

**Indigenous Knowledge, Alternative Medicine and Intellectual Property  
Rights Concerns in Kenya**

**By**

**Kibet A. Ng'etich  
Department of Sociology and Anthropology  
Egerton University  
P. O. Box 536  
Njoro, Kenya  
Email: [k\\_ngetich@yahoo.com](mailto:k_ngetich@yahoo.com)**

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## **Abstract**

This paper examines emerging intellectual property rights concerns arising from increased local and international interest in traditional health resources. It discusses the development in interest in traditional medicine and outlines the intellectual property rights concerns generated by the quest for ownership and control of not only the knowledge but also the benefits that may accrue from indigenous health resources. Intellectual property right concerns stands in the path of integrating traditional medicine in efforts to address the Millennium Development Goals (MDGs) for Health. The paper focuses on emerging intellectual property concerns with respect to indigenous medicine in Kenya. It outlines pertinent issues in intellectual property discourse particularly, on the question of whether and to what extent intellectual property rights can productively help protect the different forms of indigenous knowledge. The paper discusses intellectual property concerns and explores ways to resolve conflict over ownership of indigenous knowledge and allocation of benefits that accrue from such knowledge. Assuming that indigenous knowledge cannot be divorced from indigenous peoples interests, paper contends that although intellectual property is advocated, it may negatively impact on the interests of indigenous peoples.

## Introduction: Intellectual Property Conventions

There are two important international conventions that have bearing on intellectual property rights in indigenous knowledge systems. These are the World Trade Organization's Trade-Related Aspects of Intellectual Property Rights (TRIPs) and the Convention on Biological Diversity (CBD). TRIPs is a key international agreement promoting the harmonisation of national IPR regimes. Although TRIPs covers four types of intellectual property rights- Patents, geographical indications, undisclosed information (trade secrets) and trademarks, it does not acknowledge or distinguish between indigenous, community-based knowledge and that of industry. Furthermore, it makes no reference to the protection of traditional knowledge.

The CBD is the only major international convention that assigns ownership of biodiversity to indigenous communities and individuals and asserts their right to protect this knowledge. Two articles of this convention are particularly relevant:

**Article 8 (j):** State Parties required to “respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote the wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilisation of such knowledge, innovations and practices.”

**Article 18.4:** Contracting Parties should “encourage and develop models of cooperation for the development and use of technologies, including traditional & indigenous technologies.”

## Traditional Medicine and Intellectual Property

Intellectual Property Rights (IPRs) are granted to individuals or juridical persons who claim to be inventors or creators. Such rights may apply to a broad range of creative expressions, designs, products and processes, provided that certain requirements and conditions are met. In the case of patents, the claimed inventions must be novel (that is, not publicly available or disclosed), convey an inventive activity and, in most jurisdictions, be capable of industrial application ( ). For trade secrets the knowledge must be of actual or potential commercial value. Although there is, no reason why such categories of rights may not apply to various expressions of traditional knowledge, including traditional medicine, there are several characteristics of traditional medicine that create barriers to protection through the use of existing forms of IPRs.

In this section I explore some of the features of traditional medicine that may determine the extent to which IPRs can be applied to its various aspects of traditional medicine. The discussion in this section does not address the question of whether IPRs *can* or *should be applied* to TRM, but rather highlights peculiar characteristics of traditional medicine that may be relevant to the potential application of such rights and the range of issues that arise from the application of IPRs to traditional medicine.

### **Components of Indigenous Medical Knowledge**

Traditional or indigenous medicine encompasses knowledge and practices used for diagnosis, prevention and cure. A greater part of indigenous knowledge refers to the properties of natural materials especially medicinal plants, animal parts and minerals (Sindiga 1995). Due to the extensive use of plant materials, traditional medicine is associated with herbalism. However, animal-based medicines also play a significant role in healing practices of many traditional health practitioners in Kenya<sup>1</sup>.

