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Harnessing indigenous knowledge for sustainable forest management in Ghana

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ABSTRACT

This paper makes a case for harnessing indigenous knowledge (IK) for sustainable national development in Ghana. IK according to the World Bank is the basic component of any country's knowledge system and it is upon this knowledge that scientific research builds. In Ghana the Government has recognized the need to harness IK for sustainable national development and has therefore incorporated it into the National Science, Technology and Innovation Development Programme. But there is no evidence however that scientific research in Ghana actually takes IK into consideration during the research process. This paper discusses the concept of indigenous knowledge, its relevance in scientific discourse and the need for harnessing it for national development in Ghana. A desk study was conducted using journal publications, research and technical reports, online databases and the internet. About sixty articles were analysed using the thematic synthesis method under the following broad headings: Importance of Indigenous knowledge, Indigenous forest foods, Indigenous medicines, IK and food security, the management and processing of IK and the protection of Indigenous Knowledge.

The results of the study established the need to document the local knowledge using appropriate procedures and strategies. It also concludes by suggesting that IK in Ghana must be protected by law and integrated into formal science.

Keywords: Indigenous Knowledge, sustainable forest management, forestry, information management, knowledge systems, Ghana.

1 Introduction

Forest resources play a key role in protecting the environment and are of tremendous importance to the sustainable development of every society (Boon et al, 2009). They provide mankind with social and environmental benefits such as biodiversity conservation, carbon sequestration and protection against desertification. They also provide physical products like wood for construction, fuel wood, food and medicines. Forests are also an ideal habitat for a wide range of flora and fauna some of which are endangered species (Tanyanyiwa and Chikwanha, 2011). In addition, forests provide non-market benefits such as recreation, landscape amenity and pollution absorption (Willis et al, 2003).

A significant percentage of the world's population depends on the forests for their livelihoods. Indeed the World Bank (2004) has estimated that about 1.6 billion people around the globe depend on the forests to some degree for their livelihoods. It is believed that forests can play a far bigger role in halving extreme poverty, which is a target of the UN's Millennium Development Goals.

Forests also contribute significant amounts of income to individual economies. In Ghana for example, Kpelle (2012) explains that agriculture including forestry accounted for 21.3% of Gross Domestic Product (GDP) while the forests alone in the same year accounted for 2% of GDP and 11% of export earnings. He

indicates that this is a significant reduction in GDP from a contribution of 8% about a decade ago.

From the above analyses it can be seen that the contribution of the forests to GDP in Ghana has been declining but in spite of this reduction forests still contribute a significant percentage of income to Ghana's GDP. However the current decline in revenue may be attributable to forest degradation and the dwindling of the resource base and this gives cause for concern. For instance, Boon et al (2009) report that the once rich evergreen and lush forests of Ghana have dwindled significantly due to a number of factors, key among them being the increasing rate of deforestation, illegal logging, population pressure and unsustainable agricultural practices, just to name a few. This has significantly affected communities who depend on the forest resource for their survival. There is the need therefore to ensure that forest resource base does not disappear. The current situation calls for the application of measures and strategies to manage Ghana's forests sustainably and ensure that the resource base can be increased. Successful and sustainable forest management thrives on the availability of information in various forms. For example the use of well-known documented information can be applied in various ways. The use of such information is often validated by various academic experts and bodies through formal scientific process and the results documented. Other types of information such as indigenous knowledge (IK) are a valuable source of knowledge which may have been available in a community for many generations. This knowledge though valuable is often not documented in scientific literature.

IK is a powerful resource of rural people and therefore a key element in the fight against poverty and social exclusion for many rural communities worldwide (Boven and Morohashi, 2002). Recent trends also show that attention is shifting towards the use of scientific knowledge complemented with indigenous knowledge (IK) for economic development. There are a growing number of African governments and international development agencies such as the World Bank who recognize that local-level knowledge provides the foundation for participatory approaches to development that are both cost-effective and sustainable. However, policy makers, forest managers and the scientific community have for far too long ignored and in some cases denigrated the knowledge and experiences of traditional people in the management of the forests. These indigenous knowledge systems developed by local people over many years have supported their forest based livelihoods and sustained the environment in which they live for many generations.

