

Review

Biopiracy and states' sovereignty over their biological resources

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Accepted 12 September, 2011

In the last several decades, indigenous communities had to contend with the misappropriation of their biological resources and associated traditional knowledge (TK) through the inappropriate exercise of intellectual property rights (IPRs). The advent of modern biotechnology has intensified this problem leaving indigenous communities increasingly vulnerable. As a counter measure, the Convention on Biological Diversity (CBD) was adopted in 1992, proclaiming the sovereignty of states over their biological resources, and requiring their consent and the equitable sharing of benefits on mutually agreed terms as conditions for access. On October 29, 2010, the Nagoya Protocol was adopted to implement these provisions. Nevertheless, the CBD has attracted critical comments from those opposed to the idea of state sovereignty over biological resources, especially when the exercise of sovereignty transcends a state's territorial borders. Two alternative doctrines; "the common heritage of mankind", and "the global commons", have been canvassed. This paper set out to analyse these arguments together with the alternative doctrines, in order to determine whether state sovereignty over biological resources as proclaimed by the CBD is justified. The merits of each doctrine were examined against the background of the problems presented to indigenous communities by the trinity of biopiracy, IPRs and modern biotechnology. The paper found that the doctrine of state sovereignty over biological resources, whilst having its limitations, is not only normatively justified, but is also, comparatively more capable of helping to protect the biological resources and associated TK of indigenous communities against piracy.

Key words: Indigenous communities, biological resources, traditional knowledge, biopiracy, Convention on Biological Diversity (CBD), plant breeders' rights, patents, sovereignty.

INTRODUCTION

In the last several decades, indigenous communities have been confronted with biopiracy; that is the misappropriation of their biological resources, especially medicinal plants and associated traditional knowledge

(TK), through the use of IPRs. The advent of modern biotechnology has intensified this problem leaving indigenous communities increasingly vulnerable. As a counter measure, the CBD was adopted in 1992, proclaiming the sovereignty of states over their biological resources and TK. It mandates the consent of indigenous communities and the equitable sharing of benefits with them, as conditions for access. On October 29, 2010, the

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Nagoya Protocol was adopted to implement these provisions. Nevertheless, the CBD has attracted critical comments from those opposed to the idea of state sovereignty over biological resources, especially when the exercise of sovereignty transcends a state's territorial borders. Two alternative doctrines, "the common heritage of mankind", and "the global commons" have been canvassed.

The paper refers to existing disagreements amongst scholars, civil society groups and the courts on plant variety rights and patents as they apply to biological resources and TK. A number of judicial authorities from Australia, the U.S. and Canada are considered which only help to highlight the scientific and legal intricacies that permeate these protective mechanisms, rendering them more favourable to users in foreign countries than the indigenous providers of biological resources and TK.

This analysis leads to the discussion of the CBD (including the Nagoya Protocol), which was adopted in response to the problem of biopiracy, and in particular, the declaration that states have sovereign rights over the biological resources in their territories. In discussing the doctrine of sovereignty, as enunciated under the CBD, the paper looks at opposing viewpoints, which charge that the doctrine is overreaching, and therefore unjustified. Specifically, it assesses the doctrine against two alternative propositions, namely the "common heritage of mankind" doctrine, and, in particular, the "global commons" doctrine.

The paper also examines the TRIPS Agreement, specifically Article 23(7)(b), as well as the Convention for the Protection of New Varieties of Plants (UPOV, 1961), which came into effect in 1968, as amended in 1978, and 1991. The discussion of the TRIPS and UPOV provisions is conducted within the context of the contending provisions of the CBD. As a backdrop, the paper examines the problem of biopiracy faced by resource-rich indigenous communities. It then shows how, in conjunction with modern biotechnology, the present intellectual property (IP) system, has exacerbated this problem through two principal mechanisms, patents and plant breeders' rights, which enable individuals, corporations and other institutions to pirate the biological resources and TK of indigenous communities. The objective of this paper is to analyse the arguments already set forth, in order to determine whether the doctrine of state sovereignty over their biological resources as proclaimed by the CBD is justified.

THE IMPORTANCE OF BIOLOGICAL RESOURCES AND TRADITIONAL KNOWLEDGE

Biological resources, including plants, animals, and

microorganisms are central to indigenous community life in most developing countries, providing affordable alternative means of healthcare and nutrition, in addition to employment and income generation. For example in the South and South-East Asia; this region of the world produces about 90% of global rice, an important staple for many Asian families that account for approximately 80% of daily intake of calories (GRAIN, 1998a) as well as significant levels of employment and income.

Traditional medicinal plants and knowledge of their healing properties are also vital to the work of the scientific community, and provide important leads for the development of new drugs by pharmaceutical companies (Mugabe, 1998; Nwabueze, 2007). Collectively, traditional medicines (TMs) command a global market worth of approximately USD 60 billion (WHO, 2000; Timmermans, 2003). Biological resources and TK also provide useful means for cultural expression and the assertion of local autonomy.

Biopiracy and the need to protect biological resources and traditional knowledge

Given the importance of biological resources and TK, indigenous communities, governments and civil society activists clamour for their protection. But the importance of these resources and the need for protection gained international limelight comparatively recently, following the spate of biopiracy witnessed especially in the last three decades as illustrated by the Hoodia (Commission on Intellectual Property Rights Report, 2002). In that case, scientists at the South African Council for Scientific and Industrial Research (CSIR) patented a medicinal element (P57) in the hoodia cactus. This is a plant which San hunters had traditionally used to suppress hunger during hunting expeditions, by chewing it.

The patent was subsequently licensed to a British biotechnology company, Phytopharm. Pfizer later obtained rights from Phytopharm for about US\$32 million to produce and sell P57 as a slimming drug and cure for obesity, with a potential income in the region of US\$7 billion. All along, the San people were never informed. They were also not compensated, until they threatened to sue CSIR upon becoming aware of the piracy of their biological resource and TK (Commission on Intellectual Property Rights Report, 2002).

Biopiracy may take several forms. It may arise from a patent being granted erroneously for a purported "invention" derived from prior art, that is, biological resources and TK that have long been known to and used by indigenous communities; or because the domestic law of a state, such as the U.S., does not recognise public disclosure of TK in foreign states as prior art; or due to

regulatory laxity, in that a state maintains very low patenting criteria; or where a true invention has utilized the biological resources and/or TK of indigenous communities, without obtaining their prior informed consent, or providing them fair and equitable compensation (Commission on Intellectual Property Rights Report, 2002).

