Indigenous Knowledge Systems and the Need for Policy and Institutional Reforms

Kwame Ameyaw Domfeh

INTRODUCTION

Indigenous Knowledge System (IKS) refers to intricate knowledge systems acquired over generations by communities as they interact with the environment. It encompasses technological, economic, philosophical, learning and governance systems. It refers to a body of empirical knowledge and beliefs handed down through generations of long-time inhabitants of a specific locale, by cultural transmission, about the relationship of living beings with each other and their environment (Warren, 1991; Johnson, 1992 p. 4). IKS is about reopening crucial files that were closed in the process of modernization and development in which the cultural, socio-economic life of indigenous peoples was maimed or killed.

Indigenous knowledge encompasses spiritual relationships, relationships with the natural environment and the use of natural resources, relationships between people, and is reflected in language, social organization, values, institutions and laws. These knowledge systems are usually embedded in naturalistic epistemologies and belief systems, which differ radically from those of scientific systems (IUCN, 1997). However, indigenous knowledge has value not only for the culture in which it evolves but also for researchers who are interested in improving conditions in rural localities (Warren, 1991). The recognition of IKS is, therefore, crucial for economic and cultural empowerment of indigenous people in particular, and the world in general.

Notwithstanding the increased awareness about the role of indigenous knowledge in the socio-economic development of developing countries, it continues to be labelled variously and misconceived at international discussions and in modern literature (Nwokeabia, 2003); it plays only a marginal role in biodiversity management and its contribution to society in general is neglected. The misconception is further aggravated by the little or no growth in the sector and the lack of understanding of the context in which for instance practitioners apply traditional medicine. Consequently, indigenous knowledge is being lost under the impact of modernization and the ongoing globalisation processes. There is, therefore, the need to protect and further develop the knowledge generated and perpetuated by local communities through deliberate policy and institutional reform programmes.

ASPECTS OF INDIGENOUS KNOWLEDGE

IKS have enabled, and continue to enable diverse indigenous peoples throughout the world to adapt to and survive environmental change and other societal dynamics. Many long-established groups, which have mixed with native populations, have also developed knowledge systems to successfully manage their local resources. This section examines some of the key components of IKS as practised, especially in African societies.

Food and Agricultural Science

Traditional agriculture in Africa is seen as an indigenous agricultural system that has developed over time with cropping patterns based on an agricultural knowledge system, expressed in the local language, viewed to be in dynamic equilibrium with the environment, influenced by innovations emerging from within the system as well as those adopted from other indigenous systems and the national and international agricultural systems (Warren and Cashman, 1988).

Traditional agriculture is an ecologically tolerant and resilient crop production system. It has optimized production security through an evolution which stresses low risk through adaptation to the local environment and probably is among the closest relationships between man and his environment. Crop security, essential to subsistence farmers, is assured through the development of a complex system involving such factors as diversity of crops, well dispersed plantings, heterogeneous genetic resources, minimum tillage, and varying fallow, as well as sharing of food and labour. Such practices are

often rational responses to local conditions and are logical adaptations to risks.

The use of plant derivatives for insect control was common in the tropics before the advent of synthetic pesticides. An environmental advantage of most natural products is their biodegradability. Many of the products used act as repellents or anti-feedants and their advantages include reduced virus transmission and reduces or eliminates the effects of plant injury, not only on yield but cosmetically as well. Unlike ordinary insecticides based on a single active ingredient, plant derived insect repellents and anti-feedants comprise an array of chemicals which act concertedly on both behavioural and physiological processes. Thus, the chances of pests developing resistance to such substances are less likely.

In Ghana, the most common indigenous farming systems are intercropping and bush fallowing. Intercropping involves the planting of different crops in the same field in a farming season (Appiah-Opoku, 1999, p. 220). Farmers often plant between 6-10 crop species sequentially on the same farmland. The mixture of crops is often made up of varieties that have different moisture, soil nutrients, and resilient levels. The practice ensures that the entire farm is not devastated in case of disease outbreak or pest attack. It also facilitates recycling of nutrients through crop and weed-residues and ensures constant vegetative cover.

Under the bush fallowing system, farmers often abandon their farm plots after a 2- or 3-year period of cultivation. This allows for re-growth of natural vegetation and enrichment of the soil through decomposed organic materials before returning to the same plot for another cropping phase.

Constraints to traditional agriculture are not lacking, however. This system shares many of the constraints of other agricultural systems, including the stress of environmental degradation and variability, particularly drought, deteriorating climatic conditions, and increasing health pressures. The unwillingness of people to discuss or share their knowledge, i.e. knowledge is power, represents another constraint. Additional problems include the high labour requirements of the system in order to maximise production.

Engineering and Technology

Indigenous people improve their livelihood through the use of simple technology. Many of these communities work on finding and developing technologies that improve the lives of the poorest and provide openings for small local enterprises. These include bee-keeping, making soap from local materials, planting weeds that lure animal pests away from the fields, and traditional crop varieties that grow best in local conditions.

The work of Gibbons (cited in Appiah-Opoku, 1999, p. 217) in Sudan for instance, suggests that by relying on local informants and drawing on their technical knowledge, it may be possible to undertake a perfectly satisfactory soil survey and mapping in a few days even though a formal scientific approach could take several months. Similarly, pastoralists in Mali who noticed that drinking a lot of tea made people nervous and irritable wondered as to whether the tea or sugar was the causal agent. To find out the cause, they poured sugar and water on a liver from a freshly slaughtered animal and there was no visible reaction. A similar experiment with tea and sugar gave a visible reaction. They concluded, rightly, that tea was the causal agent (Chambers, 1983).