This paper makes a case for harnessing indigenous knowledge within Ghana, processing the knowledge acquired using standardized procedures and storing them for preservation and future use.

2 Methodology

2.1 Overview

A desk study was conducted to analyse the available literature on the use of indigenous knowledge in the forestry sector in Ghana using journal publications, research and technical reports, online databases and the internet. In addition refereed journal articles, government and technical reports were analysed. A number of websites dealing with IK and its impact on food were also part of the study. About sixty articles from peer reviewed journals, reports and websites were analysed and synthesised using the thematic synthesis method under the following general themes:

1. Importance of Indigenous knowledge
2. Indigenous forest foods
3. Indigenous medicines
4. IK and food security
5. The management and processing of IK
6. Protecting Indigenous Knowledge

2.2 The importance of indigenous knowledge and its relevance in scientific research

The importance of IK and its relevance to scientific research was analysed. Global communities have been using indigenous knowledge (IK) for hundreds of years to solve specific developmental and environmental problems (Mohamedbhai, 2013; Boven and Morohashi, 2002). This knowledge is passed on from generation to generation, usually by word of mouth and cultural rituals, and has been the basis for agriculture, food preparation, health care, education, conservation and a wide range of other activities that sustain societies in many parts of the world. It also refers to knowledge and skills that have been developed outside the formal educational system. This kind of knowledge is embedded in the community and is unique to a given culture, location or society. It is the local knowledge that forms the basis for local-level decision-making in agriculture, human and animal health, food security, education, natural resource

management, and a host of other activities in rural communities (Boven and Morohashi, 2002).

Berkes (2000) on the other hand reports that traditional knowledge is similar to western science in that it is based on an accumulation of observations and should therefore be regarded as a complement to scientific knowledge.

Table 1.
Differences between Science and Indigenous Knowledge

Factor	Science	Indigenous Knowledge
How approached	Compartmental	Holistic
How communicated	Written	Oral
How taught	Lectures, theories	Observations, experience
How explained	Theory, "value free"	Spiritual, social values

Source: Brascoupé and Mann, (2001)

Differences between IK and formal science are presented in table 1. Inspite of these differences, Ajibade (2003) reports extensively on the need to incorporate indigenous knowledge into formal science. He affirms that academic concern with indigenous knowledge dates as far back as the first intensive fieldwork by anthropologists, but it is only in recent years that the possibility of using such knowledge as a basis for development activities been entertained. Other scholars such as Warren et al, (1989) and Richards, (1979) have tried to establish a basis for utilizing indigenous knowledge in agricultural development. Warren et al (1989) for example wrote extensively on ethno-veterinary medicine, indigenous agricultural knowledge and gender issues, while Richards (1979) and others also emphasized on the relevance of utilizing indigenous knowledge in soil resource inventory for increased agricultural production.

From the foregoing, it is evident that IK is important in several disciplines such as ethno-veterinary medicine, anthropology, agricultural development, forest management, soil management, and food security among many others. In the field of medicine, indigenous knowledge is now increasingly being used not only with the aim of finding new drugs, but also to derive new concepts that may help us to and nuances. Thus the depth of their knowledge is unmatched by technical experts.

3 The Use of Ik in the Forestry Sector in Ghana

The study identified that in natural resource management, IK features prominently in food production, food security, climate change, management and use of medicinal plants, soil fertility and protection. In Ghana IK is applied in similar disciplines. This section discusses indigenous foods derived from the forest, indigenous medicines, soil fertility and its role in providing food security.

