ABSTRACT

Indigenous knowledge (IK) has formed the backbone of rural livelihoods for centuries. It preserved biodiversity and ensured long-term sustainability of natural resources. In South Africa and elsewhere, its survival was threatened by the arrival of Europeans and colonialism. The status and role of IK in South Africa with special emphasis on agricultural rural development are discussed. The article shows how colonialism and, more recently, apartheid impacted the IK of South African rural communities. The essential aspects critical to understanding IK for agricultural rural development, particularly in research, are considered. Lastly, the emergence of IK within the research and political domains in South Africa is explored. Although the South African government has made substantial progress towards promoting and protecting IK for the betterment of rural communities, there are still gaps and challenges. Politically these include the need for further legislation on intellectual property and general implementation of existing IK systems policies. In research, although many studies have been carried out on culture and ethnomedicine, other IK categories, notably soil and agriculture, have received insufficient attention. If maximisation of the contribution of IK is to be realised these need to be addressed as they are central to agricultural innovation and agricultural development.

Keywords: Indigenous knowledge systems, colonialism, government legislation, research progress, local culture, traditional agriculture.

INTRODUCTION

Indigenous knowledge (IK) is a much contested term and its definition has caused considerable debate. However, this article is not concerned with this debate but rather takes as a working definition that of Purcell (1998), where IK refers to “the body of historically constituted (emic) knowledge instrumental in the long-term adaptation of human groups to the biophysical environment”. This knowledge encompasses a way of knowing acquired by local people over a period of time through accumulation of experiences as well as their intricate relationship with the environment. It informs the skills and practices of local people, collectively known as indigenous knowledge systems (IKS), and is viewed as the sum total of knowledge and skills unique to a given culture. Indigenous knowledge thus provides the basis for daily problem-solving strategies for local communities.
Continuous detailed observations and the strong relationships local people have with nature have given them a deeper understanding of the environment as it evolves. Thus, when scientific interventions have failed, this knowledge has proven to be an invaluable alternative. It provides sustainable solutions by bringing a locally informed perspective to development strategies through the inclusion of socioeconomic factors as well as cultural diversity (Briggs and Sharp, 2004; Crevello, 2004; Sillitoe and Marzano, 2009). This knowledge is embedded in community practices, institutions, relationships and rituals and is commonly tacit and orally transmitted (Beckford and Barker, 2007). This, as well as the localness of IK, has limited its contribution to development as it is often regarded as inferior compared to “universal” scientific knowledge. This attitude has resulted in IKS being neglected in favour of western knowledge systems (Muwanga-Zake, 2009), which has been considered to be a function of colonialism (Battiste, 2005). This colonial discourse presented IK and scientific knowledge as dichotomous entities with the latter being superior and true. More often than not, this resulted in IKS being marginalised and submerged (Ocholla, 2007). To redress this, scholars (Agrawal, 1995; Pretty, 1995; Ericksen and Woodley, 2005; Aikenhead and Ogawa, 2007) have suggested that it is essential to recognise the existence of types of knowledge systems and their different epistemologies but to not disregard their similarities. This is very important given that IK has been suggested to be complementary to scientific knowledge (Gadgil et al., 1993). Acknowledging their similarities will assist the development of effective integration methodologies.

Given the influence of colonialism on South African communities this article examines the background and advances made regarding IKS in South Africa (SA), with special emphasis on agricultural rural development.

WHY INDIGENOUS KNOWLEDGE SYSTEMS?

The increasing interest in IK across a wide range of disciplines is associated with a number of factors. In development studies it has been attributed to the failure of grand theories of development and the consequent formulation of new strategies to which IK can contribute (Bronkesha et al., 1980; Richards, 1985; Inglis, 1993; Agrawal, 1995; Sillitoe, 1998; McGregor, 2004). Failure of scientific methodologies, especially in rural areas, has often been attributed to the exclusion of peoples’ IK. This has resulted in the development of inappropriate, technically oriented solutions and management practices that have not addressed complex ecological issues and hence have failed to provide long-term sustainability for local farmers (Gadgil et al., 1993; Agrawal, 1995; Woodley, 2002). This inadequate understanding of micro-variations by science-based societies (Blaikie et al., 1997) often resulted in resource exhaustion and environmental degradation (Gadgil et al., 1993). In response, conferences such as the World Commission on Environment and Development (Brundtland, 1987), the Earth Summit (1992), and the Convention on Biological Diversity (1995) concluded that the contribution of IK must be recognised and considered in development processes. This context, as well as the realisation that much of the
worlds’ biodiversity is vested in the hands of indigenous people, has proved IK to be highly significant (Berkes et al., 1995) and has led to the questioning of the supremacy of scientific knowledge.