Ghanaian farmers are able to identify precursors of climatic and weather conditions. There is always a strong possibility of prolonged dry season when a vulture is seen incubating at a time when rainfall is widely expected. Farmers can tell the time accurately by observing the range of their shadow under the tropical sun. They also have a good knowledge of the characteristics of soils in the local environment. Indicators commonly used by the farmers to determine soil fertility include the presence of clay; low proportion of sand and moisture; decayed organic matters; and earthworms and certain plant species (*Asaman-ntorowa* or solanum torvum) (Appiah-Opoku, 1999, p. 221).

Traditional Medicine

"Traditional medicine" refers to ways of protecting and restoring health that existed before the arrival of modern medicine. As the name implies, these approaches to health belong to the traditions of each country, and have been handed down from generation to generation. Indigenous Africans like other indigenous peoples elsewhere, rely on plant and animal based medicine to meet their health care requirements.

In a study by Appiah-Opoku (1999, pp.217-

227) in Ghana, he established distinguishing features of indigenous healers who provide health care with plant, animal or mineral substances and use methods that are based on socio-cultural and religious beliefs of the people. The following categories of indigenous healers were identified: herbalists, traditional priests and priestesses, traditional birth attendants, and bone setters. The herbalists, for example, are knowledgeable in the medicinal uses of herbs and other naturally occurring substances, while bone setters use herbs and other naturally occurring substances to heal patients with fractured bones.

Reports of scarcity of species used for medicine are being received with increasing frequency. Few projects have been undertaken to propagate or breed species in demand for traditional medicine and most plant and animal species are taken from the wild. Plants are particularly vital components to African traditional medicine, but a wide range of animals are also used ranging from the large mammals such as African Elephant and Giraffe to the Leopard and Four-toed Hedgehog. A variety of birds, reptiles, amphibians, fish and invertebrates are also utilised.

Over 100 key species of plants, and 29 species of animals, have been found by Shackleton an Campbell (2000) to have become scarce or difficult to obtain in their survey of East and Southern Africa. Some of these species are known to be endangered, such as the African Wild Ass and the Green Turtle. Populations of plant species such as *warburgia salutaris* and *prunus africana*, are experiencing serious decline and are now regarded as rare in many areas.

Natural Resource Management

The UN Conference on Environment and Development (UNCED) in 1992 highlighted an urgent need for developing mechanisms to protect the earth's biological diversity through local knowledge. Many of the documents signed at UNCED reflected the need to conserve the knowledge of the environment that is being lost in communities. Similarly, the World Conference on Science in Budapest in 1999 recommended that scientific and traditional knowledge be integrated in interdisciplinary projects dealing with links between culture, environment and development in areas such as the conservation of biological diversity, management of natural resources, understanding of natural hazards and mitigation of their impact.

Many indigenous communities did not need any "sermonising" from global agencies and external interventions to appreciate the importance of effective and efficient natural resource management. For example, in the village of Zaïpobly in La Côte d'Ivoire, West Africa, there is a community protected land, which covers an area of 454,000 hectares and is the largest remnant of the original humid tropical forest in West Africa. It contains an extraordinary specific wealth of numerous endemic species. Most of the relics in the forest have survived because they are considered to be sacred. A sacred forest is a place that is venerated and reserved for the cultural expression of a community. Access and management are governed by traditional powers (Centre de Recherche en Ecologie (CRE), On-Line: http://www.grain.org/gd/es/case-studies/africa-west.cfm)

For village dwellers, the forest fulfils many functions: it serves as protection, provides them with medicinal plants and food and is a place for the conservation of flora and fauna. It creates a favourable damp microclimate for rural activities in the surrounding fallow lands. It also serves as a place for important socio-cultural meetings and serves as a last living testimonial for future generations of what a true forest is.

In Ghana and West Africa, the ancient tradition of community forest management seems to hold the ancient keys for a meaningful model of forest conservation. However, government attempts at dealing with biodiversity loss have applied a reductionist approach which has implied the establishment of protected areas at the expense of the people. Experience shows that this eventually fails to achieve the proposed goal. And the solution is out there, in old systems which until recently remained extremely effective.

Sacred and community forests that have contributed immensely to biodiversity conservation are also now under serious threat in Ghana. Once found dotted throughout the different vegetation zones of the country, their presence ensured that endemic species restricted to that zone were protected from extinction. Only a few of these reserves remain today, which serve as home to the endangered Mona monkey and other endangered animal and plant species. Some have become major tourist attractions, generating revenue for local communities and the nation.