3.1 Indigenous forest foods -a solution for sustainable food production and security

World population is expected to reach 9 billion by 2050 (United Nations, 2013). The expected demands by this large population for food, shelter and medicines will have to be met. One area which is of great concern to the world is how to ensure food security for all nations and eliminate extreme poverty and hunger (Hunter and Fanzo, 2013). Hunter and Fanzo (2013) again assert that there is an urgent need for collective action to address food and nutrition security at the global level. Several strategies therefore need to be adopted to meet this growing global need including making maximum use of the forests which can contribute significantly to agricultural productivity, nutrition and sustainability. Forests for instance provide ecological processes that aid agricultural productivity such as the maintenance of watershed services, soil fertility, pollination, seed dispersal, nutrient cycling, and natural pest and disease control (Hajjar *et al*. 2008; Millennium Ecosystem Assessment 2005; Sunderland, 2011). These factors may individually or in combination contribute to improved agricultural production. The forests themselves harbour treasures that have not yet been tapped to the fullest such as nutritious foods, medicines, raw materials for shelter and clothing. For example a wide diversity of foods from the natural environment are available, and such foods which become part of the cultural food use patterns of a group of indigenous people are known as indigenous foods (Kuhnlein and Turner, 1991). These indigenous foods according to Kuhnlein and Turner (1991) can be categorized into plant foods, animal foods, earth elements such as

salts, and water. They go on to indicate that local knowledge on indigenous foods is disappearing both among indigenous societies as well as from collective human knowledge.

FAO (2011) also explains that the most direct way in which forests and trees contribute to food security is through contributions to diets and nutrition. Forest foods add flavour and palatability to otherwise bland and nutritionally poor foods while forest animals are an important source of protein providing nutrient rich supplements for rural households.

In Ghana, the forests provide valuable non timber forest products (NTFP) such as food and food additives in the form of edible nuts, mushrooms, grass-cutters, snails, fruits, herbs, spices and condiments, aromatic plants, game, resins and gums. The foods consumed also improve health through the prevention and treatment of diseases (Ahenkan and Boon, 2011). Indeed statistics indicate that NTFPs contribute substantially to nutrition either as part of the family diet or as a means to achieving household food security. Ntiamoa-Baidu (1998) reported that an estimated 385 million kg of wildlife meat worth over US$350 million was harvested every year in Ghana. In another study conducted in 1987, she emphasised that wildlife was eaten by all classes of people in Ghana and encouraged those in authority to introduce measures that would ensure the sustainability of wildlife as a source of protein for the populace (Ntiamoa-Baidu, 1987). In Ghana, wildlife and its associated products and industries contribute significantly to both national and household food security through the generation of financial resources which can be used directly to purchase food or to develop and improve food production systems. The main contribution of wildlife to the macro-economy of Ghana comes from wildlife-based tourism, which provides employment to a significant number of local people, thereby contributing to household income and access to food (Ntiamoa-Baidu, 1997).

Forests hold tremendous benefits for meeting food needs and ensuring food security in Ghana and this should feature prominently in political and scientific discourse on agricultural production and in the management of the forests. Greater attention should therefore be paid to the direct and indirect benefits of the forest in ensuring food security by sustaining livelihoods which can provide nutrition for the benefit of the people (Sunderland et al, 2013). Clearly the forests have a role to play in enhancing local efforts to end hunger and improve the nutrition of communities living in forested areas as well as those living in areas removed from forests.

3.2 Role of forest soils in achieving food security

Agricultural production cannot be sustained without soils but rapid soil degradation has a negative impact on food production. Trees however have beneficial impacts on soil properties because of their longer residence time, larger biomass accumulation and continuous and more extensive root systems. Trees protect the soil by ensuring that the soils maintain enough moisture to cool crops down and prevent them from withering (Kock, 1990). In the natural forest, nutrients on the soil surface are continuously protected by one or more plant canopies. It is thus necessary for the important role of the forests in soil conservation not to be lost. Studies conducted in Ghana on the use of indigenous knowledge for soil management indicate that farmers continue to use local indigenous knowledge in improving the quality of degraded soils. In fact farmers in northern Ghana have intensified and adapted local indigenous knowledge for soil conservation such as the application of various forms of traditional farm yard and organic manure to sustain crop production (Derbile, 2009; Mikkelsen and Langohr, 2004). It is evident from Derbiles's study that farmers have a vast knowledge on soil classification, types and qualities.