Biotechnology, IPRS and biopiracy

Article 27 (3)(b) of the TRIPS Agreement requires Member States to grant protection to plant varieties, either by patent or under a *sui generis* system, or a combination of both. It, however, does not indicate the nature of the *sui generis* system referred to. Consequently, a controversy has emerged between the developed and the developing Member States. Whilst the former point to UPOV as the *sui generis* system mentioned in Article 27 (3)(b) of the TRIPS Agreement, the latter strongly protest that contention. UPOV (1991) protects the rights of breeders of distinct, uniform and stable plant varieties, and its provisions have been incorporated into most national laws.

Plant breeders' rights

The protection of plants through patents and plant breeders' rights has been much contested, more so, given the advent of modern biotechnology. Long before the era of classical breeding and especially modern biotechnology, farmers in indigenous communities were largely responsible for the domestication of useful medicinal plants, and the identification of their chemical properties.

However, modern biotechnology had profound influences on indigenous farming rights and practices. It would, no doubt, be perverse to pretend about the benefits of recent developments in biotechnology. However, it is clear that these developments have major implications for farmers and indigenous communities.

Sanderson (2009) vividly explains how modern biotechnological developments have helped breeders to overcome the comparatively imprecise, time-consuming and costly nature of classical breeding. Previously, breeders who wanted to achieve certain plant characteristics, such as robust yield, resistance to insects and diseases, or rich nutritional content, needed to cross-breed large amounts of plants over a long period of time, with considerable uncertainty of outcome. But with genetic engineering, these objectives are more rapidly attainable with greater certainty, through targeted gene transfers.

Modern biotechnological developments have simultaneously enabled subsequent breeders of derived plant

varieties to undermine the rights of the initial plant breeders by substantially copying or "plagiarizing" the protected varieties, with insignificant modifications. As Sanderson points out, this is made possible by the fact that under Article 5(3) of UPOV (1978), subsequent breeders do not require the consent of the breeders of protected varieties in order to use those varieties to breed or market other varieties (Sanderson, 2009).

Moreover, a derived variety only needs to fulfill minimal conditions, in order to be granted its own protection. Initially, under Article 6 of UPOV (1961), a new plant variety only needed to be distinct, uniform and stable to qualify for protection, and according to Article 6 of UPOV (1978), the requirement of distinctiveness was met if the new variety exhibited at least one important new characteristic that differentiated it from a variety (an existing, protected variety) commonly known to exist at the time when protection is sought. Under Article 1 of UPOV (1991), that new characteristic related simply to physical, observable characteristics, and it was unnecessary to show actual genetic novelty.

In addition, the word "important" is italicized above because in Article 7 of UPOV (1991), it was completely removed (Byrne, 1991). Thus, the threshold for protection was further reduced. And since the consent of the breeder of an existing variety was not required in order to use that variety to breed a new one, it became light work for competitors to claim protection over an alleged new variety, which is actually no more than an artificial modification of an existing variety with no genuine transformation. For example, a claimant who bred blue rice from existing white rice could easily obtain protection under this scheme, even if the former shares every other physical and genomic characteristics with the latter (Guiard, 2001; Sanderson, 2009).

Combined with the breeders' exemption, it proved inevitably difficult for the breeders of existing varieties to challenge abuses of their rights by subsequent breeders, because they could only successfully do so if the allegedly infringing varieties were identical with their protected varieties (Sanderson, 2009). Sanderson concluded that, modern biotechnology has heightened these problems by facilitating the "plagiarism" of existing plant varieties with unsettling ease and rapidity.

Sanderson's analysis is outlined simply to show that the same arguments can analogically be deployed to illustrate how plant breeders' rights themselves, as established under UPOV has similarly undermine the rights of farming communities. Those communities have from time immemorial been responsible for domesticating the plants from which plant breeders have developed protected varieties with the aid of modern plant genetic engineering techniques. Foreigners obtain the biological

resources of indigenous communities without authorization and compensation, and then seek protection under UPOV for cosmetic modifications.

The unease caused by modern biotechnology and the lapses of the plant variety regime coupled with pressures from plant breeding groups led to the revision of UPOV (1987), and the subsequent adoption of UPOV (1991) which amongst other things broadened plant breeders' rights, and permitted the combined ownership of patents and plant breeders' rights (Greengrass, 1991). In addition, UPOV (1991) attempted to check the plagiarism of protected plant varieties by restricting the scope of the breeders' exemption which would no longer cover acts done with the objective of breeding new varieties (Article 15(1) (iii)).

For the same reason, Article 14(5)(a)(i) introduced the notion of "essentially derived varieties", that is new varieties that are substantially derived from an existing variety. Unlike previously, these would no longer be protected or exploitable without the consent of the breeder of the protected variety (Sanderson, 2009).

Under Article 14(5)(b), for a new variety to be declared as essentially derived from an existing variety, three conditions must be cumulatively proven, namely: (a) that the new variety was predominantly derived from an existing variety or a variety predominantly derived from an existing variety while retaining the expression of the essential characteristics that resulted from the genotype or combination of genotypes of the initial variety; (b) the new variety is clearly distinguishable from the initial variety; and (c) except for the differences which result from the act of derivation, the new variety conforms to the initial variety in the expression of the essential characteristics that resulted from the genotype or combination of genotypes of the initial variety.

However, the application of these criteria has proved to be problematic, despite the guidelines provided in Article 14(5)(c) of UPOV (1991), and similar efforts by plant breeding organizations in that regard (Sanderson, 2009). Matters are made worse by the fact that the phrases, "predominantly derived", "essential characteristics" or "conforms to the initial variety" are not defined. Furthermore, a breeder who alleges that a subsequent variety was predominantly derived from his own bears the expectedly intricate task of proving that fact, especially where the subsequent breeder has managed to add at least an additional characteristic to the new variety.

More recent attempts have been made to use scientific methods, based on physically observable characteristics, and molecular characteristics, or a combination of these to prove genetic conformity between an existing variety and a subsequent one (International Seed Federation, 2004). One particularly interesting statistical tool applied

by scientists is the, "Jaccard statistical distance". This is used to compare the characteristics of both an initial variety and a subsequent variety. If the latter exhibits a "genetic distance" of more than 0.96, it is deemed to have been essentially derived from the former (International Seed Federation, 2005). Another strategy, which was propounded by Heckenberger et al. (2005), uses a "code of conduct" that has three ranges: below 82%, between 82 and 90%, and above 90%. If a subsequent variety measures a genetic similarity of below 82% with an initial variety, there is no presumption of essential derivation. If the genetic similarity is between 82 and 90%, there is a potential essential derivation. But, if the genetic similarity between both varieties measures above 90% then there is clearly a case of essential derivation (Sanderson, 2009).