Sustainable Development

Sustainable development has been variously defined and explained. For example, the International Union for the Conservation of Nature and Natural Resources (IUCN) explains that, "for development to be sustainable it must take account of social and ecological factors, as well as economic ones; of the living and non-living resource-base; and of the long term as well as the short term advantages and disadvantages of alternative actions" (IUCN, 1980, p. 23). The definition most often quoted, however, comes from the World Commission on Environment and Development (WCED), published in 1987, which refers to sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

Indigenous knowledge in respect of sustainable development provides an expanded view of the concept. African philosophies explain that there is a duty on the present generation to look beyond itself to future generations as well as to look back at the past and respect departed ancestors. This is beautifully expressed in the traditional African concept which Bishop Desmond Tutu has referred to in his sermons – that, the human community consists of three elements - those who went before us, those who are with us here and now, and those who are yet to come. All three together constitute the human community and if sight is lost of any one of those component parts of the *trinity,* you then get a lopsided view of the human endeavour. That is a very important concept, which can help protect the environment as well as enhance the principles underlying sustainable development.

Weeramantry (2003) has researched the customs relating to the land of the various islands in the Pacific. He came across evidence given by a Solomon Islander to a Commission in the Solomon Islands. His evidence was to the effect that Pacific Islanders did not treat land like an article of merchandise to be utilised anyhow. Land has to be treated with reverence and respect and its "owners" are obliged to use it in a manner that is respectful to the rights of generations.

I refer to a famous letter described by Weeramantry (2003). Apparently, the President of the United States had sought to buy some land belonging to the Cherokee tribe and the chief of this tribe wrote this letter to the President saying:

How can you suggest that I sell this land? It is like asking me to sell you a part of the sky or a part of the flowing rivers. Every part of the earth is sacred to my people, every shining pine needle, every sandy shore, every mist, every humming insect is holy in the memory of my people … we treat Earth as a mother and brother and the earth and sky are not things to be bought and sold like sheep or bright beads. These are entities that have a living life of their own. The community respects it because that is the source from which the community gathers nourishment.

And, in Ghana, hunting and trapping are regulated by indigenous beliefs and taboos, most of which ensure humane and sustainable hunting practices. For instance, hornbills (birds) feed their mates (females) during incubation and this often occurs in January and February. For this reason, it is a taboo to kill these birds during this period. In addition, hunters do not kill game under the following circumstances:

- When the game is pregnant or nursing young ones;
- When game is spotted drinking from a stream (except after it has drunk from the stream);
- When the game is mating;
- On sacred days when the spirit of the forest is believed to be resting; and
- During the closed-season (June to September) which is the breeding period for most game.

In fact, according to Appiah-Opoku (1999, p. 223), hunters used to conduct funerals for certain animals with the sole intention of making the vindictive souls of these animals passive and innocuous in the affairs of the living. Although the funeral ceremonies for animals were less elaborate compared to those of humans, it discouraged young and inexperienced hunters from killing these animals.

Traditional Ecological Knowledge

The term Traditional Ecological Knowledge (TEK) includes intimate and detailed knowledge of flora, fauna, natural occurrences and the development and use of traditional technologies (Mathooko, 2000). The amount of TEK in Africa, for instance is vast and its development is due mainly to the wide diversity of peoples, cultures, landscape, eco-zones and eco-regions. Knowledge stemming from a long-term association with the ecosystem allows fishermen, for instance, to compete with large, commercial fishing operations

which do not have a full understanding of the fishing areas (McGoodwin, 1990).

Local fishermen often possess 'mental maps' (Paine, 1957) of fishing areas and the seabed and a fishing location is often memorised using a triangulation method. However, sonar technology has now marginalised mental mapping and even though it is expensive, young fishermen prefer it.

In spite of its usefulness, the future of TEK among African communities is uncertain. Such knowledge should be recorded and evaluated by people who possess the appropriate background in biology, ecology, resource management and the social sciences, and also hold appropriate skills for translating cultural information so that it can be understood by other cultures and those who can address the social frame of reference.

There cannot be any sustainable use of any resource if the interests of the local traditional communities are not taken into consideration. Modern science must accommodate TEK and *vice versa*. The two types of knowledge should be integrated; the survival of TEK in Africa and similar communities depends on it.

Conflict Management

Conflict management refers to the variety of ways by which people handle grievances - clashes of right and wrong. It includes such diverse phenomena as gossip, ridicule, lynching, terrorism, warfare, feuding, genocide, law, mediation, and avoidance. Which of these diverse forms of conflict management will be used in any given case is predicted and explained by the social structure- or social geometry- of the case.

Since the 1980s, there has been a search for new conflict management concepts and methods in order to deal with Africa's ubiquitous and apparently intractable conflicts. It can be argued that the main problem militating against conflict management in Africa is that the contemporary conflict management systems of the region's modern states are generally not continuations or adaptations of those of the indigenous communities over which they have gained jurisdiction since the colonial period (Fred-Mensah, 2003). In other words, the main drawback in conflict management in Africa is that there exists a disconnection between the conflict management systems of the modern states and those of their ethnic constituents.

In his study of the Buem-Kator people of the Volta Region of Ghana, Fred-Mensah (2003) explains that the paramount concern of the community is to sustain harmony within the social system. The philosophy of this worldview is encapsulated in the phrase, *kanye ndu bowi*, which translates literally to mean the "ingredients of social harmony". *Kanye ndu bowi* is a broad ideological orientation, which provides moral and legitimate basis for all manner of social control and is translated into practice through the imposition of "intrinsic sanctions". Intrinsic sanctions in the Buem-Kator context are both positive and negative. They are the subtle, though pervasive, means by which the members of the community are moulded to uphold the normative order (Fred-Mensah, 2003). Whereas the *positive* sanctions consist of the psyche rewards that the people receive when they conform to the approved mode of behaviour, the *negative* sanctions are the feeling of moral discomfort that they experience when they default.