In addition, traditional medicine encompasses a great variety of *methods* of diagnosis and treatment, including physical, mental and spiritual therapies<sup>2</sup>. The application of such methods is largely influenced by the culture and beliefs dominant in a particular community to the extent that they may be ineffective when applied in a different context. Thus traditional medicine includes knowledge concerning medicines and their use (appropriate dosage, particular forms of administration, etc.), as well as the procedures and rituals applied by healers as part of their traditional healing methods.

While some products used in the context of traditional medicine, as well as the processes for their preparation, may find protection of IPRs, some methods of diagnosis and treatment generally would not due its peculiarities, unless specifically protected under national law. It is these knowledge, products and process that have become of concern with regard to IPRs.

### **Possession of Indigenous Medical Knowledge**

Possession is probably the single most important basis of defining intellectual property rights. On the basis of possession, knowledge may be categorized in individual knowledge, distributed knowledge and communal knowledge.

*Individual Knowledge.* In some cases, individuals produce traditional medical knowledge without any interface with the community or outsiders. In such cases, the knowledge is held by individuals (individual knowledge). For instance, some individual traditional healers continuously improve or innovate on existing body of knowledge through sustained observation and experimentation. Some traditional health practitioners have appropriated modern biomedical technologies such as the use of x-rays and laboratory tests to improve on their knowledge.

*Distributed Knowledge.* In other cases, knowledge is in the possession of some but not all members of a group (distributed knowledge). In such cases, the knowledge is asymmetrically distributed among individuals within a group, even though such individuals may not be aware that others in and outside the community share the same knowledge (Bonabeau and Theraulaz, 1994). “Individual” and “distributed” knowledge are often interconnected in that sometimes healers compare notes and share remedies across quite wide geographic areas.

*Communal Knowledge.* Certain medical knowledge may be available to virtually all members of a group (communal knowledge). In such a case, the knowledge is freely available to its

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<sup>1</sup> In fact, of the 252 essential medicines selected by the World Health Organization only a small percentage are derived from animals (Medeiros Costa Neto, 1999:6)

<sup>2</sup> Physical methods of treatment involve muscle manipulation; mental methods of treatment involve self-discipline in the form, for instance, of a strict diet; spiritual methods of treatment include, for instance, prayers and use of holy water (Koon, 1999, p. 167).

members although it may concentrate among the old members of the society. In every community, for example, there are plants, which are well known to have some medicinal properties.

Traditionally, the attitudes towards the appropriation and sharing of knowledge vary significantly among different local/indigenous cultures. In some cases a strong sharing ethos prevails, leading to the rejection of any form of individualistic Western style appropriation. In other cultures, the concept of property in knowledge exists in a manner comparable to IPRs, with some degree of sale or exchange of knowledge as a commodity (Dutfield, 2000a, p. 281-282; Dutfield, 2000b, p. 288).

The possession of knowledge by individuals, in effect, does not mean that such knowledge is perceived by communities as not belonging to them. Although at any one time, knowledge may only be held by a handful of people with special roles in the community, in the course of the history of that community it becomes essentially communally held knowledge. This is because those with the special knowledge do not “own” it as such, and many have obligations to share the knowledge within the community. There may exist, for instance, community standards for when the information must be passed, such as during initiation rituals. These features indicate slight but important differences between the meaning of individual property in Western culture, and knowledge held by individuals within a non-Western community context.

With regard to ownership of traditional medical knowledge, most Kenyans make no clear demarcation between what belongs to the general community, specific community, or individuals within the communities. However, for most herbalists, herbal knowledge is personal property, despite the fact that some of the knowledge they possess is relatively available in the same form in the general community due to the older tradition of sharing knowledge. It is only in some instances that the herbalists have innovated what is available in the general community and consequently possess special rights to their innovations. Hence, without clear ownership of this knowledge, it is difficult to determine how the benefits could be shared amongst the stakeholders.