3.3 Indigenous herbal medicine in Ghana

The use of traditional medicine therapies in meeting health needs globally is receiving significant attention on international platforms. WHO (2002) explains Traditional Medicine (TM) therapies to include medication therapies such as the use of herbal medicines, animal parts and/or minerals and non-medication therapies if they are carried out primarily without the use of medication, as in the case of acupuncture, manual therapies and spiritual therapies. TM is an alternative source of medical support for citizens. They further explain it as the sum total of knowledge, skills, and practices based on the theories, beliefs and experiences which are indigenous to different cultures, whether explicable or not, and used in the maintenance of health as well as in the prevention, diagnosis, improvement of treatment of physical and mental illness (WHO, 2002). According to WHO (2002), 80% of Africa's population uses TM to help meet their health care needs. A similar situation persists in Asia and Latin America where populations continue to use TM as a result of historical circumstances and cultural beliefs. In China, TM accounts for around 40% of all health care delivered (WHO, 2002). There are approximately 7,000 medical compounds that have been derived from plants (Lasimbang & Nicholas, 2004) that are currently being used by conventional doctors to treat various ailments (Adventure Life, 2014). A greater majority of these species are also used as herbal medicine. In Ghana, the estimated ratio of the Traditional Medicine Practitioner

(TMP) to the population is 1:400 as against a ratio of the orthodox doctor to the population of 1:12,000 (STEPRI, 2007). The TMP is therefore an important actor, in the health care delivery system in Ghana.

Ghana also has a rich biodiversity which has remained largely untapped. For centuries, local communities in Ghana have relied on herbal medicines to meet their health needs. Despite its significant role in meeting health needs, indigenous herbal practices have not been given the much needed attention due to perceived antagonistic relationship that exists between practitioners of herbal medicine and their counterparts in the conventional system and the drugs regulating authority. This notwithstanding, the use of herbal medicine continues to remain an integral part of the indigenous health care system in Ghana. It is worthy to note that most conventional health medicines are directly or indirectly derived from plants or herbs located in our forests. The Centre for Indigenous Knowledge, a not for profit organization in Ghana, plans to collect, process and store such knowledge on local medicines for the use of all in collaboration with the Centre for Scientific Research into Plant Medicine, a Government research centre located in Ghana.

4 Harnessing and Utilizing Indigenous Knowledge

4.1 Harnessing Indigenous Knowledge

The need for increased recognition of indigenous knowledge requires that managers of information apply effective strategies to enable the effective harnessing of indigenous knowledge for development.

The process of harnessing indigenous knowledge for development has not received much attention among researchers. However some suggestions have been made by Hiwasaki et al who recommend the identification, documentation and validation of the knowledge and integrating this knowledge with science as a sure way of utilising them effectively (Hiwasaki et al, 2014).

In order to ensure that the information collected is reliable and acceptable to all, the process of collection must be community-led and supported by research or development organizations who would help in the validation process (Hiwasaki et al, 2014). They are emphatic that communities that participate in harnessing IK can categorize local and indigenous knowledge and choose which knowledge to integrate with science. Harnessing IK for development is virtually absent in Ghana. There has not been any concerted effort at identifying; collecting or processing IK neither is there any policy document on the strategies to adopt in harnessing this knowledge. However there is currently a great awareness within Government on the potential role of IK and its contribution to livelihood sustenance and rural development.

4.2 Managing and processing IK

In Ghana information managers and librarians have not paid significant attention to the collection, processing and management of Indigenous Knowledge. As a result there are no processes for information managers to follow or to guide those who may want to add IK to their collections. This section therefore gathers ideas from similar initiatives by other information managers and discusses the procedures and processes used that information managers in Ghana can follow.