Natural Disaster Management

In Africa, local communities had well-developed traditional IKS for environmental management and coping strategies, making them more resilient to environmental change. This knowledge had, and still has, a high degree of acceptability amongst the majority of populations in which it has been preserved. Specifically, from time immemorial, natural disaster management in Africa has been deeply rooted in local communities which apply and use indigenous knowledge to master and monitor climate and other natural systems and establish early warning indicators for their own benefit and future generations. These communities can easily identify with this knowledge and it facilitates their understanding of certain modern scientific concepts for environmental management, including disaster prevention, preparedness, response and mitigation.

For example, the application and use of indigenous knowledge for disaster management is prevalent in Swaziland. Floods can be predicted from the height of birds' nests near rivers. Moth numbers can predict drought. The position of the sun and the cry of a specific bird on trees near rivers may predict onset of the rainy season for farming. The presence of certain plant species indicates a low water table (Kamara, On-Line: www.environmenttimes.net/article.cfm).

MAJOR CHALLENGES

Our discussions so far have revealed that indigenous knowledge is an essential element in the development process and the livelihoods of many local communities. One key question regarding the sustenance of indigenous principles and knowledge, however, is whether the conditions that made them effective in the past are still intact to cope with the dramatic social changes the world has been experiencing over the past decades. This is because the apparent effectiveness of the indigenous principles in the past was possible because they evolved with, and were tailored to, the scale of society and exigencies of the time. As in all areas in Ghana, and, in fact, in Africa, indigenous principles and values have been significantly altered with the advent of the modern state, the production of Western-style education, world religions, increased modernisation of local economies, and the development of modern infrastructural and communication facilities. The changes have posed a challenge to the effective mobilisation and utilisation of the indigenous principles and knowledge.

A major challenge that African countries continue to face is how to reconcile indigenous knowledge and modern science without substituting each other, respecting the two sets of values, and building on their respective strengths.

Other threats to the importance of IK are patents and copyrights, formalised by law, to protect Intellectual Property Rights (IPRs) (Roland, On-Line: http//:www.eolss.net). Patents are held on hundreds of life forms that have been manipulated in the laboratory to be somewhat different from original ideas found in regions inhabited by indigenous groups. Once an item is patented, the former free use of that item is prohibited for 17 to 20 years. This allows the holder of a patent to monopolise the market during that period. It has been noted that patents result in farmers being denied their traditional rights to save seed; forced to pay royalties for every seed and animal derived from patented stock; and, more dependent on herbicides and fertilizers made by the same companies that collected their traditional seeds in the first place, and now sell them as chemically dependent varieties.

Indigenous peoples who assimilate the western worldview find themselves caught between cultures. Contact with modern medicine and health care systems have led some indigenous groups to have declining respect for local healers and herbalists. This has led to increased poverty and declining health care. It has also led to a decreasing familiarity with the natural environment. Modern medicines are costly; and, if people cannot afford them they may go without, or they may attempt to administer traditional medicines incorrectly due to lack of information. Furthermore, assimilation frequently results in changes in lifestyle and diet that result in disease (diabetes, alcoholism, etc.,) and explosions in population as traditional curbs on sexual behaviour are ignored (Roland, ibid). These challenges and others call for urgent and immediate need for policy and institutional reforms in respect of IKS.

POLICY AND INSTITUTIONAL REFORMS

A significant mix of individuals and groups, policy makers, civil society, academia and the scientific research community has been grappling with the complex issue of "indigenous knowledge" and the challenges and responsi-bilities of the state and society in respect of promoting and protecting the rights and status of the holders of such knowledge, in most cases communities. However, the current policy and institutional frameworks appear inadequate to support and nurture the promotion and protection of IKS in the world.

Effective policies and institutions are recognised as essential in sustaining livelihoods. Together, they shape people's livelihood options. Although the importance of policy and institutional issues is widely recognised, approaches to reform are generally poorly understood. Taken together, policies, institutions and processes form the context within which individuals and households construct and adapt livelihood strategies. Realising the importance of IKS, each country should endeavour to introduce an IKS policy that seeks to facilitate a better understanding of the historical and cultural context and worth of indigenous and local communities. An IKS policy should bring together key drivers that are catalysts for the development and economic viability of holders and practitioners of IKS.

Affirmation of Cultural Values

There is a clear need for recognition and

protection of IKS for cultural reasons. Lessons can be learned from the Ghanaian and South African examples. Ghana's National Commission on Culture, which was established in 1990, is a statutory public institution with a mandate to preserve the unique cultural identity and values of the country. It is also mandated to promote an integrated national culture and to contribute to the overall economic development of the nation. Its role is to advise and manage cultural life in Ghana from a holistic perspective. In 2001, in partnership with Konrad Adenauer Foundation of Germany, the Commission initiated a programme for the promotion of peaceful cultural integration, development and good governance in Ghana. Section 185 of South Africa's National Constitution requires the establishment of a Commission for the promotion and protection of the rights of cultural, religious and linguistic communities. The relevant Act mandating the Commission was signed into law in 2002. In addition to the above functions, the Commission also has the power to monitor, investigate, research, educate, lobby, advise and report on issues concerning the rights of cultural and religious communities.