In the Kenyan situation where traditional medical knowledge is largely distributed and a common possession, complex issues of entitlement to any possible intellectual property rights also arise, because the Western IPRs systems do not provide for the granting of rights to communities. In many instances, more than one community may hold the same medical knowledge and this raises an issue of geographical or historical priority. For example the use of Neem tree derivatives, which is common denominator in most herbal preparations in different communities in Kenya presents a serious problems when it comes to attribution of ownership. Thus the multiplicity of forms of possession of traditional medicines makes it particularly hard to apply existing IPRs or to develop *sui generis* regimes.

### **Evolution Traditional Medical Knowledge**

Much of traditional medicine has been used for generations and has been passed on inter-generationally (WHO 2000). Hence, traditional medicine is not a static body of knowledge for it continues to evolve with the practices of the individuals or communities that hold and use it (Correa 2000:242). Like other bodies of knowledge, it builds on incrementally through

improvement on and additions to old knowledge<sup>3</sup>. As such, traditional medicine consists of knowledge received from the past and handed down from generation to generation as well as recent knowledge that may be the product of deliberate experimentation and observation. Individually and collectively, the health practitioners variously contribute to the pool of existing medical knowledge. It is this context that the Association of Herbalists in Kenya (AHK) identifies continuous improvement of traditional medical practice as one of their main goals.

### **Disclosure and Secrecy**

Some traditional knowledge have in the recent past become disclosed as a result of codification (that is, formalization in written form), wide use, or through collection and publication by anthropologists, historians, botanists or other researchers and observers (Rukwaro 1996, Koning 1998). However, in comparison to the situation in Asian countries such as India and China where a lot of indigenous medical knowledge have been disclosed through use and publication (Shankar, Hafeel and Suma 1999:10), disclosure of traditional medical knowledge remains relatively limited in Kenya. In these Asian countries, codified traditional medical knowledge has been made publicly available and, hence, under current IPRs rules, this knowledge could not be appropriated, either by its traditional holders or third parties.

In contrast to the Asian situation, traditional medicine in Kenya remain non-codified and include what have generally been termed “folk”, “rural”, “tribal” and “indigenous” which has been handed over orally from generation to generation in communities. They are generally based on traditional beliefs, norms and practices based on centuries old experiences of trials and errors, successes and failures at the household and community level (Balasubramanian, 1997:1). Thus, a significant part of traditional medicine in Kenya remains secrets. In specialized areas, such as knowledge held by bone-setters, midwives or traditional birth attendants and herbalists, including knowledge of healing techniques and properties of plants and animal substances, access is restricted to certain classes of people (Nyamwaya 1992). For instance, a study on herbal medicine in Kenya showed that most of the herbalists maintained the secrecy of their knowledge:

*In Kenya, among the members of the Kikuyu community, indigenous knowledge in some fields was a well guarded secret. For instance a person who had acquired special skills as a black smith would not allow just anybody to walk into his workshop and watch him make such instruments as spears, pangas, diggings hoes, etc. The skills of making such instruments were carefully guarded. Such a person would only train his son or a very close relative. The same case applied to herbalists. An intruder was always heavily fined in order to deter any attempt to steal such knowledge. The problem with this type of system is that such important knowledge was owned by and confined to a few family members and rapid development on innovations was hampered by secrecy” (Muchae, 2000: 6).*

From the above context, it should be noted that while prior disclosure of traditional medicine will in many cases prevent the acquisition of IPRs, notably patents, not all traditional medicine is disclosed nor lacking novelty for the purpose of IPRs protection.

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<sup>3</sup> What is “traditional” about traditional medicine is the way it acquired, used and transmitted. It does not necessarily mean the knowledge is old.

## **Commercial Value**

The commercial value of traditional medicine can be directly appropriated by the knowledge holders or through transmission of knowledge to researchers and companies, domestic or foreign. Traditional medicine can provide some useful leads or cues “sign posts” for the screening of natural products for therapeutic benefit<sup>4</sup>. Traditional knowledge may also be useful to confirm research results produced in the laboratory and complement scientific testing, including safety and efficacy.