An important study was conducted by Moos (2010) on the attitudes of the South African public to IKS in comparison to scientific knowledge. A total of 3307 respondents were interviewed through the use of questionnaires aimed at obtaining baseline data on perceptions and attitudes towards various IKS and related issues. Amongst these were western science versus traditional knowledge, the role of IKS in formal curricula, women's roles in IKS, the government's role in IKS, and traditional agricultural and medicinal practices. In terms of views about traditional agriculture he found that 71% of the respondents agreed that traditional agriculture plays an important role in providing livelihoods for South Africans and two-thirds (67%) agreed that traditional agriculture plays an important role in reducing poverty. The results also indicated an overall positive attitude towards IKS (Figure 1). More than half of those interviewed (53%) believed that modern science does more harm than good, two-thirds (67%) felt that IKS offers lessons that can benefit everybody, 71% felt we trust too much in science and not enough in IK and 72% stated that we trust too much in science and not enough in cultural beliefs and practices.

![Figure 1: Perceptions (%) of science versus indigenous knowledge systems (Moos, 2010).](image)

These results show that IKS have an important contribution to make to socioeconomic growth and sustainable development (Moos, 2010). If promoted and encouraged, IKS can be a leading contributor to SA’s (and by extension other countries) progress and development.
On the other hand, postcolonial literature attributes this increased interest in IKS to the assertion and political recognition of IK aimed at correcting the past colonial discourse (Dei, 2002; Mapara, 2009). In this context IK is partly about colonised people being given a voice and responding to the colonial legacy (Greene, 2004; Mapara, 2009). According to Mapara (2009) this gives indigenous people a chance to reclaim their dignity and humanity lost during colonialism. In the same vein, Kalland (2000) suggests that this increasing interest is an “intellectual reaction” against anti-cultural and anti-natural modernism.

These are both valid views. However, the focus of IK research is moving beyond the colonial paradigm. It is more a response to the threat of the otherwise inevitable loss of both environmental and agricultural sustainability. Indigenous knowledge provides many valuable lessons for sustainable natural resource conservation, and thus can contribute towards improving rural livelihoods. Through research this potential contribution of IK can provide relevant and sustainable solutions and is treated as a valid way of knowing. The correction of past colonial actions is thus encompassed in this broader aim of IK research.

**COLONIALISM, APARTHEID AND INDIGENOUS KNOWLEDGE**

Although South Africa has had democracy for about two decades, there is still a lot to be done to redress the impact that colonialism, and later apartheid, had on the IK of rural communities. Similar to a number of other African countries, colonisation left an almost permanent scar on IKS in South Africa which was exacerbated by apartheid that was a product of both a colonialist and a racist paradigm (Noyoo, 2007).

When Europeans colonised South Africa they took away the focus of the identity and IK of the people, i.e. land. Land defines the well-being, identity and the very existence of indigenous people (Anderson, 1996; Molintas, 2004). Indigenous people view the environment “Creation” as sacred and having a symbolic meaning and hence is considered as a source of IK (McGregor, 2004). As a result, land is perceived as a resource which behaves as a living being (Barrera-Bassols and Zinck, 2003; Payton et al., 2003). This close relationship that indigenous people have with their land develops as they become settled in one place (Payton et al., 2003). Unfortunately these ties were broken when colonists came. The colonists considered that indigenous people were barbarians that could not conserve resources due to lack of laws and ethics (Makwaeba, 2004). Consequently, land misappropriation and displacement of indigenous people became part of the new land policies. This displacement consequently led to a substantial loss of culture (Mkabela, 2005; Sandor et al., 2006). Since IK is linked to cultural survival (Sandor et al., 2006), indigenous peoples’ way of life and their environment was destroyed (Noyoo, 2007). This imposed a major threat to the survival of IK.