Globalisation and Indigenous Knowledge Systems

The process of globalisation involves the widening and deepening of the international flow of trade, finance and information within a single integrated global market. The cultural implications of globalisation relate to the mixture and very often the imposition of different ideas and values to create a homogenous worldwide culture in the global village. Important modalities in this process are the economic interactions, mass media and other aspects of modern information technology platforms, which, for example, tend to accelerate the establishment of such homogenous cultural practices expressed in eating, singing, dancing, speaking, and so on, which constitute global village homogenisation (Republic of South Africa, 2004). Strenuous efforts should be made to promote IK movements that would influence mainstream multilateral agreements from human rights perspective. Another approach is to translate the assertion that indigenous peoples of the world have the right to self-determination and in exercising that right, they must be recognised as the exclusive owners of their cultural and intellectual property.

PROTECTION AND DEVELOPMENT OF IKS

Knowledge is indispensable for understanding and promoting technical, economic and social change in societies. It is fortunate to observe that interest in the role of indigenous knowledge in sustainable development, for instance, has increased in many countries as well as in Intergovernmental Organizations and NGOs. Nevertheless, indigenous knowledge continues to be largely disregarded in development planning, it plays only a marginal role in biodiversity management and its contribution to society in general is neglected. Furthermore, indigenous knowledge is being lost under the impact of modernization and of ongoing globalisation processes. There is a need to protect and further develop the knowledge generated and perpetuated by local communities through awareness raising, training programmes, international property rights arrangements, and validation procedures.

To prevent IK that is already in the public domain from being patented as a new invention in another country, it is vital to provide written documentation of such practices. This way, indigenous communities can challenge Intellectual Property Rights being patented to others for practices that are traditionally their own. The Traditional Knowledge Digital Library (TKDL) of India was established to prevent the granting of patents to unpatentable inventions on Indian IK, to break the language as well as the format barriers, and to establish modern classification, search and retrieval tools on IK (Republic of South Africa, 2004). In addition, the creation of national, regional and international registries of IK could support benefit-sharing among industry and local communities.

Integration and Co-operation

Many scientists, governments and indigenous peoples agree that given the failure of conventional development models, the pluralistic nature of society and the ecological interdependence between nations, modern and indigenous knowledge systems must be integrated. Despite much discussion on the need to integrate the two systems and a few attempts at co-management (Sneed in Stevens, 1997; De Lacy in Stevens, 1997; IUCN, 1997 p. 132), its role and importance has not been fully assessed.

Seemingly, though integration is not enough,

if western people and western institutions aspire to have a role in the developing world, they need not only treat local knowledge as valid and local knowledge holders as equals. It behoves on them to adopt a local worldview and learn to understand and interpret the world from their perspective. Otherwise there are very real dangers of cultural imperialism or non-sustainability.

The key to success in the development of a framework for protecting IKS lies in transparent and continuous communication among governments at all levels, with local civil society, and in adhering to the principle of cooperation. Exchange of region- and location-specific information at the regional level is a pre-condition for fruitful co-operation. Each region will have to develop an approach either collectively or individually for the sake of protection.

Rights to Knowledge Systems

The individualistic nature of intellectual property regimes creates several complications, when applied to local communities. They fail to take into account the fact that these communities have a holistic approach to their environment and do not separate the resources from which their livelihood stems into distinct economic and social assets. In some cases, there are sub-groups within communities, such as traditional healers and crafts people, who mediate and develop IK among themselves, rather than the broader community. The problem is further complicated in cases where the same or similar IK is used by different communities across the world.

These issues may be reconciled by working within the framework of trade-related aspects of intellectual property rights (TRIPs) using different forms of intellectual property rights. These include geographical indications, the notion of community-based rights and *sui generis* forms of protection to complement the current system of Intellectual Property.

Article 8(j) of the Convention on Biological Diversity provides that knowledge, innovations and practices of local or indigenous communities of individuals cannot be used without their involvement and approval and ensuring in the process equitable sharing of benefits. There should, therefore, be liberalisation of institutional instruments for ownership of Intellectual Property Rights (IPR). Ownership of any IPR must go to the researcher and the community. The community may have to enter into some agreement with a researcher in a form of Memorandum of Understanding (MOU). If there is no sufficient interest or support from the local authorities, the IPR may be made available to foreign companies.

Contribution to the Economy

IKS is relatively static as a result of the lack of effective mechanisms and incentives for sharing knowledge relating to it. For example, in the lower income agricultural sector, innovators tend to be indifferent because of the lack of public incentive and protection and to making their knowledge public. In general, African countries have not put in place the incentive policies that can help achieve a continuous and additive innovation in IKS. As a result, the growth-enhancing effects of IKS remain minimal, supporting the misconception of IKS as being intrinsically static. The creation of incentive mechanisms needs to be the cornerstone of any IKS policy in Africa.

Furthermore, IKS are owned by and provide services to people who are prone to unemployment. Consideration therefore needs to be given to the role that IKS can play in employment creation. In deploying economic potential of IKS, countries need to consider three main factors (Republic of South Africa, 2004):

- The creation of incentive mechanisms to promote IKS innovation;
- The promotion of IKS in the context of sustainable development; and
- The promotion of IKS as an employment generator.