Nevertheless, other scientists have faulted these quantitative techniques. This is because of the likelihood of variability in genetic readings dictated by peculiarities of plant species and differences in research methodologies (Staub, 2005; Rahman et al., 2002). More important for the discussion at hand is that a strategy which relies on genetic characteristics in order to determine essential derivation which could easily be circumvented by breeders who creatively select "molecular marker profiles" to ensure that the subsequent varieties measure below the genetic threshold necessary to trigger a declaration of essential derivation. Yet, those subsequent varieties may exhibit substantial qualitative similarity with existing varieties (Donnenwirth, 2004).

In order to overcome the shortcomings of the scientific approach to the determination of essential derivation, the courts, therefore, move beyond the mere assessment of the quantity of genetic similarities to also consider the qualitative similarities or differences between an existing variety and a subsequent one. The courts look to see whether a subsequent variety is significantly inventive and non-obvious, having regard to functional performance and related value to society (Sanderson, 2009). In *Astée Flowers versus Danziger 'Dan' Flower farm* (2005), the Hague Civil Court adopted this approach in resolving a dispute between two breeders and holders of European Community plant variety rights in relation to the *Gypsophila* plant variety. It considered the differences in the observable physical traits, as well as the structural configuration of both varieties, and held that, the differences were so significant as to justify the finding that the plaintiff had carried out a genuine breeding. The court rejected the defendant's counterclaim that the plaintiff's variety was an essential derivation.

Again, for indigenous communities whose biological resources have been pirated and utilized in the breeding of other varieties, a multiplicity of problems can be envi-

saged. First, if the test of essential derivation were applied, given the advances in modern biotechnology, plant breeders could still manipulate their breeding processes and effectively evade the threshold necessary to have their supposedly new varieties declared as essential derivations, even though they may be only minor adaptations of plants that were originally bred by indigenous communities.

Secondly, indigenous communities are largely strangers to the IP system, and are ill-equipped to meet the qualitative test applied by the courts to prove essential derivation. The truth, however, is that the criteria for obtaining rights over plant varieties derived from those initially bred by indigenous communities are less stringent, as plant breeders only need to show that they have derived distinct, uniform and distinct varieties. And distinctiveness is proven by identifying at least one observable physical difference.

Plant patents

As earlier noted, apart from protection under Convention for the Protection of New Varieties of Plants (UPOV), Article 27(3)(b) of the TRIPS Agreement requires WTO Members to protect plant varieties through patents, sui generis systems or a combination of both. Of course, based on UPOV (1991), it is now possible to seek both plant variety rights and patents for new varieties of plant. Once again, a vital question is whether plant modifications are inventive enough to merit patent protection.

Until recent times, plant varieties did not qualify for patent protection because they were considered incapable of meeting the criteria of inventiveness, non-obviousness and disclosure. Also, it was thought improper to grant monopoly rights over plant varieties in view of their communal significance (Llewelyn, 1997). Instead, plant breeders' rights under the UPOV system were conceived to cater for the interests of breeders of new plant varieties (Rimmer, 2003).

But the threats faced by breeders of existing plant varieties as a result of the problems associated with the UPOV regime, and the pressures of modern biotechnology led to the gradual but steady movement toward the patenting of plants, in addition to micro organisms and transgenic animals like oncomouse (Edelman, 1988). Nevertheless, thinking on this issue among scholars, courts and civil society organizations remains riddled with controversy.

In the U.S. case of *JEM Ag Supply Inc versus Pioneer Hi-Breed International Inc*, where farmers' unions, corporations, cereal trade associations, the biotechnology industry, IP lawyers, the American Bar, and the U.S.

Government pitched tents on one side, or the other, the majority of the U.S. Supreme Court held that utility patents could be granted to protect plants, in addition to protection under the Plant Patent Act (PPA, 1930) and the Plant Variety Protection Act (PVPA, 1970). But the minority sharply opposed this view, holding that the existence of both those Acts evidenced a legislative intent to exclude plants from the Patent Act (1952). They explained that the PPA (1930) was only meant to protect new and distinct plant varieties, other than a tuber-propagated plant that had been discovered and asexually reproduced, such as plants reproduced through grafting. In view of this, according to the minority, plants did not fall within the ambit of "manufacture" or "composition of matter", as used in the Utility Patent Statute, which was amended by the PPA (1930).

Relying on the dissenting decision of Justice Brennan in *Diamond v Chakrabarty*, the minority explained that life forms were outside the categories of patentable inventions, pointing out that the Patent Act (1952) should be construed in light of the PPA (1930) and the PVPA (1970). In *Chakrabarty*, the majority had held that live, man-made microorganisms were patentable under the U.S. Patent Act (1952) as being "any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof".

Likewise, in the Australian case of *Grain Pool of Western Australia v Commonwealth*, the majority of the High Court adopted the reasoning of the majority of the U.S. Supreme Court in *Chakrabarty*, and decided that plant varieties could be protected by patents as inventions under the intellectual property power provided in Section 51(18) of the Australian Constitution. The High Court likened a plant variety having distinct, stable and uniform characteristics to an invention, and a plant breeder to an inventor. Continuing the analogy, the Court compared the requirements of "distinctiveness, uniformity and stability" under the Plant Variety Rights Act (1987) and the Plant Breeders' Rights Act (1994) to "novelty and inventiveness" in patent law; just as it compared "common knowledge" and "recent exploitation" respectively, to "prior art" and "secret use" in patent law.

In the Canadian case of *Harvard College versus Commissioner of Patents*, the Canadian Supreme Court had to decide whether a transgenic mammal, oncomouse, was patentable. This case also aroused intense societal interest, with contributions from religious, environmental and animal rights groups as *amici curiae*. In the end, the majority of the Court held that oncomouse was not a patentable subject matter under the Canadian Patent Act (PA, 1985). The majority emphasized that the patenting of higher life forms was very contentious, and would amount to a fundamental change to the existing

patent system.

The Court maintained that it could not bring about such a radical change, unless there was an express legislative endorsement. It added that the existence of the Plant Breeders' Rights Act (PBRA, 1990) suggested that the legislature did not intend to extend protection to higher life forms under the Patent Act. Instead the PBRA, the Court noted, was designed to be a more appropriate mechanism to cater for plant materials and other products of biotechnology.