The commercial value of traditional medicine may be derived from different activities, such as cultivation of medicinal plants for sale or production and distribution of herbal medicines. However, in Kenya where the majority of the population relies greatly on traditional medicine, there is virtually no investment in cultivation of medicinal plants. Instead, many Kenyans depend on natural forests to provide the majority of plant material consumed by the herbal medicine industry<sup>5</sup>.

## **Impediment to Access**

It is well established that traditional medicine plays a crucial role in health care for a large part of the population living in developing countries. According to the World Health Organization, “...up to 80 per cent of Africans –or more than a half billion people- visit traditional healers for some or all of their medical care” (Nelson-Harrison et al, 2002:283). In the light of this, considerations of IPR must take into account of the vital role of traditional medicine in a society where provision of health services is very poor and highly skewed. Thus attempts to realize the commercial value of traditional medicine through IPRs may conflict with the achievement of some public health objectives, particularly that of increasing access to medicines by the poor.

## **Intellectual Property Rights: A Solution Or Problem?**

In recent years indigenous knowledge (IK) resources (technical local knowledge about biodiversity, health and actual organic materials) have come to be recognized as increasingly significant in development. If a productive structure, based on the satisfaction of basic human needs and collective rather than individual consumption, is concomitant with sustainable development, the need for imported technology must be replaced by increased demand for local knowledge and innovation. Reasons lie in their possible utility in environmental conservations, medical treatments, and improvement of soil fertility. All these provide the benchmark for sustainable development. Consequently, traditional knowledge, innovations and creativity, including "folklore" , have received increasing attention in numerous policy areas, ranging from food and agriculture, the environment, health, human rights, and cultural policy, to trade and economic development. The role of intellectual property rights in the protection of traditional knowledge is being considered in several of these policy contexts, which have become the benchmark for sustainable development.

As indigenous knowledge become more significant, fears have grown that populations who have been responsible for developing and preserving the knowledge will lose them to

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<sup>4</sup> Many recent researches in Kenya have sought to test the therapeutic property of some known medicinal plants (Gisesa 2004)

<sup>5</sup> In Asia the trend is towards agriculturally cultivated materials (ten Kate and Laird, 1999, p. 101; Chandra, 2002, 142)

unscrupulous “outside operators”. The irony is that increasing value of indigenous knowledge corresponds with increasing fear of its loss. The dilemmas of increasing value and fear of loss feature most in the alternative medicine sector where many people are increasingly turning to them as an important source of health care services. Consequently, many policy analysts advocate the use of intellectual property rights to protect the rights of knowledge owners to their indigenous resources. However, with increasing economic liberalization and valorisation of private property rights, it is not surprising that intellectual property rights appeal to so many people.

Intellectual property rights are basically a mechanism to allocate ownership of knowledge and distribute benefits from it among competing claimants. Proponents of intellectual property rights seek to resolve three types of dilemmas that become prominent as the value of indigenous knowledge grows: ethical, managerial, and preservationist.

Ethical dilemmas arise because indigenous knowledge resources lie mainly in marginal environments and are often threatened with extinction. The threat of rapid losses of rare knowledge present a moral obligation to strive to protect and conserve the knowledge for the benefit of posterity. Indigenous people who are custodians of indigenous knowledge often lack the capacity to maximise the utility of indigenous knowledge. At the same time, the technological prowess to realize the full commercial potential of these resources lies largely with scientists who are often not the owners but have access to capital intensive research facilities. While technological developments have made it possible to isolate new natural products by manipulating genetic materials, the research can be simplified if scientists learn from the indigenous people living closely with these biological resources, often developing important insights into their uses. The recognition of the intellectual property rights of indigenous actors allows them to be compensated for their efforts through the profits new natural products bring as they are marketed. It is only when legitimised and formalized, compensation through recognition of intellectual ownership that some significant ethical problems can be resolved.