Medicinal Plants and Traditional Healers

The use of medicinal plant species and the accumulated knowledge of traditional medicinal practice are threatened by habitat destruction and by the unsustainable harvesting of plants from the wild. The resulting shortages of plant material have been noted by collectors concerned with having to travel far for raw materials. This is a valuable indicator of the current status of medicinal plant species in the wild and is a critical warning sign that action needs to be taken now to reduce the pressure on these diminishing populations.

As most plant species used in primary health care are collected from the wild, habitat destruction is seriously affecting their availability, collection pressure and the consequent severe

strain being put on plant populations in the vicinity of urban centres. There is consequently an urgent need to encourage local people to cultivate medicinal plants for use in their community.

Traditional medicine is widely used in a rapidly growing health system with economic importance. The use of traditional medicine in developing countries is often attributable to its accessibility and affordability. It is sometimes the only affordable source of health care, especially for the world's poorest patients. In recognising the important de facto role of traditional medicine in many developing countries, there is the need to regulate the activities of traditional healers. South Africa has, for instance, promulgated the Traditional Health Practitioners Act, which seeks to address the issues of national policy and regulatory frameworks; safety, efficacy and quality; access; and rational use of traditional medicine (Republic of South Africa, 2004).

Research, Development and Training

Governments should initiate programmes with the aim of auditing, documenting and supporting research associated with IKS. India has, for instance, a similar programme that has grown substantially and offers an instructive model for other developing countries intending to support the development of IKS. The programme comprises a number of activities supported by the Indian government through various institutions. The Indian example appreciates the need to develop capabilities to determine what knowledge exists within communities, what the value of existing knowledge is and how it can be used to generate wealth.

Indigenous veterinary experts, herbalists and pastoralists know a lot about the habitats, the life cycles, and the many facets of plants and other resources. Yet, efforts to build upon knowledge systems of people who have maintained their natural resources so far are quite inadequate. There is therefore a need to develop a clearly articulated research agenda for IK, based on the articulation of desired research priorities and outputs. There is also a need to develop clear knowledge validation frameworks that inform the education system.

There should be efforts at establishing formal mechanisms for integrating IKS knowledge and innovations into the educational system, by training teachers and students to embed IKS innovations in their school activities. Such a programme should organise workshops to train primary level teachers and also encourage students to search for and document innovations from the community.

Funding IKS

IKS requires dedicated funding as is with all knowledge systems. It is also recognised that IKS outputs and IK policy objectives are strongly facilitated by appropriate funding mechanisms. Since there is a need for a holistic co-ordination and collaboration of all stakeholders and resources in the IK system, appropriate IKS funding streams are vital for the following, among other (Republic of South Africa, 2004):

- Curriculum development
- Public understanding of IKS
- IK practice and accreditation
- Research and development
- IK innovation;
- IK protection
- Small business development based on IK

It is expected that Government and its agencies will be the primary source of funding the above functions, especially in the early phases of promoting and strengthening IK system. However, other sources of funding will also be critical, both from national and international in origins.

Traditional Leaders

Traditional leaders are the formal custodians of the customary values of the communities, which are historically and constitutionally entrusted to them in many developing countries. The existence of traditional leadership in the development process of IK is therefore significant. An agreed mechanism involving traditional leaders on IKS activities will have to be established to ensure that researchers gain access to indigenous and local communities on a sound and sustainable basis. Access to the community in respect of IK should involve discussions with traditional leadership structures. Ghana's "Houses of Chiefs" serve as a classical example in utilising the individual and collective wisdom of traditional leaders in the promotion of good governance (Box 1).