The minority, nevertheless, rejected these arguments. It insisted that biological inventions fell within the language of "manufacture" and "composition of matter" under the PA, and that the PBRA did not preclude the patenting of plants under that Act. In fact, both rights, the minority maintained, could be held together. The minority also pointed out that oncomouse had already been patented in other jurisdictions, including the U.S. and the European Union, leaving Canada as the only comparable jurisdiction to take a different view.

No doubt, arguments in support of the patenting of life forms are eloquent. In fact, the decision in *Oncomouse* alarmed many observers in Canada, including those in government circles. Notwithstanding, the truth may lean toward the majority view in *Oncomouse*, as well as the minority view in both *JEM Ag Supply Inc.* and *Grain Pool*, which doubt the propriety of such a step. To appreciate this, one only needs to remember the reasons why, historically, such a step was not accommodated. Plants, in particular, were considered incapable of meeting the requirements of patent law. Extending patents to plants was also perceived as controversial, given their communal importance; a point broadly reaffirmed by the majority in *Oncomouse*.

The movement toward the patenting of life forms, as Edelman observes, has only come about as a result of the pressures from commercial interests, propelled by modern biotechnology, mostly in the West (Edelman, 1988). Indeed, the above cases unearth the controversy engendered by the IP system, and the potential threats it poses to the holders of biological resources and TK, which are worsened by modern technological advances. Individuals, research institutes, pharmaceutical and biotechnological companies hunt for microorganisms and plants in indigenous communities, which they exploit for largely commercial purposes, under exclusive rights obtained through plant variety and patent laws.

In many cases, these rights are claimed based on purely superficial adaptations of biological resources that have been historically nurtured by indigenous communities, and which, in no way, come close to inventions that justify the granting of exclusive of IP rights. Apart from the *Hoodia* example, several other cases from

South and South-East Asia help to demonstrate this point. One such case involves *llang-llang* flowers which, a French fashion company, Yves St. Laurent, previously imported from the Philippines. It later established its own farm, where it bred *llang-llang* flowers that were developed from the species it had imported from the Philippines. These flowers were subsequently used to prepare a perfume formula for which it successfully obtained a patent (GRAIN, 1998a).

Even if Yves St. Laurent invested some intellectual effort in preparing its perfume formula, that does not negate biopiracy. This is because the formula was based on resources that were already in the public domain, and obtained without any benefit-sharing arrangements (GRAIN, 1998a). Another case involves *plan-noi*, a plant grown in Thailand, which has active ingredients, with healing properties that are well known to the Thais. Sankyo, a Japanese company, extracted active ingredients from these plants, which it obtained from Thailand, and patented them as "*Plaonol*". These are later sold as tablets called "*Kelnac*", for the treatment of ulcers (GRAIN, 1998a).

Similarly, although *tempeh*, a Vitamin B12-rich health food processed through the fermentation of soybeans, has long been associated with the people of Java in Indonesia, Japan has granted several patents on the process of making this product. Still another incident involved the bitter gourd, which is a plant grown in Thailand. Thai scientists had been working on this plant, which they found to contain compounds that could be active against HIV/AIDS. However, to their dismay, American scientists not only copied their research work, but also patented an active protein from a native Thai strain of the bitter gourd (GRAIN, 1998a). These incidents show how the IP system and modern biotechnology facilitate the misappropriation of the biological resources and TK of indigenous communities. Even if genuine inventions were proven, it is still an important question whether that excuses the appropriation of the biological resources of indigenous communities, without their consent and benefit-sharing arrangements.

In addition, it can be seen that the conditions stipulated for the granting of patents and plant variety rights would be more easily met by users of biological resources in technologically advanced countries, rather than indigenous providers in technologically poor countries. Thus, both regimes favour the owners of technologies, rather than the holders of the biological raw materials, which are adapted through the application of those technologies (Overwalle, 2005).

For example, patents require inventiveness, novelty, and industrial applicability, whereas biological raw materials and TK involve no inventive step, neither are

they novel, generally speaking, having been in the public domain and transmitted between generations (Cottier and Panizzon, 2004). Also, the patent system typically protects the rights of a private individual inventor, or a group of inventors, rather than collective rights, which characterize indigenous resources and TK (Posey and Dutfield, 1998). In the same way, plant breeders' rights are granted to breeders of plant varieties that are considered distinct, uniform and stable, and not to the natural parent plants in general that belong to indigenous communities (Overwalle, 2005).

These requirements are more compatible with the level of technology already attained by Western and other foreign users, rather than that of the indigenous communities, which own the biological resources, and are responsible for improving them and identifying their therapeutic properties (Blackeney, 1998). Added to these, are the costs of acquiring IPRs, and of monitoring infringements, as well as of enforcing rights, which are unaffordable to indigenous communities.

Put together, these factors clearly show that the IP system either way, does not sit well with the interests of indigenous communities. On the one hand, indigenous communities cannot meet the requirements for obtaining IPRs, and on the other hand, the system enables foreigners to obtain and exploit their biological resources without their consent and appropriate compensation. The biological resources of indigenous communities are treated like the "common heritage of mankind", with free access to all and sundry (Brush, 2003).

THE CBD (STATE SOVEREIGNTY) VERSUS "COMMON HERITAGE" AND "GLOBAL COMMONS"

The doctrine of common heritage of mankind

The notion of "common heritage" has been traced to a certain Ambassador Pardo, who in 1967, used the term to describe places like the Antarctica, outer space, the ocean bed and the resources they contain (Brody, 2010). And for a while, the notion was also espoused by the Food and Agriculture Organization (FAO), with regard to genetic resources relevant to food and agriculture, as can be seen in Article 1(1) of its International Undertaking on Plant Genetic Resources for Food and Agriculture (1983), which stated that the Undertaking was based on "the universally accepted principle that plant genetic resources are a common heritage of mankind and consequently should be available without restriction" (Brody, 2010). This means that nobody can claim sovereignty over those resources.

But this notion, in combination with the lopsided nature

of the IP system, the advances in modern biotechnology and the accompanying spate of biopiracy, grossly disadvantaged indigenous communities, since the implication was to place their resources squarely at the disposal of technologically developed user countries. Therefore, just as the challenges posed by those who bred subsequent plant varieties from existing protected varieties led to calls by plant breeders' rights holders for the better protection of their rights through changes in the prevailing plant variety regime, indigenous communities and their supporters started to clamour for the protection of their own resources and TK from misappropriation by the holders of plant breeders' rights and patents. Consequently, the common heritage notion was reviewed and eventually jettisoned with the adoption of the CBD (Overwalle, 2005; Brody, 2010).