The managerial issue relates to the question of creating ownership rights over indigenous knowledge resources that will ensure appropriate rewards to innovators, and thereby maximize future innovations. The concern is based upon the belief that the increasing poverty of indigenous populations is leading them to undertake activities that erode biodiversity. If, therefore, they received material benefits in exchange for their stewardship of genetic materials, the decline would be halted. Intellectual property rights, therefore, can simultaneously satisfy the ethical and managerial dilemmas created in the extraction of indigenous medical resources because once indigenous populations possess formal ownership rights, they should be able to negotiate rules of access and use, fees, and royalties with other interested parties.

Preservationist issues arise in terms of long term management and protection of existing indigenous knowledge resources. The guarantee of ownership rights to indigenous peoples would also safeguard the future of indigenous knowledge, thus helping resolve preservation issues. This is because as beneficiaries and owners of knowledge, the indigenous people will strive to protect indigenous knowledge resources.

Ethical, managerial and preservationist issues present a number of intellectual property concerns. First, what is notable about intellectual property rights as a solution is that it focuses primarily on the material aspects of knowledge, and little on the cultural contexts in



which knowledge is created and practised. Although intellectual property rights provide mechanism for defining ownership and pattern of benefit distribution, there are some socio-cultural features that make it incompatible with protection under a system of rights that grants benefits primarily to individual or corporate actors possessing legal identities. For example, collective ownership and use of various forms of indigenous knowledge is a common feature that is not compatible with most of existing intellectual property regimes that give rights to individuals and corporate actors with legal identification. Without their own "legal" regulatory institutions to "protect" knowledge and resources, knowledge in most indigenous groups is either shared by the various members of the group, or remains the province of individuals such as traditional health practitioners or specific elders. Where specific individuals retain knowledge, the retention is not a product of legal design, but of secrecy. It is, therefore, difficult to defend or protect legally.

The above incompatibility can be resolved through agreements that, in addition to IPRs, guarantee political rights and space to indigenous peoples. Thus if Kenyan indigenous knowledge resources are to survive, the Kenya government should seek to protect the political rights and geographical terrain of indigenous communities collectively. This leads to the need for self-determination among the indigenous people.

The second common feature of most forms of indigenous knowledge is that they have survived and exist in marginal or relatively isolated environments. A good example is the Okiek of Mau Forest, Kenya. They are the only remaining indigenous hunting and gathering community. As mainstream populations have expropriated the most fertile, ecologically well-endowed, high rainfall regions, various indigenous and other disadvantaged groups have been pushed to the outskirts of development -- spatially as well as figuratively. But their marginality and isolation has provided a refuge as well. Because they must confront and solve problems posed by a harsh and relatively isolated environment, without much access to the capital and capital-intensive technological innovations, they have created institutional forms, technical innovations, and behavioural strategies that today seem valuable in a world increasingly without boundaries.

If these two features are common to various forms of IK--a marginal location, and collective orientation--it should be obvious that the loss of indigenous knowledges and resources is a consequence of general trends that characterize the processes of development and social change, not of indigenous peoples' activities. If their subsistence leads to the depletion of some resources, this depletion is evidence of the shrunken space within which they are confined. It is the operation of capital and the need for an ever-increasing field of raw materials that destroys diversity and associated knowledges. On a global scale, deforestation results less from the harvesting activities of various indigenous, poor or marginal populations, far more from the felling practices of timber companies and concessionaires and the policies of national governments. Depletion of crop germplasm, similarly, takes place because of the spread of modern high-yielding varieties of seeds and increasing capitalization and mechanization of agriculture. And, the loss of traditional medical practices is, similarly, due to the power of the modern medical corporation.

The extension of ownership rights through intellectual products is likely to expedite the very processes that contribute to the appropriation and erosion of indigenous knowledge resource base. Intellectual property rights aid in promoting mechanisms through which indigenous resources can be incorporated into the system of science and technology and western worldview values. However, these developments towards greater integration in global

systems and intellectual property rights contribute to undermining the indigenous knowledge resources in four ways.