Moreover, colonialism harmed the ancestral languages of indigenous people. This was mainly caused by imposition of the dominant language policy in
schools, the media, government affairs, and most other public contexts (Maffi, 1998). The way formal education was introduced was biased against IKS as the education system did not acknowledge the existence of diverse knowledge epistemologies. It reflected European culture which inevitably submerged IKS of local people in rural communities. Formal education then undermined Africans as it endorsed European ideology that assumed superiority of knowledge. This led to a re-definition and socialization of Bantu people in South Africa out of their IKS to suit a “global view” of who they are (Muwanga-Zake, 2009). Ultimately, indigenous people ended up disregarding their knowledge in favour of western knowledge systems, which has had an adverse influence on the sustainability of IKS.

INDIGENOUS KNOWLEDGE AND AGRICULTURAL RURAL DEVELOPMENT

Similar to most rural communities worldwide, rural livelihoods in South Africa are largely dependent on agriculture. With the exponential increase in the world’s population and consequent food security concerns, agricultural technologies remain integral to increasing food production. Agriculture is therefore a fundamental economic factor upon which the future of the population depends.

Africa has made significant progress in addressing agriculture and rural development. The establishment of organisations such as the New Partnership for Africa’s Development (NEPAD) in 2001 and the Comprehensive Africa Agriculture Development Programme (CAADP) in 2003 to address agricultural issues show the commitment of the whole continent towards agricultural development. Two of the priorities of the CAADP are to (i) increase food supply and reduce hunger across the region by increasing smallholder productivity and to improve responses to food emergencies; and (ii) improve agricultural research and systems to disseminate appropriate new technologies and increase the support given to farmers to adopt them.

Despite such excellent aims, agricultural development in rural areas is still largely constrained by issues of appropriate technologies (Asenso-Okyere and Davis, 2009). This suggests that there is a need for agricultural innovations for which knowledge is fundamental. Here knowledge refers to both tacit (indigenous) and codified (scientific) knowledge. It is unfortunate that most national agricultural systems have mainly considered a top-down approach where knowledge originates from a source (scientific researcher) and flows to the end-user, the farmer (Asenso-Okyere and Davis, 2009). This has often resulted in agricultural studies focusing only on biophysical aspects and not the social and cultural aspects. Indigenous knowledge considers these aspects and forms the basis for decision-making processes in all rural communities. It is therefore vital to understand IKS for rural agricultural development.

Traditional agriculture is based on farmers’ cooperation with nature, thus using this knowledge local people have developed ecologically complex and sustainable farming systems. Such systems are characterised by high diversity
and resilience which ensure that they are able to maximise yield without sacrific-
sacrificing long-term productivity (Table 1).

Table 1: Characteristics of natural ecosystems, sustainable farming systems and 
unsustainable farming systems (Handayani and Prawito, 2010).

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Natural ecosystems</th>
<th>Sustainable farming systems</th>
<th>Unsustainable farming systems</th>
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<tbody>
<tr>
<td>Production</td>
<td>Low</td>
<td>Low/medium</td>
<td>High</td>
</tr>
<tr>
<td>Species diversity</td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Resilience</td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Flexibility</td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Output stability</td>
<td>Medium</td>
<td>Low/medium</td>
<td>High</td>
</tr>
<tr>
<td>Human displacement of ecological process</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Reliance on external input</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Internal nutrient cycling</td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Sustainability</td>
<td>High</td>
<td>High</td>
<td>Low</td>
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</tbody>
</table>

Characteristics of traditional farming systems reflect the culture and economics 
of local communities in maintaining sustainability (Handayani and Prawito, 2010) 
i.e. more efficient use of resources and balance with the environment. It is 
therefore not surprising that the creative synthesis of indigenous agricultural 
knowledge and science is increasingly considered as a cornerstone for 
sustainable development (Kitch et al., 1997).