The Doctrine of State Sovereignty over Biological Resources and Traditional Knowledge

In its preamble, the CBD affirms that states have sovereign rights over their biological resources, while Article 3 acknowledges their rights to exploit those resources, subject to the provisos stated therein. As a direct biopiracy counter measure, Article 1 outlines three objectives, the third of which mandates the equitable sharing of the benefits derived from the use of genetic resources.

The principle of equitable sharing is further elaborated in Article 15(7), which requires appropriate measures to be taken for the purposes of sharing, in a fair and equitable manner, the results of research and development and the benefits arising from the commercial and other uses of genetic resources with provider countries. In furtherance of the equitable sharing objectives, Article 15(5) provides that, unless otherwise determined by them, access to genetic resources are subject to the prior informed consent of provider countries. This consent is to be based on full and complete information given by the prospective genetic resource user, prior to the granting of access to the genetic resource (Glowka, 1994).

Also, based on the sovereign rights of states over their biological resources, Article 15(1) states that the right to grant access rests with national governments in provider countries, and is subject to their national legislation. And, in order to ensure the equitable sharing objective stipulated in Article 15(7), Article 15(4) provides that access where granted should be on the basis of terms mutually agreed between the provider country and the user of the genetic resources. The Article 15 principles are also repeated in the Bonn Guidelines on Access to Genetic Resources and Benefit-Sharing that was subsequently

adopted by the Conference of the Parties to the CBD on April 19, 2002 in The Hague, Netherlands.

Apart from genetic resources, the CBD in Article 8(j) also attempts to protect the TK of indigenous communities by requiring each signatory to respect such knowledge and encourage the equitable sharing of the benefits derived from its use. Following the adoption of the CBD, Annex III was introduced into the FAO's International Undertaking, which affirmed that the notion of "common heritage", as used in the Undertaking, is subject to the sovereignty of states over their genetic resources (Brody, 2010).

The Nagoya protocol to the CBD (2010)

On October 29, 2010, the Conference of the Parties to the CBD adopted a Protocol in Nagoya, Japan meant to implement the provisions of the CBD, especially Article 15, thereof. The Protocol in its preamble, further reaffirms the sovereignty of states over their natural resources, and stresses the importance of benefit-sharing on mutually agreed terms.

According to Article 5 of the Protocol, benefits from the use of genetic resources and associated TK, including their applications are to be shared in a fair and equitable manner, based on mutually agreed terms between providers and users, in accordance with Article 15 of the CBD. Furthermore, each Party is to take legislative, administrative and policy measures to implement these provisions. Article 6 reiterates that access to genetic resources is to be based on the prior informed consent of the providers, in the exercise of their sovereignty, and in accordance with their domestic access and benefit-sharing laws. Each Party is also required to ensure that the consent of indigenous communities is duly obtained and that they are involved in the process.

Equally important are Articles 15 and 16, which require each Party to ensure that genetic resources and TK used in its territory have been obtained based on prior informed consent and equitable benefit-sharing on mutually agreed terms in accordance with the domestic laws of the other Party. Each Party is also take appropriate, effective and proportionate measures to cooperate and provide redress in situations of non-compliance with these requirements.

Under Article 18, Parties are required to encourage providers and users of genetic resources and TK to include as part of their mutually agreed terms, dispute settlement mechanisms, including arbitration and mediation. They are also to ensure that an opportunity to seek redress is available under their legal systems in disputes over mutually agreed terms, subject to jurisdictional requirements.

The doctrine of global commons

Nevertheless, the CBD has come under criticism. For example, the U.S. refused to sign the Convention because of reservations over its impact on businesses and IPRs. In particular, the requirements of prior informed consent and benefit sharing arrangements, which have been introduced, based on the CBD, into the IP law of some developing countries, such as India, as well as those in the African Union (AU) and the Andean Community, as conditions for recognizing IPRs, have also been criticized as being incompatible with TRIPS (Article 27(3)(b)).

Moreover, in a recent commentary, Brody (2010) attacked the notion of state sovereignty over genetic resources, which underpins the CBD. Although Brody acknowledges that states, as a result of their territorial sovereignty, can control access to biological resources within their borders, and claim part of the benefits derived from them, he objects to the extension of that power to cases where information was obtained, or a patented material was used outside a state's territory.

What Brody is advocating, in other words, is the "global commons" doctrine. As he describes it, this doctrine treats biological resources just like any other resources. Unlike the common heritage doctrine, it allows researchers who use genetic information to make useful products to patent those products. Also, unlike the state sovereignty doctrine, it allows researchers to use biological material found outside a state's territory, for example, in seed banks, to conduct studies in order to obtain genetic information for the making of patentable products, without being under any obligation to share the resulting benefits with the state of origin of the biological material.

Brody points to a clause in Decision 391 of the Andean Community "Common Regime on Access to Genetic Resources" (1996), which states that Members may institute actions requesting the nullification of IPRs over genetic resources and associated products that were obtained or developed through an access activity that does not comply with the provisions of the Decision, and casts doubts over its viability or justification.

In an apparent support of these claims, Brody alludes to an assertion by GRAIN, an NGO (GRAIN, 1998a) that whilst the CBD and the notion of state sovereignty which it propagates may hold sway within a state's internal borders, in a clash between a sovereign state and a foreign IPR holder, the state's jurisdiction cannot trump the IPR holder.

In addition, he refers to the view expressed by the International Chamber of Commerce (ICC, 2006) that the doctrine of sovereignty advocated by the CBD does not

create any new property rights in genetic resources, or nullify other possible rights, presumably, IPRs. Instead, it only restates the traditional principle that sovereign states have the power to control what takes place in their territory. Thus, states can only control access to biological resources within their internal borders.

Finally, Brody relies on a remark credited to another NGO (Third World Network, 2001) to the effect that since TRIPS does not require prior informed consent as a condition for granting IPRs, it does not recognise the rights of a state, which hosts biological resources or the knowledge of their use. Therefore, applicants can seek for, and patent offices can grant IPRs over such resources or knowledge, without verifying whether they have obtained the prior informed consent of the host state.

Based on these sources, Brody contends that state sovereignty should not extend to actions performed outside a host state on biological resources obtained outside that state. He illustrates this with the example that if a biological material has been "lawfully", obtained from a host state and deposited in an international repository for plants and animals, there should be no basis for the exercise of state sovereignty.

Brody argues, that in all these cases, it is the sovereignty of the state in which the use takes place that is violated, and not that of the host state. Thus, once a genetic material has been removed overseas, state sovereignty is inapplicable.