First, it subverts its collective orientation by extending to indigenous knowledge resources the protection of a formalized, legalistic, individual-actor-oriented mechanism. The notion of private property hinges on the recognition of human labour mixed into nature, and on rewarding the expenditure of that labour. The vesting of exclusive rights to resources in legally recognized actors destroys the incentives to maintain a collective orientation and communal ownership of indigenous knowledge. The loss of collective orientation may not be a foregone conclusion. It depends on the manner in which rights are created in indigenous knowledge, and the extent to which community representatives are accountable to community members. But even if it was possible to avoid a strict correspondence between effort and reward, the problems posed by the replicability, mobility, and the non-endemism of indigenous resources remain. As such, resources become commercially valuable, individual incentives to cheat would increase, undermining any newly devised collective institutions.

Second, the incorporation of indigenous knowledges into the system of patents and copyrights strengthens the material forces that have depleted the resources and the strength of indigenous peoples. Because capital-intensive medical and agricultural industries depend on large-scale production and homogenization, the incorporation of more knowledge into these industries will further shrink the space available to indigenous peoples. For example, mass adoption and production of new useful natural products inevitably will colonize the isolated and marginal spaces that still survive, and condemn diversity to extinction. The commodification of biodiversity and indigenous knowledge resources consumes its very source to flourish in the short term.

Third, the extension of legal protection to indigenous knowledges through property rights is problematic at a far more fundamental level. Converting knowledge into a good for exchange commodifies the "indigenous" into yet another instance of the transformation of the world into a system of production and resource management. Rather than viewing indigenous knowledge as a cultural artifact with a status that derives as much from its position within the daily life of a group of people as its instrumental utility, current advocacy of intellectual property situates indigenous knowledge primarily within a utilitarian calculus of costs and benefits.

Finally, if herbal medicines are patented - either domestically or internationally - the medicines used as the first and last resort for healthcare by the poor may become unaffordable. In countries with patents, the medicines are more expensive. For example, in Italy cost of medicine increase by 200% upon being patented. Indigenous peoples are caught on the horns of a dilemma that arises from the spreading interest in their knowledge. Without control over their intellectual products, their knowledge stands to be expropriated without any material benefits reaching them. Yet, even with intellectual property, and even if they achieve some significant material gains, these success contain the seed of elements that are contrary to the interests of indigenous people in general.

## Future Directions

The future of intellectual property rights with respect to traditional medicine depends on to a large extent, how the following issues will be resolved.

1. **Informed Consent.** Debate over patenting will hinge much on what constitutes prior informed consent, particularly on how to determine who represents a community.
2. **Ownership of Indigenous Knowledge.** Ownership of indigenous knowledge remains a major issue. First, there is State vs. Community ownership of indigenous knowledge. Should states get royalties from knowledge that originates from communities within those states? Or should royalties go direct to the traditional knowledge holders? Should it go to individual traditional health practitioners? Disputes over patents on herbal products are likely to increase as the market for the products increase<sup>6</sup>.

## Conclusions

Recognition and reinforcement of local knowledge systems can be the basis for an alternative development model. The capacity of these systems to integrate, and the resultant synergism, are beginning to demonstrate higher levels of efficiency, effectiveness, adaptability, and sustainability than many conventional technologies. However, in the process of mainstreaming traditional medicine, intellectual property issues need to be resolved. Thus this papers has discussed features of traditional medicine that may be amenable to application of intellectual property suggest the need for

Although some aspects of traditional medicine may be protected under existing IPRs, such as patents, other aspects may require tailored intellectual property regimes. Consequently, there have also been proposals to develop *sui generis* systems of protection -- that is, systems specially suited to the characteristics of traditional knowledge, including traditional medicine. Such proposals are often, explicitly or implicitly, based on considerations of equity: if innovators in the “formal” system of innovation receive compensation through IPRs, justice requires that holders of traditional knowledge be similarly treated. Hence the need for the development of appropriate legislations on intellectual property rights that recognize and protect indigenous knowledge. Innovative protection of intellectual property of traditional medicines according to their particularity should be developed as it is difficult to attribute traditional medicine “novelty, originality and industrial utility” which are the basic requirements and conditions of intellectual property.