Institutional Framework

The South African IKS policy, which was

Box 1: Ghana's Houses of Chiefs and Good Governance

In Ghana, the 1992 Constitution, like all previous constitutions, guarantees the institution of chieftaincy together with its traditional councils as established by customary law and usage. To preserve their role as symbols of national unity, however, chiefs are forbidden from active participation in party politics. There is a National House of Chiefs and ten Regional Houses of Chiefs, which represent more than 32,000 recognized traditional rulers who exercise considerable influence throughout Ghana, especially in the countryside. As trustees of communal lands and natural resources, chiefs are often the pivot around which local socio-economic development revolves.The national and regional houses of chiefs function openly as independent national lobbies to promote common rather than special interests. They insist on negotiation and mediation in the management of national disputes, and they advocate policy alternatives that stress the long-term needs of society. In the past, they have taken bold initiatives to attain the abrogation of state measures and legislation that violate human rights or that threaten law and order. The houses of chiefs share a commitment to democracy, the rule of law, and the creation of political institutions that reflect Ghanaian cultural traditions.The National House of Chiefs among other things advises any person or authority charged with any responsibility under the Constitution or any other law for any matter relating to or affecting chieftaincy. It further undertakes the progressive study, interpretation and codification of customary law with a view to evolving, in appropriate cases, a unified system of rules of customary law. In addition, it undertakes an evaluation of traditional customs and usages with a view to eliminating those customs and usages that are outmoded and socially harmful, and performs such other functions that Parliament may refer to it.South Africa and Botswana are two other African countries that have *houses of chiefs*. The principle underlying Houses of Chiefs is simple: all democracies have at least one House of Parliament that represents all citizens on questions of national relevance. Some countries, like Canada, the UK and the US, also have a second House of Parliament (a Senate or House of Lords), that deals with situations or interests related to geography, regional equality, or history. The Houses of Chiefs or Houses of Traditional Leaders in these African countries are concerned with how the post-colonial state should respond to the problems of indigenous (pre-colonial) people who have been colonised, but whose political, social, cultural, and economic (including land) values, relationships, and structures have survived to a greater or lesser degree. **Advisory role** The Ghanaian, South African, and Botswana Houses of Chiefs have the authority to advise their governments on all sorts of issues. Depending on the country, these issues can range from land ownership or governance questions to the evaluation of "traditional customs and usages" that the House of Chiefs believes are in need of change. In Ghana, for instance, the Houses of Chiefs have participated in the delicate questions of land ownership and concluded that traditional forms of communal land ownership, under which virtually every Ghanaian has rights to some land, should be maintained despite pressures for foreign and domestic investors to allow private ownership. The chiefs and traditional leaders are also collaborating in the national strategy against HIV-AIDS. **Raising issues** The Houses of Chiefs often invite presidents or other heads of state, cabinet ministers, civil servants, judges, and other officials to address and debate issues. Chiefs often play a key role as community advocates, articulating local needs. In Botswana, the House of Chiefs can summon a cabinet minister to answer questions about her or his government portfolio, and the minister must comply. In these ways, the Houses of Chiefs have the power to raise issues with the government and to push for more accountability than if they did not exist. In Ghana, the Asantehene (Ashanti King) has been able to influence the World Bank to establish a special fund to be utilised by traditional leaders towards the socio-economic development of their areas of jurisdiction. The Houses of Chiefs also act as a conflict resolution mechanism when disputes arise between different ethnic groups over traditional matters. In Ghana, such disputes may be taken first to the Regional House of Chiefs and then, if need be, to the National House of Chiefs. At each stage, careful and thorough, informal and formal discussions and committees work to ensure that nearly all traditional ethnic questions are resolved.

adopted in November 2004, provides an institutional framework that can serve as a useful example for other countries (Republic of South Africa, 2004). Recognising that IKS requires active co-ordination and that regulatory measures are dispersed across government departments and units, the establishment of a National Office on IKS (NOIKS) within the Department of Science has been recommended. The core function of such a body should include the recognition and promotion of IK and knowledge systems. The NOIKS further proposes to establish an Advisory Committee on IKS with the mandate to advise Government on all matters pertaining to the recognition, promo-tion, development, protection and affirmation of IK and knowledge systems.

One area that has grievously suffered from the process of modernisation and globalisation is traditional music. In Ghana for instance, the traditional high life music is gradually being swallowed by Western style rhythm and what is now known as hiplife. The Musicians Union of Ghana and the National Commission on Culture and their counterparts in other parts of Africa should commit themselves to re-exposing the people, particularly the young, to their own folk music. Together, they can make and promote the continent's music as a living art form, not a museum showpiece. This could give inspiration to young, talented musicians. They should respond to the virtual lack of research and information on local Ghanaian highlife music and

the demise of the 'classical' styles of yester-years.

The Centre for Scientific Research into Plant Medicine (CSRPM) situated at Mampong-Akuapem in Ghana is a good example of an institution dedicated to the promotion of traditional medicine. However, the institute needs to collaborate and co-operate with other public and private institutions towards the attainment of its goals. The CSRPM and some affiliate institutes of the Council for Scientific and Industrial Research (CSIR) should be encouraged to work on projects of common interest. For example, the Plant Genetic Resources Centre of the CSIR is currently assisting the Centre for Scientific Research into Plant Medicine with the scientific identification of plants of medicinal importance. It is also offering agronomic assistance in the establishment of *aboreta* for such plants, to ensure their sustainable production for the purpose of serving as raw material for the production of herbal drugs. The Animal Research Institute (of the CSIR) is also cooperating with the CSRPM in the use of herbal products in veterinary medicine. It further cooperates in the use of animal models in toxicity and efficacy test of herbal products from the Centre.

For such co-operative and collaborative arrangements to work effectively, units of these institutions should be established at the regional and district levels since it is only through a devolved system of governance that indigenous knowledge could be identified and harnessed for societal benefit.

The medical value of traditional plants varies. While the medicinal properties of herbs cannot be denied, in some cases herbs may be harmful and may result in severe infections or even death. It is for this reason that the formation of associations of traditional healers should be encouraged. The Traditional Healers' Association of Ghana (THAG), formed in the 1960s, has tried to preserve the integrity of traditional medicinal practice. Its members have also attempted to assure the government, through the Ministry of Health (MOH), that the dispensation of herbal medicine has a role to play in modern medical practice in Ghana. The relationship between THAG and MOH should move beyond mere *assurance*; they must supplement each other's efforts. To contain the HIV/AIDS epidemic and mitigate its impact, the involvement of THAG fosters a better understanding of factors influencing the spread of the infection and facilitates the identification of sustainable ways to address these factors.

CONCLUDING REMARKS

Indigenous Knowledge System exists in Africa and other developing societies but their future is uncertain. Such knowledge should be recorded and evaluated by people who possess appropriate backgrounds in biology, ecology, resource management, the social sciences, and have the appropriate skills for translating cultural information for the comprehanson by other cultures. Indigenous and local communities have a stockpile of knowledge about their flora and fauna - their habits, their habitats, their seasonal behaviour. It is therefore only logical and in consonance with natural justice that they are given a greater say as a matter of right in all matters regarding the study, extraction and commercialisation of indigenous knowledge.