Understanding the nature of IK becomes vital, given the diversity of indigenous 
communities. For example, South Africa has a population of about 50 million with 
rich and diverse cultures, histories and belief systems. For example, the African 
group (76.9% of the total population mostly inhabiting rural areas) is highly 
diverse with ethnic groups such as the Nguni (Zulu, Xhosa, Ndebele and Swazi 
people); the Sotho-Tswana; the Tsonga and the Venda. All these different ethnic 
groups are defined by distinctly different cultures and languages. For example, of 
the eleven South African official languages, nine (i.e. Ndebele, Xhosa, Venda, 
Tswana, Sotho sa Leboa, Sotho, Zulu, Swazi and Tsonga) are spoken by 
indigenous people. Such great diversity of indigenous populations, not only in 
South Africa but also worldwide, makes IK a highly contextual and site-specific 
knowledge (Gadgil et al., 1993). This is mainly because IK derives from practices 
and ceremonies of indigenous people relating to culture, arts and religion, 
coupled with local observations and experiments. It therefore captures ecological 
 micro-variations and thus communities have a profound understanding of their 
local environments.

LOCAL CULTURAL CONSTRUCTION OF INDIGENOUS KNOWLEDGE

Indigenous knowledge is unique to a given culture (Agrawal, 1995). It is linked to 
tergenerational cultural development, survival, beliefs, spirituality and medicinal
systems (Lodhi and Mikulecky, 2010). According to Nakashima (2000) this knowledge is a complex interplay between distinct cultures and their specific local environment. Why is local construction of IK so significant to agricultural rural development?

Local construction is linked to cultural diversity of communities which largely informs the production of IK. Culture shapes values, behaviour and consciousness within a human society from generation to generation (Odora Hoppers, 2005), eventually forming a base for IK. The inextricable nature of the relationship between culture and IK defines the commonly reported nature of IK as highly-contextual or located (Mazzochi, 2006; Aikenhead and Ogawa, 2007; Lof and Carriere, 2010). Disruption of this inter-relationship (Battiste and Henderson, 2000; Nazarea, 2006) is one of the reasons for failure of scientific interventions, especially in rural areas.

In addition, local construction is essential to understanding local innovation. Innovation has previously been understood as a linear process from formal science, through extension workers to farmer adopters (Waters-Bayer et al., 2006). In this top-down system, farmers were passive actors as it referred to them as adopters of new technologies (Waters-Bayer et al., 2006). However, recently attention has been given to new technologies that farmers develop themselves through local innovation processes. Innovation drives agricultural development. However, the type of innovation that ultimately makes the difference is what farmers decide to do (Waters-Bayer et al., 2006). In rural areas, local innovation largely informs how farmers behave and relate with nature. As a result, policy should give attention to local innovation so as to ensure that local people have a chance to solve their own problems. One of the roles of the National Agricultural Research and Development Strategy (NARDS) of South Africa developed in 2008 is to invest in adaptive research. However, there is little recognition of the role smallholder farmers can play in developing and adapting new technologies (Letty et al., 2011). This limits the role of local innovation as an entry point for integrating IK into scientific knowledge (Srikantaiah, 2005). Nonetheless, results by Letty et al. (2011) showed how joint innovation (alternative production practices for growing potatoes and new cash crop production) pioneered by active smallholder farmers has contributed to improving agriculture in the rural Ukhahlamba District of KwaZulu-Natal, South Africa (Table 2). Farmers observed the challenges that their community faced and developed innovative ways to address them. For example, the alternative potato production practice was initiated to address problems of high labour requirements and difficulties associated with managing the crop. The new innovative method involved planting potatoes under mulch rather than using conventional methods of planting directly into the soil. Beyond addressing the observed challenges, this alternative method also showed potential to improve soil structure and soil fertility.
Table 2: Characteristics of joint innovation processes pioneered by the community members of Ukhahlamba District, KwaZulu-Natal (modified from Letty et al., 2011).