In a guide developed for processing indigenous knowledge, Brascoupé et al (2001) lists key procedures that can be followed successfully. According to them there are four procedures that communities involved in the use of IK will have to follow. They will need to:

1. Understand what is meant by IK and its products
2. Identify what organizational structures it needs
3. Understand the scope of the knowledge and gather them together
4. Determine what roles community members can play

These procedures are useful in guiding librarians and managers of IK who in turn are able to focus on exactly what can or cannot be documented. Adam (n.d.) has also written on the need to process IK so that it can be better preserved. In processing IK, the information manager must go through the following phases. These are preparation, data gathering, analysis and validation, science integration, popularization and utilization of local and indigenous knowledge (Hiwasaki, et al 2014). These procedures are basically followed in the processing of conventional information. Nakata and Langton (2005) observe that libraries and information centres may have to move outside their comfort zone and begin to explore the unknown.Library and Information Science professionals must first seek to understand the context in which IK came to be in their collections.

4.3 Use of Information and Communication Technologies to manage IK.

ICT's are valuable tools that are being used by nations to create wealth and jobs. Within organisations ICT's are useful for communication, sharing and delivering essential services to those in need of them.

ICT's include telecommunications technologies such as telephony, cable, satellite and radio, as well as digital technologies such as computers, information networks and software. It is difficult to envisage how these ICT's may contribute to the transfer of IK for development considering the form in which IK's are developed, collected and managed. However experiences in other countries indicate that ICT's can contribute significantly to achieving developmental goals.

Adam discusses information and communication technologies and explains the major roles they can play in making IK systems available. The procedures used in processing scientific information in libraries are well documented. However, for IK there are no such rules or procedures, but judging from the fact that IK is an information resource there is no reason why the same procedures used for processing scientific information cannot be used in managing it. It is however worth noting that not all IK can be captured using ICT's. This is because its oral nature makes it difficult to record, transfer, and disseminate. Moreover, indigenous people are reluctant to share their knowledge; thereby making it difficult to capture complete information.

Adam (n. d.) in his writings has pointed out that ICT's can be used for various activities such as:

- Capture, store and disseminate indigenous knowledge so that it can be preserved for the future generation
- Promote cost-effective dissemination of indigenous knowledge
- Create easily accessible indigenous knowledge information systems
- Promote integration of indigenous knowledge into formal and non-formal training and education
- Provide a platform for advocating for improved benefits from IK systems

In Ghana, a lot of work needs to be done in the area of identification and collection of IK even before ICTs can be used for processing. Guidelines on how to identify and disseminate IK need to be formulated and promoted. Easily accessible databases using user friendly software and metadata standards need to be developed.

4.4 IK and Intellectual Property Rights

Once databases are developed for promoting IK, there is the need to consider the protection of the knowledge. This is because local communities hold a wealth of local knowledge that has high potential for commercialisation and profit (CIEL, 2007). As a result many trans-national and multi-national companies are taking and using traditional knowledge with little thought for the wellbeing of the local communities who own them. The appropriation of this local knowledge for profit has brought to the fore problems associated with the misappropriation and use of traditional knowledge for commercial purposes. In particular, the intellectual property system for patents and copyright has served to enable the trans-national corporations to appropriate IK and patent them without recourse to the local owners of the knowledge.

It is important therefore for the producers and users of such knowledge to identify who owns the knowledge so that proper compensation can be fashioned out. Intellectual property rights of indigenous knowledge needs to be established and maintained. In Ghana there are no laws governing the use of IK and it is important for any such national policy in support of knowledge for development to be put in place.

5 Conclusion

The study recognised IK as an important resource for economic development in Ghana. The promotion of indigenous foods and medicines should be intensified and revived to ensure that this valuable local knowledge does not get lost. Indigenous foods it was realised could contribute significantly to improving food security in Ghana and also contribute to improved health due to their nutritious components. However, it is evident that this rich body of knowledge is either getting lost among indigenous people or from the collective human knowledge.

The study concludes that IK must be protected by law and integrated into formal science. As an information product it must be validated, processed, stored and preserved. However, further research

needs to be conducted in this area, so that effective measures and procedures can be put in place for its proper integration.

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