Therefore, according to Brody, by seeking to extend state sovereignty to cover these instances, beyond those occurring within the internal borders of a host state, the CBD is overreaching, and demands further justification. He charges that this doctrine is at odds with the interdependence of states, because states are likely to manage their genetic resources in self-serving ways without due attention to how their actions impact the rest of the world. In view of all this, Brody suggests that the global commons doctrine is more likely to better cater for global interests.

Examining the concept of sovereignty

Sovereignty is one of the most contested concepts in political science. Since its emergence in political science discourse, the concept has persistently defied a universally accepted meaning (Oppenheim, 1928). Some scholars (Krasner, 1989) have doubted its continued relevance in contemporary International Relations (IR), whilst others (Camilleri and Falk, 1993) have gone as far as to declare its demise.

Without doubt, the concept of sovereignty has evolved over time, in step with historical changes, culminating in

corresponding shifts in its significance for states and IR. The advent of economic globalization, the rise of supranational bodies such as the UN, the EU, and the WTO, in addition to INGOs, as well as the global enforcement of human rights, have tended to circumscribe state sovereignty (Brahm, 2004). Nevertheless, it seems unduly hasty to proclaim its end and to seek to consign it to the rubbish bin of history. After all, states have continued to rely on the concept to justify their freedom to act within their internal borders, and their independence from embarrassing foreign interference (Fowler and Bunck, 1995).

Thus, putting aside its ever changing nature, sovereignty may be said to denote the power of a state with a government, a people, and a defined territory to do everything necessary to govern itself, including the making, the execution, and the application of laws, in both civil and criminal matters, free of unwarranted interference from other states or foreign actors; it is a state's exclusive right of control over persons, things and activities in its territory (Brahm, 2004).

Since the power of a state to make, adjudicate and enforce laws, otherwise called jurisdiction, is based on sovereignty, that power has traditionally been territorially limited (Blakesley, 1999). Several reasons underlie the territorial limitation of jurisdiction. One of these is to ensure uniformity and certainty in the way states use jurisdiction, and in that way, avoid the kind of arbitrariness that would lead to the abuse of legal processes and individual rights. Another reason is to preserve international orderliness by preventing clashes between states seeking to assert jurisdiction (Bassiouni, 1999).

In the *Lotus*, the dissent, Judge Altamira, observed that one of the most generally accepted principles of international law is the territorial nature of jurisdiction. This being so, the learned Judge thought it unacceptable and unwarranted for a court, on the basis of its domestic law, to seek to exercise jurisdiction over an alien outside its territory, for acts committed outside that territory. The only exception to the territorial limitation of jurisdiction related to instances of criminal conduct by a state's citizens abroad, under the "active personality principle" (Harvard Research in International Law, 1935).

Over time, however, there has been a shift toward the extraterritorial application of national laws. This happens where the conduct in question, even if it occurred outside a state's territory, produces some harmful effect in that territory ("protected interest" or "objective territoriality" principle), or if it harms its citizens ("passive personality" principle) (Blakesley, 1999).

No doubt, the unrestrained exercise of jurisdiction can lead to the harassment of individuals and the rupture of comity between states. Caution is therefore necessary.

Still, a careful examination of the jurisdictional rules already cited to, would show that there is a reasonable basis for the extraterritorial enforcement of a state's sovereign rights over its biological resources and TK. As explained, biopiracy involves the misappropriation of the resources and TK of indigenous communities. These are interests of important social, cultural and economic value, not only to the immediate indigenous communities that harbour them, but to the state or society at large.

Viewed in this way, piracy can be said to injure a state's interests and, therefore, in defense of such interests, an affected state can seek to sanction such conduct, even where it occurs outside its territory. This is the principle of protective interest, of which the CBD is arguably an affirmation. Thus, where biological resources or TK have been pirated and exploited abroad, the harm thereby done to a state's interest is a sufficient connecting factor for the affected state to protect that interest extraterritorially. This can be by way of a petition before the appropriate department, such as the Patent Office, in a foreign state seeking to nullify whatever rights may have been acquired through the use of such resources or TK, or through litigation in the foreign court.

Thus, in the *Neem Case* (Commission on Intellectual Property Rights Report, 2002), India successfully petitioned the United States Patent and Trade Mark Office (USPTO), as well as the European Patent Office (EPO), and secured the nullification of patents that were wrongly granted to a U.S. company, W.R. Grace. This was because the patents were based on products made from pirated extracts from the neem tree that had been bred through traditional Indian plant breeding system, and whose chemical properties the Indians had long recognised.

Again, in the *Tumeric Case* (Commission on Intellectual Property Rights Report, 2002), India successfully secured the nullification of a patent that had been granted to two Indian nationals in the U.S. by the USPTO over the use of the tumeric plant in the healing of wounds. The reason was that the patent was based on pirated TK, already well established in Indian traditional medicine.

As it were, these cases arose under the IP system. If states can successfully protect their interests in biological resources and TK against abuses of IPRs further ashore, it is difficult to understand why the extraterritorial enforcement of the same interests, as reinforced by the CBD, should be viewed differently. In any case, based on Articles 15, 16 and 18 of the Nagoya Protocol, states whose resources and TK have been pirated in violation of their domestic laws are entitled to seek redress, and other states are obliged to cooperate and provide appropriate opportunities for such redress.

Indeed, the contention that IPRs can trump the sove-

reign rights of states to their biological resources and TK under the CBD is unpersuasive. As has been cogently argued (De Carvalho, 2000; Tobin and Barber, 2003), insofar as Article 8 (2) of the TRIPS Agreement permits Member States to take appropriate measures to prevent the abuse of IPRs, a state can sanction any taking of its biological resources or TK, whether directly, or indirectly, in violation of its laws requiring prior informed consent and benefit sharing.

Equally, they have the right to apply their domestic legislation in preventing IPRs from being exercised in ways that conflict with their healthcare requirements, of which biological resources and TK are an essential part. Additionally, based on Paragraph 4 of the Doha Declaration, TRIPS should not only be interpreted, but also implemented in ways that are consistent with the rights of other Member States. That Declaration affirmed that IPRs should not undermine the developmental needs of developing Member States, and acknowledged the importance of broadening the task of the TRIPS Council to cater for the protection of TK.

Furthermore, if it is argued that the requirement that applicants for IPRs should disclose the source of origin of biological resources or TK that have been used, or proof of prior informed consent and benefit-sharing arrangements, as a substantive element of state legislation, are contrary to TRIPS, that requirement could alternatively be viewed as a procedural one within the rubrics of Article 62 of the TRIPS Agreement, which talks of "reasonable procedures" (Hassemer, 2004).

