is a small shrub that grows up to over a meter in height. It is popularly found in rocky terrain. The stem is normally rigid with many branches and smelly, that is aromatic. It has green leaves that shrink and appear to be dead during the dry periods. The flowers are found at the end of the branches between the leaves. The respondents reported that *Galalatshwene* (also known as resurrection plant) “*often appear dead but when it rains it resurrects almost immediately*” that is within hours. Every part of it is used for medicinal purposes. To process it for use, it is often pounded and sieved to make powder then packaged. Most of the natural products need to be

pounded into powder and then packaged. A summary of the six selected food and herbal plants from the research has been provided in Table 2 below.

Table 2: Summary of popular food and herbal plants and their uses

Item	Plant name	Identifiable features	Useful parts	Traditional Uses ⁱⁱ
1	Morula (<i>sclerocarya birrea</i> or <i>marula</i>)	<ul style="list-style-type: none"> • Tall tree, • many branches, • grey, rough flaking bark, • compound, ovate leaves, • fleshy spherical fruits (green, then yellow when ripe) 	Nuts and kernel Peel and juice	Human and animal consumption <ul style="list-style-type: none"> • eaten raw • adding value to food, • peel fed to domestic animals • as juice especial for the young • as an alcoholic drink • bark and leaves used as medicine for domestic animals
2	Mosata (<i>orthanthera Jasmini</i> <i>Flora</i>)	Leaves and bark	Dried fruits (bilton-like)	Human consumption as relish Medicinal value
3	Monepenepe (<i>long tail cassia</i> or <i>cassia abbreviata</i>)	It is a medium sized tree, <ul style="list-style-type: none"> • Dull green leaves, • Long fruits, cylindrical pods, and • with brown to grey rough bark 	Bark, leaves and roots	Medicinal <ul style="list-style-type: none"> • bark and roots are boiled to be taken for high blood pressure, stomach ache, headache and fever

ⁱⁱ Although the research respondents claimed the effectiveness of these plants, the researchers have taken note of the fact that unsupervised use may be harmful. We therefore, confine the information provided by informants as proof of the existence of traditional ecological knowledge and plants value to the local people.

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4	<i>Galalatshwene</i> (<i>myrothamnus flabellifolius</i>)	<ul style="list-style-type: none"> • Shrub features, • conical leaves, • soft hairy stems during rainy season. 	Every part	<p>Medicinal</p> <ul style="list-style-type: none"> • powdered, boiled and taken as medicine to reduce tiredness, high blood pressure, headache, stress, stroke • It is also used for colds, respiratory ailments, nosebleeds and fainting. <p>As tea or spice</p> <ul style="list-style-type: none"> • can be boiled and drunk like tea or added to food as spice
5	Motlopi (<i>boscia albitrunca</i> or shepherd's tree)	<p>Medium sized tree</p> <ul style="list-style-type: none"> • ever green hard but smooth leaves, • Grey bark, • Round fruits 	<ul style="list-style-type: none"> • Fruits • Leaves and • Roots 	<p>Human and animal consumption, medicinal</p> <ul style="list-style-type: none"> • Fruits are edible • Fruits processed to produce tasty juice • Leaves and roots used for medicinal purposes for both domestic animals and people • Roots can be

				dried, crushed and roasted to make a substitute for coffee or powdered to make "porridge" during drought years
6	Mmopudu (<i>mimusops zyheri</i>)	Tree found in hills, <ul style="list-style-type: none"> • green fruits when young, but turning yellow, then brown when ripe 	Fruits	Human and animal consumption <ul style="list-style-type: none"> • Can be eaten fresh • Can be dried and stored in a dry place for future consumption • It is eaten by both wild and domestic animals.

The source of traditional knowledge on biodiversity

The respondents claimed to have learnt about different plant species in an informal forum. They were taught by different people including their peers while tending livestock or wondering in the bush collecting and gathering wild products or firewood. Most of the respondents claimed that they were taught the names and uses of different plant species by their parents. They learnt through socialization as the use of plants for different purposes is part of their culture. One respondent admitted that *"no one, was born with the knowledge about all the plants, we learnt about plants' uses from childhood"*.

According to the respondents, traditional ecological knowledge included some conservation practices that were practiced to avoid depletion of the resources. For instance, it was taboo to cut down a fruit producing *morula* tree. This knowledge was passed from generation to generation. Social learning practices ensured traditional ecological knowledge passed from generation to generation. Some of the respondents

indicated that they did not remember who exactly taught them the names and uses of plants as well as how to identify them.

Conclusion

The findings of this study indicate that traditional ecological knowledge is still existing and important in eastern part of Botswana. However, it is not widely practiced as it was in the past before the advent of colonialism and its consequent education systems and religions. Traditional herbal plants are an important source of herbs or medicines among communities in rural Botswana. There are, however, some individuals who are known for certain health specialties and are often consulted when the need arises. Some of these healers provide services at nominal fees as a token of appreciation for the services. As Gapor, Daud, Said and Krishnan (2013: 60) have noted: *“Most of the healers carry the legacy from their family, while several learn from other healers. The roles come with responsibilities and accountabilities and traditional healers are also subjected to scrutiny by villagers. Traditional healers are often looked up to by the villagers as contributing to the wellness of the people in the village, thus they need to maintain their good reputation and image by observing a good service. They have not been fully integrated into the mainstream health system. In order to promote their integration, a better understanding of their practices is needed, and thus more studies need to done.”*

Based on the research outcome, the researchers are tempted to conclude that TEK, especially on biodiversity, calls for its protection based on its traditions, quality, safety, efficacy and its rational uses. To avoid further erosion of traditional knowledge, it is important to enhance the capacities and capabilities of the local knowledge holders through training. Training should include discussions on the role of TEK, traditional healing and edible plants in the modern healthcare system and nutrition and sustainable development, respectively. The capacity building programme should be targeted at reviving traditional knowledge. The programme could be multidisciplinary, that is, it should include biomedical practitioners, policy makers, researchers, education practitioners, planners, local community leaders and other relevant personnel.

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