<table>
<thead>
<tr>
<th>Characteristics of innovation system</th>
<th>New cash crop (Cherry peppers)</th>
<th>Potato production</th>
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<tbody>
<tr>
<td>Context - What was there before and what is new?</td>
<td>Farmers previously growing conventional crops were faced with the challenge of marketing their produce</td>
<td>The farmer innovator was producing potatoes conventionally, but had already started exploring conservation tillage practices and had been involved in experimentation processes with various organisations.</td>
</tr>
<tr>
<td>Actors</td>
<td>Farmers, commercial farmer, extension office, Farmer Support Group (FSG) staff</td>
<td>Pastor (source of original idea), farmer innovator, researcher, FSG staff</td>
</tr>
<tr>
<td>Type of innovation</td>
<td>Product, institution, market (farmers have now adopted cherry peppers in order to break into a wider market)</td>
<td>Process (farmers are now implementing a significantly improved way of producing potatoes)</td>
</tr>
<tr>
<td>Trigger</td>
<td>Interest in diversifying farmer enterprise; Challenge of marketing conventional produce. Market opportunity identified (Demand for the product could be the underlying trigger)</td>
<td>Need to reduce labour requirement and potential to build soil structure and improve soil fertility</td>
</tr>
</tbody>
</table>

Moreover, as marketing of conventional crops became a challenge, smallholder farmers in collaboration with a commercial farmer introduced an innovative idea of growing a new cash crop. Production of this new crop ensured a reliable market and substantially more income for farmers. These joint innovations show the significant role farmers can play in addressing their challenges. Such innovation has a definite impact as it achieves the ultimate goal of improving livelihoods of rural communities.

Hart and Vorster (2006) outlined some case studies that illustrate the use of local innovations by rural communities in South Africa. These include agricultural innovations for agronomy (both field and horticultural crops) and animal production. For example, sorghum farmers in Msinga, KwaZulu-Natal have recently adapted an ancient method of protecting seed heads from bird damage. In this traditional method, seed heads are wrapped with grass or sometimes pieces of cloth before they start to ripen. In this case IK is accompanied by knowledge of the crop as well as the habits of the birds. Such understanding ensures that application of the practice is effective.

Another of their case studies shows the similarities between IK and scientific knowledge. At Nkwalini in KwaZulu-Natal farmers prune their pumpkin plants to increase the size of pumpkins harvested. The benefits of this practice have been proven scientifically and it is widely used to stimulate growth and ensure improved quality and yield (Hart and Vorster, 2006). Such similarities show that earlier views of IK as being backward, inappropriate and inferior compared to scientific knowledge are unfounded.
ROLE OF AGRICULTURAL EXTENSION AND ADVISORY SERVICES

Extension and advisory services were established to extend research-based knowledge to rural communities in order to improve local farmers’ lives (Asenso-Okyere et al., 2008). They are therefore crucial to putting farmers’ needs at the centre of rural development (Christoplos, 2010). The current bottom-up and demand-driven advisory services approach has moved beyond only focusing on increasing production, transferring technologies, etc. to facilitation, learning and the formation of farmer and community based organisations (Asenso-Okyere et al., 2008). Such an approach maximizes farmer participation in agricultural innovations.

As in many other countries, in South Africa the National Department of Agriculture, Forestry and Fisheries has the mandate for extension services. They are offered to farmers through decentralized district offices, and bridge the gap between available technology and farmers’ practices by providing technical advice, information and training. Regardless of the progress made and expenditure allocated to extension services in SA, there are still challenges that need to be addressed. These include scope of work, qualifications (the majority of frontline extension workers lack higher tertiary qualification) and the proportion of the budget allocated to salaries (e.g. some provinces spend up to 82% of their extension budgets on salaries thus leaving little for operations) (Tregurthan and Vink, 2008). Farmers have also voiced concerns about the skills of extension officers. This is reflected in a lack of trust and inadequate interaction between farmers and extension officers. These constraints have resulted in the generally poor performance and quality of extension services in South Africa (Tregurthan and Vink, 2008). However, the best agricultural practices in rural communities based on IK can be efficiently shared through extension services.