For the avoidance of doubt, this is not the only instance where states have tried to pursue their interests extraterritorially in recent times. The antitrust laws of the U.S. are known to have extraterritorial effect. In fact, attempts by the U.S. Justice Department to enforce U.S. antitrust laws were one perceived as amounting to intolerable invasion of the sovereignty of the U.K., compelling the Government to pass the Protection of Trading Interest Act of 1980 (Blythe, 1983). Another glaring example is the Special Section 301 of the Trade Act, 1974. The Office of the United States Trade Representative (USTR) by placing foreign states on differentiated Watch Lists pressurizes them to control what it considers the harmful pirating and counterfeiting of American products, and also dissuades them from invoking compulsory licences that are considered to threaten the interests of American pharmaceutical companies.

Therefore, contrary to Brody's comments, where scientists or institutions and corporations use the knowledge of indigenous communities, or their biological resources, whether obtained directly or laundered through apparently legitimate repositories, they should not be immune

to challenge by the affected state. To argue the opposite would lead to the untenable result that an act of piracy ceases to be unlawful because the pirated material has successfully been removed from the host state to a foreign state where it is being exploited. Apart from the provisions of the Nagoya Protocol, that action could be caught by the doctrine of “unclean hands”.

In *Keystone Driller Company versus general Excavator Company*, the U.S. Supreme Court observed that if the conduct of a party is so offensive to the dictates of natural justice, whatever rights he may hold and however he may apply them at law, the court of equity will not afford him any remedy. Undeniably, the pirating of the biological resources and TK of indigenous communities is foreboding. It threatens their survival, and is inequitable.

Brody’s arguments relating to central depositories bring to mind the activities of the International Rice Research Institute (IRRI) in the Philippines, an arm of the Consultative Group on International Agricultural Research (CGIAR), which functions under the World Bank. IIRI initially collected seed varieties from farming communities in Asia at the beginning of the 1960s, for research purposes alleged to be beneficial to poor communities.

Ironically, however, a disproportionate amount of the benefits accruing from IRRI’s activities are being channelled to Western plant breeders, who get almost exclusive access to IRRI’s collection of seed varieties from which they develop the so-called “new varieties”. For example, records indicate that about three-quarters of U.S. rice harvest are from varieties supplied by IRRI. These supplies enrich rice producers in the U.S., Canada, Australia and New Zealand by about USD 655 million annually, whilst many go hungry in South and South-East Asian communities (GRAIN, 1998a).

Furthermore, where biological resources or information have been pirated and exploited in a foreign state, it is not the sovereignty of the foreign state that is violated as Brody claims. This is because the pirated material does not belong to that state. Rather, it is the sovereignty of the state where the pirated material or TK originated that has been violated, and that state has the greatest interest in sanctioning such misconduct. Under the Nagoya Protocol, the latter state also has a duty to cooperate in such cases.

The fact that these protection regimes; patents and plant varieties, favour the users of biological resources, rather than their holders, helps to explain why neither the common heritage of mankind doctrine nor its global commons counterpart, is in the interest of the holders of such resources and the associated TK. This is because the predictable result would be the plundering of the biological resources of indigenous communities, and the laundering of such resources through minor scientific

tinkering, masquerading as “genetic engineering” or “invention”, which are economically exploited through patents or plant breeders’ rights.

These facilities are mainly available to the users of biological resources, who pay no compensation to their traditional custodians. This is not only morally unjust, but is also illegal in that it violates other international instruments, such as the UN Declaration on the Rights of Indigenous Peoples (2007), which recognises and establishes the rights of indigenous peoples over their resources, in addition to the CBD and the Nagoya Protocol.

Conflict between the CBD and TRIPS

Without doubt, there is a conflict between the CBD and TRIPS, and this problem must be tackled. The CBD fosters the interests of developing countries, and the protection of biodiversity, while TRIPS aims to protect the private interests of corporations, mainly in developed countries (Jungeurt and Meyer, 2006). Unlike the CBD, TRIPS does not accommodate the idea of state’s sovereignty over their biological resources, neither does it mandate access based on the consent of holders and the equitable sharing of benefits with them. In fact, it does the opposite by facilitating biopiracy. Yet, a purposeful reading of the TRIPS provisions, including Articles 7, 8(1), 30 and 73, would show that TRIPS and IPRs can serve broader societal objectives, beyond the protection of corporate interests. The Doha Declaration of November 2001, and the August 2003 Decision are a further affirmation of this point.

Developing countries should interpret TRIPS flexibly, and effectively incorporate the CBD provisions into their domestic laws. They should exclude the patenting of their biodiversity. Developing countries should form a united front, and not succumb to attempts by developed countries to expand the reach of TRIPS, such as by advancing the UPOV model of *sui generis* protection as the only possible mode of protection (Sahai, undated). They should continue to campaign, at appropriate fora, with the support of civil society groups, for a redefinition of the scope of TRIPS. The ultimate goal should be to accord priority to the provisions of the CBD, which in Article 22, excuses Parties from carrying out their obligations under any other treaty, such as TRIPS, where to do so would endanger biodiversity (Sahai, undated).

Shortcomings of the CBD and the Nagoya protocol

Yet, it must be recognised that the CBD has its own

shortcomings. It provides for prior informed consent and the payment of compensation to indigenous communities. But practical problems of compliance could arise because biological resources and associated TK may be held by different indigenous practitioners and communities, often dispersed across geographical borders. This presents difficulty to foreign users as to how to determine the actual right-holding community and the members of such a community. In the Hoodia, Phytopharm's excuse for not informing the San was that it had made several enquiries, but was unsuccessful in locating the people, who were believed to be sheltering in tents far removed from their tribal homelands (Commission on Intellectual Property Rights Report, 2002). Moreover, it is not clear who may represent indigenous communities in access and benefit-sharing discussions.

Additionally, the validity of *sui generis* protection systems is, generally, territorially limited (Dinwoodie, 2005), whereas the misappropriation of biological resources and TK can occur overseas, thus weakening such options, and presenting problems of enforcement (Timmermans, 2003). Some of the above issues are addressed in the Nagoya Protocol. But it must immediately be noted that although the Protocol marks some progress in the protection of the biological resources and TK of developing countries, a good number of the provisions are weaker than developing countries had bargained for. Still, there are clear options open to them under the Protocol.