It is important to note that though on one hand the IPRs may, under some circumstances, help traditional medicine holders to obtain a monetary compensation for their knowledge, by their very nature they may, on the other hand, restrict the diffusion of the protected knowledge, thereby reducing access and imposing a cost on communities. Thus, in the case of traditional medicine in particular which over eighty percent of the population depend on, the application of IPRs may benefit those who commercially exploit protected knowledge or who share in the benefits of such a commercialization, but at the cost of limiting access to traditional medicine by those who need medicines and treatment. Conflict arises between different objectives: to compensate traditional medicine holders and promote the commercialization of traditional medicine, on the one hand, and to ensure the widest possible access to traditional medicine especially by the poor, on the other. The success of alternative medicine model depends largely on the extent to which the relevant intellectual property issues are addressed.

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<sup>6</sup> World Bank estimates that there will be a \$3 trillion herbal market by mid 21st century.

## References

- Balasubramanian, K 1997, *Herbal Remedies: Consumer Protection Concerns*, Consumers International, Penang.
- Bonabeau, E. and Theraulaz, G. 1994, *Intelligence collective*, Hermes, Paris.
- Chandra, S. 2002, 'Role of traditional systems of medicine in national health care system', in Chaudhury,R.R, & Rafei,U.M (Eds.), *Traditional Medicine in Asia*, WHO, Regional Office for South-East Asia, New Delhi.
- Correa, C. 2000, 'In situ conservation and intellectual property rights', in Brush,S (Ed) *Genes in the field. On-farm conservation of crop diversity*, IPGRI/IDRC/Lewis Publishers.
- Dutfield, G. 2000a, *Intellectual property rights, trade and biodiversity*, IUCN, London.
- Dutfield, G. 2000b, 'The Public and Private Domains. Intellectual property Rights in Traditional Knowledge', *ScienceCommunication*, vol. 21, No.3.
- Gisesa William Nyangate Obiero 2004, An Ethnopharmacological Investigation of Plants Used By Abagusii Traditional Medical Practitioners, PhD Thesis, School of Pure and Applied Sciences, Kenyatta University
- Koning, M. 1998, 'Biodiversity prospecting and the equitable remuneration of ethnobiological knowledge: reconciling industry and indigenous interests', *Intellectual property Journal*, No.12
- Koon, O.C 1999, 'Intellectual property protection of traditional medicine and treatments in Malaysia', in Blakeney,M (Ed)*Perspectives on Intellectual Property. Intellectual property aspects of ethnobiology* Sweet & Maxwell, London. vol. 6.
- Medeiros, C N, & Eraldo 1999, 'Traditional use and sale of animals as medicines in Feira de Santana City, Bahia, Brazil', *Indigenous Knowledge and Development Monitor*, vol.7, issue
- Muchae, J. 2000, 'Indigenous Knowledge and Industry Property Rights: Kenyan Experience', *Inter-Regional Workshop on intellectual Property Rights in the Context of Traditional Medicine*, Bangkok.
- Nelson-Harrison, S; King, S, Limbach, C, Jackson, C, Galiwango, A; Kisingi, K, Sirimani & Kanyerezi, B., 2002, 'Ethnobotanical research into the 21 st. century', in Iwu and Wooton (Eds), *Ethnomedicine and drug Discovery*, Elsevier, Ireland.
- Nyamwaya David 1992, *African Indigenous Medicine*, Nairobi: KEMRI.
- Kokwaro, J.O. 1993, *Medicinal plants of East Africa*, East African literature Bureau, Nairobi.

Shankar, D., Hafeel, A., & Suma, T., 1999, 'Cultural Richness of Green Pharmacy', *Compass Newsletter*, No.2.

Sindiga I. 1995, *Traditional Medicine in Africa*. East African Publishing House, Nairobi, Kenya.

Ten Kate, K. & Laird, S. 1999, *The Commercial Use of Biodiversity-Access to Genetic Resources and Benefit Sharing*, Earthscan, London.

WHO 2000. *Strategy for Traditional Medicine 2000-2003*. Geneva: WHO publication