Revitalizing indigenous agriculture will allow effective coupling of high productivity and ecological considerations which is fundamental to long-term agricultural sustainability. This type of agriculture is not only interested in production and profits but also in maintaining a healthy and sustainable environment. Such ‘ideal’ agriculture would, however, be achieved only if all three aspects of sustainable development (i.e. environmental or ecological, economic and social) are considered. Previous exclusion of one or more of these aspects in development processes has resulted in the failure of some major agricultural interventions that employed a top-down approach. Africa has had a considerable number of such interventions that were aimed at increasing agricultural production but were not successful, e.g. Office du Niger in Mali, 1931 (Filipovich, 2001), East African groundnut scheme, 1946 (Hogendorn and Scott, 1981), Mokwa Scheme in Nigeria, 1949 (Miracle, 1967), Massive Food Production Programme, 2002 and the Accelerated and Shared Growth Initiatives, 2007 in South Africa (Hajdu et al., 2012). Thus any intervention aimed at improving agricultural sustainability should implement an integrated approach that involves all three dimensions simultaneously. This will require a holistic view of agriculture not only in terms of production and profits but also as an integrated system. Indigenous knowledge brings this holistic view. Thus, the contribution of IK to sustainability of natural resources cannot be overemphasized.
CHALLENGES FACING INDIGENOUS KNOWLEDGE SYSTEMS DEVELOPMENT IN SOUTH AFRICA

Despite the substantial contribution of IK to rural agriculture, there is a need to develop integrated techniques that will be universal and adaptable and yet relevant and effective in addressing rural needs. For such interventions to succeed it is critical that researchers’ understanding of local knowledge associated with indigenous practices is improved.

Understanding local innovation is also vitally important as it can form the basis of the development of new improved technologies that integrate both IK and scientific knowledge. Improved local innovations will ensure locally-specific practices that will result in increased diversity and rapid adaptation by local people to keep up with dynamic environmental conditions (Waters-Bayers et al., 2006). Innovations that match local realities ensure relevance and efficiency and their implementation will ensure both agricultural and environmental sustainability.

With extension and advisory services being key to linking research, field-level innovation, education and other aspects (Christoplos, 2010), the challenges and constraints to the running of these services must be prioritised to ensure knowledge-sharing. This is vital for the processes of integration and is thus critical to sustainable development (Asenso-Okyere et al., 2008).

It should not be overlooked, however, that even in instances where such innovations have been undertaken with all the stakeholders involved, ethical issues still remain a major concern. For example, local people provide researchers with knowledge which stimulates research and forms the basis for new innovations. To whom do the findings or the innovation belong is the question that often causes conflict as researchers collect the knowledge from the villagers and disappear (Msuya, 2007). Despite the existence of the Intellectual Property Right Act, such ethical issues have created resistance amongst rural communities which inevitably exacerbates knowledge-hoarding, subsequently limiting research innovation. This suggests that there is still a challenge in implementing Intellectual Property policies at community level given their individualistic nature.

The passive response of universities and research institutions also poses a challenge for the development of IKS in South Africa. This was mentioned by Osman (2009) who attributed it to the Western dominance in research and teaching policies in these institutions. He perceived this as a cause of the low participation of academics in IKS research as well as the poor representation of the African context in research outputs from these institutions. This needs to be addressed to ensure effective documentation of indigenous knowledge in order to prevent its extinction.

INDIGENOUS KNOWLEDGE SYSTEMS: POLITICAL ADVANCES

In order to overcome the challenges the role of state institutions and implementation of government policies cannot be overstressed. Policy development processes in post-apartheid South Africa have been largely inspired by universal
principles of human rights and incorporate fundamental African values such as Ubuntu: “humanity” and Batho-pele: “people first” (Bennett, 2011). Following the first democratic elections in 1994, IK became a critical component in the process towards reconstructing a new South Africa (Akenji, 2009). Consequently, there has been substantial progress in terms of the policies pertaining to IKS in SA. For example, in 1998, the Portfolio Committee on Arts, Culture, Language, Science and Technology conducted the first national workshop on IK in South Africa (Akenji, 2009) which pioneered the processes of drafting more IKS policies and directorates.

In 1994 the Department of Science and Technology developed an IKS policy. By adopting this policy in 2004, the Government registered its commitment to the recognition, promotion, development, protection and affirmation of IKS. The National IKS Office (NIKSO) was then developed. The main mandate of NIKSO is to coordinate and support IKS research and a few key platforms have been identified through which to mainstream IKS in South Africa. Amongst these are knowledge systems studies. Most of the methodology (e.g. participatory rural appraisal) implemented in knowledge production satisfies some guiding principles of IKS. These include (i) epistemological aspects as well as applied application of knowledge production; (ii) capacity development; and (iii) joint and active participation of IKS practitioners and communities.