OPTIONS FOR DEVELOPING COUNTRIES

As already pointed out, Article 5 of the Protocol provides for the equitable sharing of benefits resulting from biological resources and their subsequent uses. Here, developing countries can indicate in their domestic laws minimum requirements that can be considered to meet the condition of equitable sharing (Nijar, 2011).

They should also ensure that their obligation to grant access are properly matched with the corresponding obligation on the part of developed countries to ensure compliance and contribute to technological diffusion, as well as funding (Nijar, 2011). The issue of technology transfer is pertinent because the Protocol unfortunately undermines the related provision in Article 16(4) of the CBD. Developing countries should try to restore that provision through a decision of the Conference of the Parties acting as a Meeting of the Parties (COP/MOP) (Nijar, 2011).

Of significance is the WHO Agreement reached in April, 2011 on the sharing of viruses and vaccines. That Agreement was meant to redress the gross imbalance in the

previous arrangement, which was seriously challenged by Indonesia. Developing countries had been asked to relinquish ownership over influenza viruses, which are part of their genetic resources, and to grant automatic access. They deposited these viruses at WHO centres, which are all located in developed countries (ICTSD Reporting, 2011; IP WATCH, 2011).

Pharmaceutical companies in developed countries then obtained those sample viruses from WHO, patented them, as well as the vaccines developed from them, which they sold at prices unaffordable to developing countries. As a result, many people in developing countries died from the H5N1 virus because they could afford the high costs of the vaccines. Indonesia challenged that arrangement as it provided no benefit sharing, access to vaccines or transfer of technology. Under the new Agreement, pharmaceutical companies offered to pay 50% of the costs of administering the global influenza monitoring scheme and to supply 10% of vaccines and ARVs to developing countries (ICTSD Reporting, 2011; IP WATCH, 2011) Although this is good step forward, these commitments are far too little in meeting the needs of developing countries that constitute a greater part of the global population (Third World Network, 2011). Developing countries should, therefore, campaign to have these targets increased.

It should be recalled that, on the very important issue of compliance, Article 15 clearly requires user countries to establish mandatory compliance measures that are "effective, appropriate or proportionate." The Article, however, fails to clarify the criteria for determining such a standard. An option for developing countries is to seek appropriate clarification from the COP/MOP. Alternatively, they can spell out clearly in their domestic law what would constitute such a standard, and on that basis, refuse access to users whose home countries have not adopted measures, which meet that standard (Nijar, 2011).

Norway provides an example of how user countries may implement this obligation. According to the Nature Diversity Act No, 100, Section 60 (2009), the importation into Norway of any genetic material requiring consent can be done only if that consent has been obtained. In case of any violation, Norway may sue the offender on behalf of the party requiring the consent (Nijar, 2011). Under the Protocol, user countries are obliged to cooperate where the law of a provider country on access and benefit sharing has been violated. The provider country can seek a remedy against the offender, and the country where that offending user is located has a duty to cooperate. Any refusal to cooperate must be justified, otherwise that could constitute an act of non-compliance with the Protocol under procedures to be established by the

COP/MOP (Nijar, 2011).

To ensure compliance and monitor the use of biological resources, Article 17 of the Protocol requires Members to establish checkpoints. Developed or user countries are hesitant in implementing this provision. Developing countries can induce compliance by providing in their domestic laws that access will be denied to users whose home countries have failed to establish effective checkpoints. User countries that have established checkpoints, for example IP Offices, must clearly identify same to the provider countries. There must also be mandatory disclosure of the use of biological resources, origin, consent, and equitable benefit sharing arrangements through the tendering of an appropriate international certificate as provided for under the Protocol (Nijar, 2011).

Moreover, although under the Protocol checkpoints may refuse to furnish information received on grounds of confidentiality, developing countries should strive to limit what could qualify as “confidential” information. They can seek guidance from Article 21 of the Cartagena Protocol, and enact similar provisions in their domestic law. Under the Cartagena Protocol, a Living Modified Organism (LMO) exporting party who claims confidential information must justify it. The importing party may deny such a claim, with due regard to specified safeguards. In addition, under the Cartagena Protocol some forms of information are excluded from confidentiality claims (Nijar, 2011).

As indicated earlier, Article 18 of the Nagoya Protocol requires user countries to ensure that provider countries get access to justice in their judicial system, where the terms on which access was granted have been breached. Since the benefit sharing agreement is a contract, provider countries can sue the user in his home country. Although, the precise scope of this provision was the subject of a fierce debate between developed and developing countries during the negotiation of the protocol, useful insights into its meaning could be gained from the Aarhus Convention on Access to Information, Public Participation in Decision-making, and Access to Justice in Environmental Matters (Nijar, 2011).

That Convention makes it clear that, “access to justice” encompasses the duty to provide affordable legal or administrative means to seek redress at affordable costs against violations of domestic law, as provided for under Article 18(2). The terms also permits a broad array of other interested parties, such as indigenous communities, and NGOs to challenge such breaches of the domestic law of a provider country, whether in court, or before an impartial independent body. Developing countries may clarify this in their domestic law, or seek a confirmation from the COP/MOP (Nijar, 2011).

CONCLUSION

Biological resources and TK are of immense importance to indigenous communities. They provide food, and medicine, just as they generate employment and income for those communities. They also serve as a source of cultural pride and identity. Biopiracy, spurred by IPRs and modern biotechnology, threatens to undermine these benefits. The internationally agreed CBD is, therefore, justified in that it attempts to provide a bulwark against this situation, and to help indigenous communities regain some control by imposing prior informed consent and the equitable sharing of benefits on mutually agreed terms, as conditions for access.

Whilst indigenous communities would doubtlessly continue to confront biopiracy, they can, at least, assert more control over their resources, stipulate conditions for access and monitor infringements. State sovereignty over biological resources and associated TK, as established by the CBD, also strengthens the standing of indigenous communities in any challenge mounted against the holders of patents, plant breeders’ rights, or any other related rights, which have been acquired illegitimately through biopiracy and bio-laundering. These instruments open the way for them to seek appropriate remedies.

Surely, the CBD has its limitations, as has been pointed out. The Nagoya Protocol attempts to address some of those limitations, although it too has its own shortcomings, especially since it was largely based on compromises. Still, the CBD and the Nagoya Protocol are important steps in the safeguarding of the biological resources and TK of indigenous communities against biopiracy.

ACKNOWLEDGEMENT

The authors would like to thank Universiti Kebangsaan Malaysia for supporting this research under the UKM-AP-CMNB-21-2009/1 grant.

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