In summary, it is important to note that we need to legitimatise and validate IKS on its own terms, and also recognise that IKS is crucial in the development of rural communities and that the skills and cultures of indigenous people need to be harnessed for the good of all of us. Furthermore, we need to create conditions in which the highest values of IKS assist in shaping Science and Technology policies, and encourage benefit sharing for indigenous innovation. In addition, there is a need for thorough research to provide basic biological and chemical information that will allow for innovation and success in the development of new products from indigenous plants. For the legislative process, attention should be given to the period of monopoly for each category of IKS inventions, while academic and scientific research institutions need to transform their mindset and practices with regard to indigenous knowledge and other forms of knowledge in general.

REFERENCES

Appiah-Opoku, S. 1999. "Indigenous Economic Institutions and Ecological Knowledge: A Ghanaian Case Study." *The Environment*, 19: 217-227.

Chambers, R. 1983. *Rural Development: Putting the Last First*. London: Longman.

Centre de Recherche en Ecologie (CRE). "La gestion durable et communautaire de la forêt sacrée de Zaïpobly". <http://www.grain.org/gd/es/case-studies/africa-west.cfm>

Fred-Mensah, B. K. 2003. "Kanye Ndu Bowi: An

Indigenous Philosophical Context for Conflict Management." *IK Notes*, 56. Washington D.C.: World Bank.

IUCN. 1980. *World Conservation Strategy: Living Resource Conservation for Sustainable Development*. Gland (Switzerland): International Union for the Conservation of Nature and Natural Resources - IUCN.

IUCN. 1997. *Indigenous peoples and sustainability: Cases and Actions*. Amsterdam: IUCN.

Johnson, M. 1992. *Lore: Capturing Traditional Environmental Knowledge*. Ottawa: Dene Cultural Institute/IDRC.

Kamara, J. "Indigenous Knowledge in Natural Disaster Reduction in Africa, in *Environment Times*". < www.environmenttimes.net/article.cfm>

Mathooko, J. M. 2000. "The Status and Future of African Traditional Ecological Knowledge in the Sustainability of Aquatic Resources". *2nd Pan-African Symposium on the Sustainable Use of Natural Resources* in Africa, Ouagadougou, Burkina Faso, July, 2000.

McGoodwin, J.R. 1990. *Crisis in the world's fisheries: People, problems and policies*. Stanford, California: Stanford University Press.

Nwokeabia, H. 2003. "Economics of African Indigenous Knowledge." *IK Notes*, 53, Washington D.C.: World Bank.

Paine, R. 1957. *Coast Lapp society: A study of a Neighbourhood in Revsbotn.* Fjord: Tromsø Museum.

Republic of South Africa. 2004. *Indigenous Knowledge Systems*. Pretoria: Department of Technology and Science.

Roland, M. L. *Indigenous and Neotraditional Knowledge Systems and Their Role in Creating and Maintaining Ecological Sustainability*. Oxford: Eolss Publishers. <http//:www.eolss.net>

Shackleton, S. and B.M. Campbell. 2000. *Re-Empowering Communities to Manage Natural Resources: Where Does the New Power Lie? Case Studies from Southern and Eastern Africa*. Harare: SADC Natural Resource Management Project (CIFOR/WWF).

Stevens, S. (ed.). 1997. *Conservation through Cultural Survival: Indigenous People and Protected Areas*. Washington D.C.: Island Press.

Warren, D. M. 1991. Using Indigenous Knowledge in Agricultural Development. *Discussion Paper 127*. Washington D.C.: World Bank.

Warren, D.M. and K. Cashman. 1988. "Indigenous Knowledge for agriculture and rural development: Some practical applications." *Paper presented at the conference on 'Indigenous Knowledge Systems'*. Washington D.C.: Academy for Educational Development.

Weeramantry, C. G.. 2003. "Sustainable Development: An Ancient Concept Recently Revived." *Speech Delivered at a Meeting of Chief Justices and Justices* in Pretoria, South Africa, April 24, 2003.

World Commission on Environment and Development (WCED). 1987. *Our Common Future*. Oxford and New York: Oxford University Press.

KEYWORDS Indigenous knowledge systems; traditional agriculture; traditional medicine; traditional healers; sustainable development; traditional ecological knowledge; cultural values

ABSTRACT Recent studies have provided valuable insights into how people use their own locally generated knowledge to change and to improve their communities. These studies further reveal that development interventions have failed to induce people to participate because of the absence of instruments and mechanisms that enable them to use their own knowledge. However, there are no simple technical Western solutions that can be easily diffused and adopted by people on the margins. Greater efforts therefore should be made to strengthen the capacity of local people to develop their own knowledge base and to develop methodologies to promote activities at the interface of scientific disciplines and indigenous knowledge. Efforts in this direction would yield the needed results if conscious attempts are made to protect Indigenous Knowledge Systems (IKS) through policy and institutional reforms. This paper examines the importance of IKS and the need to effectively promote and manage policy and institutional reforms in the sector.

Author's Address: **Kwame Ameyaw Domfeh,** Department of Public Administration & Health Services Management, University of Ghana Business School, P. O. Box LG78, Legon, Ghana
Telephone: 00 233-21-500593, *Fax:* 00 233-21-500024, *E-mail:* kadomfeh@ug.edu.gh