To discourage misappropriation and exploitation of IK without recognition, in 2007/8 the South African Department of Trade and Industry developed a policy on the protection of IK through Intellectual Property (IP). Such a policy is crucial given the fact that the processes recommended for IK conservation consider ex-situ processes such as scientization as described by Sillitoe et al. (2002). Without IP policies these ex-situ processes will continue to disempower indigenous people (Lodhi and Mikulecky, 2010).

After 1994 the South African government also had to develop a culturally sensitive education curriculum that accommodated its diverse population. This necessitated the adoption of an approach that allowed for the inclusion of IK into formal education (Owuor, 2007). Subsequently another curriculum, known as “Curriculum 2005”, was developed that included indigenous technology and culture. It was aimed at ensuring contextualisation of research as well as strengthening linkages between educational institutions, homes and the wider communities of South Africa (Winberg, 2006).

There have also been considerable developments towards improving the health systems of rural communities in South Africa. Over 80% of people in South African rural areas still rely on traditional medicines. The interventions by the government in recognition of these IKS include the Traditional Health Practitioners Bill (2003), the Traditional Leadership and Governance Framework Bill (2003) and the projects on Development of Traditional Medicines Database for South Africa (2002–2003) and the Mapping of Traditional Healers in South Africa. These will mostly protect against the misappropriation of people’s IK as interest in the conversion of this socially and culturally situated knowledge about traditional
medicines (*muthi*) into valuable pharmaceuticals by bioprospecting is growing rapidly. However, there is still a need for an IP policy that recognises collective rights based on culture as most of this knowledge does not belong to an individual but to a community as a whole.

The progress made by the South African government in terms of developing IKS related legislation should be recognised in spite of the challenges that still remain, particularly in terms of implementing some of the policies that require the cooperation of a wide range of stakeholders. Moreover, some of the implementation processes require the integration of IK with scientific knowledge, although there is still no clear methodology for articulating such integration (Mercer *et al*., 2010). Nonetheless, the inputs by the South African government are tangible evidence of a positive attitude towards IKS.

**INDIGENOUS KNOWLEDGE SYSTEMS: RESEARCH ADVANCES**

Most IK still remains unrecorded and embedded in rituals and cultural practices of everyday life (Krogh and Paarup-Laursen, 1997; Ossai, 2010) that are indispensable to the existence of this knowledge (Purcell, 1998). This has made it difficult to access this knowledge beyond local communities (Ferguson and Messier, 1997). However, the interest IK has received since its recognition in the early 1980s has resulted in numerous efforts towards increasing its availability and widening its contribution. This has been done through IK research. In South Africa, research has tried to make IK a valid field of academic enquiry in its own right (Mkabela, 2005).

The progress in IKS research in South Africa is reported in the recent comprehensive review by Njiraine *et al.* (2010). This review was an informetric study on indigenous knowledge in Kenya and South Africa. They recorded that out of 851 IKS studies done in South Africa, 264 (31.0%) focused on culture, followed by health and medicine (182; 21.4%), education (181; 21.3%), law (103; 12.1%), agriculture (62; 7.3%) and the environment (59; 6.9%). It is clear from this study that although much has been done in IKS research, not all categories have received the same attention. A considerable number of studies have been done on culture and ethnomedicine but unfortunately only a few studies have been done on soil (Materechera, 2008; Matike *et al*., 2010; Buthelezi *et al*., 2013) and agriculture (Hart and Vorster, 2006; Faber *et al*., 2011; Nethononda and Odhiambo, 2011). Most of this knowledge remains vested in the older population which implies its inevitable extinction. Thus much still needs to be done in terms of studying and documenting this IK in agriculture and related topics such as soils and the environment. Nevertheless, recognition of IK and the initiatives by the South African government towards promoting and protecting this knowledge have resulted in an overall increase in IK research (Njiraine *et al*., 2010). Moreover, South African universities have played a significant role in promoting IKS through research.

Research is the only way through which the knowledge of indigenous people will become known and contribute to the global knowledge economy. It should aim to
produce valid, meaningful and useful knowledge. This means that the approach used should pay attention to people so that their knowledge can be understood and interpreted correctly (Prior, 2007). This becomes very important given the cross-cultural differences that exist between researchers and communities (Huntington, 1998). The decolonising approach described by Prior (2007) seems appropriate for executing valid and highly contextualised research. This approach is contrary to those used earlier that were only interested in taking useful information from IK rather than understanding it (Nakashima, 2000). It brings into action a critical aspect of IK research namely, participation and Pretty (1995) outlines some of the reasons why it is important. These include increased mobilization of stakeholder ownership of policies and projects, greater efficiency, understanding and social cohesion, more cost effective services, greater transparency and accountability, increased empowering of the poor and disadvantaged and strengthened capacity of people to learn and act.

It is important to note that South Africa is developing techniques towards ensuring high quality and relevant IK research. This is evident in the recent (2011 and subsequent years) call for research on IKS by the South African National Research Foundation which explicitly stressed joint, active participation and equal ownership between academic scientists and IKS holders. This South African approach is guiding researchers to a more honest and transparent process that intends to enable the voice of the local people to be heard by involving them in the knowledge production process, thus preventing the abstraction of IK. Approaches such as this will increase the quality and standard of IK research ensuring that it contributes to global knowledge management irrespective of it being context-specific.

CONCLUSION

Indigenous knowledge is key to the sustainable future of the next generations. Although this knowledge has long been disregarded in the development process, research has shown that it can provide sustainable solutions, especially in rural areas. It is hence important that all stakeholders are involved to ensure that the past injustices are rectified. This review has shown that although the South African government is active in promoting and protecting IKS in the country, much remains to be done. In addition, huge gaps still exist in terms of IK research. Among the topics that have not received much attention are agriculture, soils and the environment. These gaps need to be bridged so as to ensure sustainable agricultural development in rural areas which largely depend on IK. In order for such progress to be made there is a need for a partnership to be developed between government and stakeholders, especially those within the research fraternity. Such a partnership is likely to be driven by the level of commitment shown by the government in the form of policy development (including the issue of intellectual property rights for community-generated knowledge) such that research into IKS within agriculture, soil science and environmental aspects is encouraged and supported. Such support would encompass both financial support for research programmes that are targeted at
IKS in these disciplines, as well as giving logistical encouragement to such research via increasing the importance granted to IKS within government organisations that operate within the rural communities. While it is possible for research into IKS within these, to date, under-represented disciplines to continue with no further state support. Such research will always then be the ‘Cinderella’ of projects within the agricultural and environmental fields, especially given the current low input into IKS by the research community. As such it would be likely to either fail or be unable to sustain itself. Thus, state support and the political will to encourage IKS research are likely prerequisites for the continuation and increase in such projects, to enable them to reach fulfilment and to put IKS research on a par with the more widely accepted scientific knowledge.

Included within such political will must be that the extension and advisory services are able to play their role in facilitating links between the researchers and farmers. Such connections effect knowledge-sharing which is vital towards informing processes aimed at building from local peoples’ knowledge. To enable these services to carry out their mandate, the major constraints that currently afflict them must be overcome and this will again only be possible with a concerted effort by the statutory authorities to improve the service that they offer to farmers. This will undoubtedly require not only an increased level of funding to enable increased staffing numbers and adequate field operations but also increased levels of expertise within the extension and advisory bodies. The concept of ‘life-long learning’ must be encouraged such that staff are constantly kept appraised of the latest developments in agricultural and environmental research through regular short courses and similar contacts between researchers and field extension staff. Such programmes, if adequately funded, will enable extension specialists to become acquainted with progress within IKS research (and indeed ‘scientific’ research) and enable them to incorporate it more effectively into their advisory remit to local farmers. Such integration will result in sustainable and effective innovations necessary for further rural agricultural development.
REFERENCES


Lof, A. and Carriere, N. (2010). Learning From our Elders: Aboriginal Perspectives on Climate Change and Reindeer/Caribou Habitat in the Circumboreal Forest. Available at:


