Biological Diversity

The Convention on Biological Diversity and TRIPs
Relationships and Synergies

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1. Introduction

The Convention on Biological Diversity (CBD) was signed in 1992, with a view to conserving and using the world's biological resources in a sustainable manner. It was agreed that states had the sovereign right to exploit their own resources according to their environmental policies and to ensure that the use of these resources did not cause damage to their own environment and to that of other nations. The Convention seeks to develop a closer and more understanding relationship between those who provide biological resources for use in new inventions, such as local communities in developing countries, and the users of the biological materials, the innovators of new products and technologies.

The use of biological diversity has become closely linked with the biotechnology industry, especially in industrialised countries in recent years. Sectors which use biological resources heavily, such as pharmaceuticals, agricultural biotechnology and plant breeding, among others, have been accused of exploiting biodiversity at the expense of local communities that have spent centuries conserving it and using it sustainably.

The TRIPs agreement which formed a part of the Uruguay Round of Multilateral trade negotiations, was signed in 1994, bringing in an era of stronger IPRs which bound all members of the WTO to comply with the new regulations or face punitive trade sanctions. While biotechnology and plant breeding before that, have been inextricably linked to the use of biological resources [1], there is no mention in the TRIPs agreement of the Convention and explicit reference to intellectual property rights in a few articles in the Convention. Moreover, the Convention makes no explicit references to trade issues and their impact on biological diversity. This is due to the fact that the Convention was signed before the outcome of the Uruguay Round was known and it was felt that such discussions should await the conclusions of the Round.

The inclusion of biological material in the TRIPs agreement, either through patent protection or through other forms of sui generis protection, has raised a number of fears in industrialised and developing countries. There is a fear that providing protection of this kind will open up a pandora's box of ills as genetically engineered plant and animal species are produced and released into the environment. This has resulted in opposition to genetic engineering in a number of European countries, on ethical grounds, where public opinion has tended to be opposed to some kinds of research and development in this field. The recent failure to approve the European patent directive was largely the result of public pressure on the European Parliament. In developing countries, the concerns relating to biotechnology are somewhat different and deal with the question of whether IPR protection will result in a greater privatisation of resources, thereby reducing access by indigenous communities and depleting biological resources at a faster rate. This paper concentrates on the second issue, while acknowledging the importance of the debate on the ethical and moral dimensions of patenting plant and animal species.

Whether these reactions by the public are deemed excessive or justified, it is clear that there are a number of ways in which intellectual property rights and their interpretation according to the TRIPs agreement, will have a direct or indirect bearing on several objectives of the CBD. A few of these include the issues of technology transfer on equitable terms, the privatisation and depletion of biological resources, and the impact on indigenous knowledge.

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[1] Swanson, (1995) for example shows that two of our most important industries, agriculture and pharmaceuticals are heavily reliant on biodiversity for continued innovation, and that the industries have to continually replenish their 'stock' of wild germplasm.

While the previous literature has either looked at the TRIPs agreement and its impact on developing countries (eg Reichman, 1994 who also looks at implications for new technologies such as biotechnology), or the legal implications of TRIPs (see eg, Acharya 1996), very little examination of the linkages between the CBD and the TRIPs agreement has taken place 2. As specified by the Conference of the Parties to the Convention, at the second meeting in Jakarta in November 1995, this paper examines the relationship between the Convention and the TRIPs agreement and attempts to identify issues of possible conflict and the way in which these potential conflicts can be resolved and synergies developed between the two agreements. It is argued that while the relationship between the two has tended to be confrontational, given the possibilities for cooperation that are in the interest of both agreements, this need not necessarily be the case.

The second section examines briefly the history of the TRIPs agreement and the reasons behind why it was introduced in the Uruguay Round of Trade Negotiations. While no reference was made to biodiversity in the Round, this section examines the relationship between TRIPs and biological diversity and the reasons for why developing countries in particular opposed the inclusion of TRIPs.

Section 3 provides a more detailed examination of the relationship between the Convention on Biological Diversity and the TRIPs agreement and how a strengthened intellectual property rights regime may affect the goals of the Convention. Finally, section four discusses how the relationship between the two can be made stronger and more effective in ensuring that the implementation of the CBD occurs without prejudicing the provisions of TRIPs.

2. Historical Precedents of TRIPs and its Relation to Biodiversity

The TRIPs negotiations were initiated largely by the industrialised countries which are the major holders of intellectual property rights today. Pressure was brought to bear on these countries by their major industries which were experiencing a downturn in their markets and also increasing pressure from their major competitors. While the recessionary tendencies of the early 1980s were no longer a major problem by the early 1990s, companies continued to experience competition which was fiercer than many had experienced before. The rapid rate of technological change, especially in industries such as pharmaceuticals where biotechnologies are being used most extensively in industrialised countries, is reducing the length of product life cycles and increasing pressure on companies to increase investment in R&D to maintain their technological advantages. The length of time taken today by a pharmaceutical company to develop a product from initial screening of biological material for useful compounds, to product development has been estimated to be anywhere between 10 and 20 years, and probably closer to the latter date. The cost of investment in a new product has also increased severalfold over the last decade, placing pressure on companies to try and recover their initial investment and also try and maintain market leads for as long as possible.

It has been argued, that if companies are not provided an incentive to recoup their initial costs, their optimal level of investment in R&D will not be as high as desired by society. Mansfield, 1977 for example in a study of several US industries, found that while the median social rate of return, i.e., the benefits of investment to society was 56 percent. However, the private rate of return in the same case, was only around 25 percent. A major reason for this as the study points out, is

[2] See for example, the papers by Purdue, 1995 which presents a political analysis, Cameron and Makuch, 1995 which presents a legal perspective and the paper by Gadgil and Devasia (1995) which alternative methods of extending protection to biological resources.

that the benefits of innovation cannot often be contained by the inventor and instead spill over to and benefit competitors. According to this view, investment by private investors is less than optimal, especially in areas where the initial investment required is high and it is not possible for the inventor to protect the invention that results from the investment. A policy tool is therefore required to induce a high enough rate of investment in R&D.

Governments in general have chosen two ways in which to provide incentives for high-technology firms. One way is by providing a direct subsidy to the firm, which induces increased investment, while the other way of way of ensuring that companies do invest optimally in R&D is to grant them monopoly rights. This is precisely what patents were designed to do in modern IPR regimes. The monopoly rights granted by IPRs such as patents, not only enable companies to recoup their R&D costs, they also enable the firm to remain competitive and capture market share before it is pushed out of the market by the next generation of innovators[3]. The monopoly power granted by IPRs (usually between 15 and 17 years in most OECD countries before the TRIPs agreement was signed), also enables firms to maintain a foothold in the market and invest in the next generation of innovations. Rising competition in the new technology industries resulted in pressure by these industries on their governments and the TRIPs negotiations were launched.

In contrast, some of the most vocal opposition to the inclusion of intellectual property rights in the GATT round came from developing countries for the following reasons:

1. Technology transfer and development of technological capabilities are high up on the agenda of most developing countries. A number of countries have developed substantial technological capabilities because their governments have provided them with weak patent protection. By requiring them to strengthen their IPRs, the international community would be denying them the ability to develop technologically. Technological capabilities are also seen as crucial for the conservation of biological diversity in the CBD [4].

Furthermore, it has been remarked that the industrialised countries not so long ago, used intellectual property rights legislation to import and imitate technology rather than to restrict its use [5]. The development of "adequate" intellectual property rights therefore, historically has been related to the level of technological development of a country (Evenson, 1993 for example, Primo Braga, 1993).

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[3] The process by which a new invention displaces an older product has been described as "creative destruction" in the literature, where a firm produces a new technology, and captures the entire market but destroys all monopoly profits of the older inventor in the process.

[4] The ability to develop their own technologies is important not just from the point of view of developing indigenous technologies for conserving biodiversity, it is also necessary for importing technologies from patent holders.

[5] David (1993) for example has argued that during the 18th century, when the old world countries like the UK were using patents to encourage invention, in the American courts, technology transfer from the old to the new world was considered far more important (Mody 1990 also argues that in the past the US was "a technology pirate par excellence"). Patents were also granted for inventions that were considered to be of potential benefit to the country, even if their inventive content was dubious (See David, 1993 on this issue and also OTA (1988)). Thus even those countries that today are arguing for stronger intellectual property rights, used IPRs not so long ago, to import technology and facilitate knowledge diffusion rather than its purpose today which is to restrict the use of patented information without a royalty payment.

The use of intellectual property rights however is not altogether alien to developing countries. Most developing countries have provided some form of intellectual property rights to inventions made by foreigners and by nationals. However, the balance between the right given to inventors, which is the monopoly right conferred by the patent, and the right of society to have access to knowledge is often different across countries.

Society's right of access to knowledge generated by each invention is not an altruistic provision built into IPR regimes. Instead, the rate of technological change is enhanced by this disclosure as it provides information relevant for the latest range of inventions, and which can aid the next generation of inventors to produce new inventions. The literature on technology has demonstrated the importance of knowledge spillovers for the next generation of inventors (see example Romer, 1990 for a theoretical discussion of this, or Arrow (1962) on the importance of learning for innovation). It is often argued that if patenting were not a feasible option, most innovators would resort to non-institutionalised forms of protection such as trade secrecy. As this would be less beneficial to society, according to this argument, since it would result in all information remaining secret and proprietary, patents are preferable to society because they aid in the furthering of knowledge and innovation. All countries therefore, developing and industrialised have included the disclosure requirement in their IPR regimes no matter how broad the scope of protection. The balance in favour of disclosure however has been greater in the case of developing countries because of the belief that the spillover of technology to aid the next generation of inventors is as important or perhaps more important than rewarding one particular individual. The TRIPs agreement, by extending the period of protection to twenty years and by including product and process patents, has broadened the scope of IPR regimes. There is concern that this will make it easier to grant very broad patents, such as the "species" patent granted to Agracetus (part of W.R. Grace), for genetically engineered cotton, which in turn will restrict access to the protected material for further research [6].

2. The second objection was based on the fact that while TRIPs included intellectual property used by modern industrialised nations based on the principles of novelty, inventiveness and non-obviousness, it did not recognise more "informal" forms of intellectual property rights used by traditional systems of protection. It also requires that any invention in order to qualify for a patent would need to demonstrate industrial applicability, thereby dismissing technological change which is not industrially applicable, putting indigenous property rights systems at a disadvantage.

Intellectual property rights are distinct from other forms of property rights in that they relate to the use of intellect in producing a new product or a new process. Intellectual property rights are therefore not granted for non-human creations, i.e., products that appear in nature. Modern intellectual property rights regimes provide monopoly protection to products and processes that are "produced" by human beings.

The conflict with biological diversity arises from the fact that while biotechnology products or processes use biological diversity, intellectual property rights are only extended to the biotechnology product or process, and the value of the biological resource is not acknowledged. In contrast, the CBD places an emphasis on the rights of peoples to their genetic resources: article 15 on access to genetic resources for example recognises "the sovereign rights of States over their natural resources, the authority to determine access to genetic resources rests with the national governments and is subject to national legislation" (article 15 of the Convention).

[6] India for example, initially accepted the patent and then revoked it after its apparent impact on the country's cotton growers and industry (Rafi Communique, 1993).

Indigenous technologies which do not meet the requirements of modern IPR regimes are also not acknowledged by TRIPs whereas the CBD explicitly calls for the use of indigenous technologies for conservation (article 18). Developing countries were concerned that indigenous communities that have made use of biological resources for centuries were not compensated for the use of their biological resources or for their knowledge. This is something that is again not addressed by the TRIPs agreement although it is an important provision in the CBD. These linkages between the biodiversity and biotechnology and the manner in which they are or are not addressed by the TRIPs agreement and the Convention are discussed in greater detail in the following section.

3. The Relationship between the CBD and TRIPs

Although there are no explicit references to biological diversity in the TRIPs agreement, a number of articles are of relevance to the Convention on Biological Diversity and a clarification of these relationships is required before we can move on to exploring the synergies between the two agreements. We first present a brief overview of the main articles in both agreeements that are relevant to each other.

3.1. CBD Articles of Relevance to TRIPs

The Articles in the Convention that are of greatest relevance to the issue of intellectual property rights include the following: Articles 7 on identification and monitoring, 8 on situ conservation, 10 on sustainable use, 11 on incentive measures, 15 on access to genetic resources, 16 on transfer of technology, 17 on information exchange, 18 on cooperation and 19 on the handling of biotechnology and distributing its benefits and 27 on settlement of disputes.

It is stated in Article 1 of the Convention that its objectives include the conservation and sustainable use of biological diversity and its components, the fair and equitable sharing of benefits arising from the utilisation of genetic resources, and the transfer of relevant technologies taking into consideration rights over those resources and technologies. This last point emphasizes the concern in the Convention to take into consideration international agreements such as TRIPs which provide ownership of technology. However, the primary objective is the conservation and sustainable utilisation of biological diversity and the linkages between biotechnology and utilization of biological resources are crucial to this discussion.

The main relationships between the CBD and TRIPs can be discussed under three broad headings: Sustainable use, Benefit sharing and incentives, and access to and transfer of technology.

The sustainable use of biological diversity along with its conservation, as mentioned is a primary objective of the Convention. In this, the Convention singles out the importance of the contribution made by indigenous communities. Article 8 of the Convention discusses the conservation of biodiversity, in situ which includes the management and regulation of protected areas where necessary through national legislation. Of crucial importance is the role played by indigenous and local communities whose knowledge and sustainable usage of local biodiversity has contributed greatly to conservation. Article 8(j) calls for nations to respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities and encourage wider application of their knowledge and technologies with their approval.

However, in order to ensure the continued use of local knowledge, its role has to be acknowledged and its use rewarded in some manner[7]. In recognition of the importance of local knowledge the Convention calls on signatories to provide some form of equitable benefit sharing from the use of their knowledge, as is the case of rewards such as patents provided by national legislation. Equitable benefit sharing is also discussed in Article 19 which relates to the benefits of biotechnological innovations. This article makes the most direct linkage between the biotechnology community and the use of biological diversity calling on countries to ensure fair and equitable access by the providers of biological materials to the resulting biotechnology innovation, on mutually agreed terms. Article 11 calls for the adoption of incentive measures for the conservation and sustainable use of biological diversity, although these are left up to the Contracting parties.

The final issue deals with technology transfer and access to appropriate technology. This is covered in articles 15 and 16 of the Convention. Access to technology is seen as a crucial for the attainment of the Convention's objectives, although the Convention acknowledges that technology transfer has to occur on terms which "recognise and are consistent with the adequate and effective protection of intellectual property rights" (Article 16(2)). Article 16(3) however, calls for countries to make technology, including proprietary technology available to the providers of the genetic material used in that technology[8]. The references in Article 16 to the transfer of proprietary biotechnologies were opposed by the USA which initially refused to sign the Convention because of the belief that the article implied that companies would have to share the benefits of their proprietary technologies with and to transfer proprietary technologies to developing countries (Lesser, 1993). In its declaration upon signing the Convention in June 1993 moreover, the US continued to express regret and dissatisfaction with "the text's treatment of intellectual property rights; finances...and technology transfer and biotechnology"[9].

In contrast, Article 15 states that nations have sovereign rights over their natural resources (Article 15(1)), and that prior informed consent is required by those who wish to have access to a nation's resources (Article 15(5)). Moreover, the benefits of any such use, should be shared in an equitable manner with the Contracting Party providing the resources (Article 15(7)). Article 19 on the benefits of biotechnology also calls for "priority access" especially by developing countries, to the "results and benefits arising from biotechnologies based upon genetic resources provided by those Contracting Parties" (Article 19(2)). Thus, once again, countries which are using genetic

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[7] This is the same argument as that used by the proponents of a system of intellectual property rights to protect innovations. According to this argument, the rate of innovation would be much smaller if weak protection were provided to inventors. Using the same rationale, it would appear that the use of local knowledge and technologies would also benefit from similar protection. However, since they fall outside of national legislation at present, they receives little or no protection, although some attempts have been made to provide a framework for protecting indigenous knowledge, such as the Model Provisions for National Laws (WIPO, 1985, quoted in Lesser (1994)) which provide some form of IPR protection to folklore. However, problems of definition and enforcement remain. There is therefore a need to protect and encourage these sustainable systems of innovation by providing incentives to local communities.

[8] "Each Contracting Party shall take legislative, administrative or policy measures, as appropriate, with the aim that Contracting Parties, in particular those that are developing countires, which provide genetic resources are provided access to and transfer of technology which makes use of those resources, on mutually agreed terms, including technology protected by patents and other intellectual property rights..."(Article 16(3)).

[9] Declaration made by the United States at the time of signing the Final Act of the Convention on Biological Diversity.

resources in their R&D are called upon to share the benefits of their research with the holders of those genetic resources. As discussed below, there is no reference to this in the TRIPs agreement and may be an important point where cooperation between the two agreements can be developed.

Finally, in the case of disagreement between Contracting parties to the Convention, Article 27 deals with dispute settlement. The terms for the arbitration procedure are given in Annex II of the Convention, and call for a final decision by the tribunal within five months of the date on which it is constituted (Article 14, Annex II) and any award made shall be binding and without appeal unless there is an agreement to do so between the two parties in dispute (Article 16, Annex II). Article 27 also provides for a submission of the case to the International Court of Justice or to a conciliation committee if this is preferred by the disputing parties.

3.2. TRIPs articles of relevance to the CBD

While the previous section looked at the emphasis in the CBD on local knowledge and technology and benefit sharing, the discussion of TRIPs examines how the articles of TRIPs deal with the relationship between biotechnology, especially the protection of biotechnological innovations and the conservation of biological resources. This is followed by a discussion in section 4, of potential synergies that can be developed between the two agreements.

The articles of TRIPs that are often referred to as potentially having important implications for the CBD are the following: Articles 7 on technology transfer, 8 on public health and nutrition, 27 on subject matter, 28 on rights conferred, 29 on conditions of application, 31 on unauthorised use of patented material, 33 on terms of protection, 34 on burden of proof for process patents, 40 on anti-competitive practices and compulsory licensing, 64 on dispute settlement, 67 on technical cooperation and 70, especially sections 8 and 9, on protection of existing matter.

It must be specified that the relationships between these articles and the CBD are not explicit and therefore if the TRIPs agreement is interpreted narrowly, these relationships appear to be even more tenuous. However, given that a number of new patent applications are being interpreted broadly (for example, the broad cotton species patent granted to Agracetus), there is no reason to believe that patent offices will interpret patent rights or the relevant TRIPs articles narrowly. The fact that the TRIPs agreement tends to be relatively unclear on a number of points that are discussed below, complicates their interpretation further.

Article 7 of the TRIPs agreement promotes "the transfer and dissemination of technology to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare". This article coincides with the objectives of article 16 of the CBD which also deals with technology transfer. However, as discussed above, article 16 of the CBD also calls for the availability of these technologies "under fair and most favourable terms, including on concessional and preferential terms where mutually agreed...."in the case of technology subject to patents and other intellectual property rights, such access and transfer shall be provided on terms which recognise and are consistent with the adequate and effective protection of intellectual property rights". According to some interpretations, this is mutually beneficial, since rights holders will be more willing to transfer technology to a country that honours its IPRs. However, it is not entirely clear whether concessional and preferential terms can be negotiated in the case of patents which last twenty years and involve royalty payments which may not be regarded as commercially feasible by the country importing the technology. It is equally unclear whether companies will necessarily transfer proprietary technologies to countries that honour their intellectual property rights but do not have the technological capability to adapt them for local use. In most cases, and especially with respect to conservation efforts, there is a need for developing a local technological and management capacity because technologies have to be tailored to local environments and infrastructures.

Article 27 of the TRIPs agreement sets out the terms for patentable subject matter. The patent term is now extended to 20 years, and includes process and product patents [10], although members are excluded from patenting or recognising a patent in order to protect public order or morality. This also coincides with articles 8 of the agreement which allows members to adopt measures to protect public health[11], and article 31 which provides conditions for other use without the patent holder's permission. These latter two perhaps provide the greatest amount of flexibility in the TRIPs agreement for compatibility with the goals of the CBD and are discussed in greater detail below.

Article 27 also provides for the inclusion of sectors not previously included by all countries, such as pharmaceuticals, although diagnostic, therapeutic and surgical methods for the treatment of humans and animals can be excluded from patentability by members. Plants and animals other than micro-organisms and essentially biological processes for the production of plants or animals other than non-biological and microbiological processes are also exluded (Article 27(3a)), although plant varieties are expected to protected by patents or an effective sui generis system (27(3b)). In the case of process patents moreover, the burden of proof now lies with the defendant in any case brought against an imitator[12]. This substantially increases the cost to those who are accused of imitating or infringing a patented process, as they are now required to prove their innocence.

The obligations of the TRIPs agreement need only apply after the expiry of transitional dates, which for industrialised countries is 1 year after the agreement was signed in 1994 (Article 65(1)), 5 years for developing countries (Article 65(2)) and an additional 5 years for least developed countries (Article 66)[13].

In the case of pharmaceutical and agricultural chemical products however, an additional provision is made which ensures that developing countries provide "a means by which applications for patents for such inventions can be filed" (Article 70(8a)), and that they "provide patent protection in accordance with this agreement as from the grant of the patent and for the remainder of the

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[10] Product patents in general are considered to be more restrictive than process patents since they prevent circumvention of a patent through the use of an alternative process. A number of developing countries, for this particular reason, have not normally excluded product patents in their legislation, although this will now have to change.

[11] Article 8(1) states that members may "adopt measures necessary to protect public health and nutrition, and to promote the public interest in sectors of vital importance to their socio-economic and technological development, provided that such measures are consistent with the provisions of this Agreement". This would presumably imply that in these cases, Article 64 on dispute settlement could be used to settle disputes relating to the use of IPRs without permission under conditions relating to public health, and socio-economic and technological development.

[12] Article 34(1) states that "for the purposes of civil proceedings in respect of the infringement of the rights of the owner, ...if the subject matter of a patent is a process for obtaining a product, the judicial authorities shall have the authority to order the defendant to prove that the process to obtain an identical product is different from the patented product".

[13] Article 66(2) also calls for "developed country memebers [to] provide incentives to enterprises and insitutions in their territories for the purpose of promoting and encouraging technology transfer to least-developed countries".

patent term, counted from the filing date" (article 70(8c)). This effectively means that even though developing countries implement the provisions of the TRIPs agreement after the transitional period, they will have to provide immediate patent protection as the patent would already have to have been filed before that date. Thus, while ordinarily it may take a patent authority two to three years, or more (the average time taken at the European Patent Office, it is claimed before a patent is granted or rejected is 26 months and considerably longer normally in a developing country patent office with fewer resources at its disposal) to grant a patent, this is no longer true[14]. In the case of these particular industries, developing countries in effect, will have to adjust sooner than in the case of others.

Thus, while it is true that developing countries have been given a number of years in which to make the required adjustments to their IPR regimes, this time period is considerably shorter in key industries which make use of biological resources, than in others. These are also the industries where the greatest amount of pressure has been brought to bear on governments to strengthen intellectual property rights regimes and also the industries which are the most protected by national governments especially, but not only in the developing countries, because of potentially negative welfare implications.

3.3. A Note on Sui-Generis Protection

Plant varieties have been explicitly excluded from TRIPs under the condition that they be protected by means of an alternative sui generis system. To date, the most well developed institutionalised system, of which a number of industrialised countries are members, is UPOV. UPOV differs from the traditional IPR regime in that it provides greater access for other plant breeders and farmers. It also recognises discovered varieties as opposed to the patent system which only recognises patent claims on newly created varieties. However, UPOV itself has undergone a number of changes which in effect have widened its scope for protection and have brought it much closer to the patent system proposed under TRIPs than before.

In 1991, the UPOV Convention was revised to increase its scope of protection. While the 1978 Convention did not include novelty as one of the requirements for protection, the 1991 revision, like patent systems, requires all applications to be novel. The term of protection in addition was increased from 15 to 20 years, legislation on the farmers' privilege has been left up to nations and breeders no longer have access to essentially derived varieties for further breeding purposes. Nations that do recognise the farmers privilege moreover, must do so "within reasonable limits and subject to safeguarding of the legitimate interests of the breeder" and it has been argued (Yamin 1995), that this is likely to result in the farmer only using saved seed for propagation on his or her land. As a result of these changes to UPOV, the main difference in terms of scope, between the protection offered by UPOV and patents under the TRIPs agreement, is in the breeders exception and farmers privilege, if they are granted by nations.

Having stated this however, UPOV is not the only alternative for countries that do not wish to protect plant varieties through patent protection. In fact, a remarkable small number of countries are actually members of the UPOV Convention and developing countries are conspicuously absent[15]. The TRIPs agreement does not specify any particular type of protection. Its only

[14] In the case of approval to commercialise this time is even longer and so even for those countries that have long transitional periods, by the time the biotechnology product or process is patented and commercialised, developing countries will be required to accept the patent and grant marketing rights to the patent holder immediately.

[15] In May 1995, there were 27 members of UPOV, of which one was a developing country.

requirement is that the sui generis system is adequate and will be reviewed after the transition period for developing countries is over in four years. Countries that do not agree with the 1991 UPOV Convention can make changes to different requirements in the UPOV system to suit their requirements. This may include providing for access to protected material for breeding purposes, or the protection of indigenous knowledge and technologies which are not protected by traditional IPR regimes in most countries. In fact, designing an alternative sui generis system may enable countries to develop a framework that is more suited to their own socio-economic needs and traditions, than offered by either IPRs or the UPOV convention. In fact, as has been argued, that an international system created 125 years ago to patent machines and factory parts may not be the best system for plants, animals and microorganisms, which may warrant their own system of property protection (The Crucible Group 1994). After the transition period when the changes under TRIPs are reviewed, presumably, if the sui generis system adopted by the country is not acceptable, the country risks having to face punitive trade sanctions until it reforms its system of protection.

It appears therefore that while certain aspects of the TRIPs agreement, notably those that ensure adequate protection and enforcement of IPRs, have been well defined, in other areas the language is less clear, leaving considerable potential for differing interpretations of these articles. While this has caused concern in a number of countries, notably because while the agreement broadens the scope of protection, it does not define adequately conditions under which IPRs need not be protected, it also raises a number of areas where there is flexibility within the agreement for cooperation between TRIPs and the CBD to protect the world's biological diversity. This is discussed in the next section.

4. Synergies between TRIPs and the CBD

There are a number of issues on which there may be areas for further cooperation between TRIPs and the CBD. These are discussed briefly in this section.

Tchnology Transfer

On the issue of technology transfer and the unauthorised use of patented material considerable flexibility exists in the TRIPs agreement for cooperation with the Convention.

The TRIPs agreement does provide a great deal of flexibility in allowing countries to use patented material without permission from the patent holder. This is provided for in article 31 and article 40. Article 31 allows the use of patented material without permission if "the proposed user has made efforts to obtain authorization from the right holder on reasonable commercial terms and conditions and that such efforts have not been successful within a reasonable period of time".

Article 27(1) which states that nations are not allowed to discriminate against "the place of invention, the field of technology and whether products are imported or locally produced", however, appears to rule out the use of compulsory licenses in the case of patents that are not worked. The country it appears, will have to import the technology in the case of a patent not being worked locally. Although there are problems in that terms are inadequately, this provision in the TRIPs agreement could be used in relation to article 16 of the CBD which calls for access to technology on fair and favourable terms.

Article 40 also provides for the use of additional licensing arrangements. Here the emphasis is on anti-competitive practices and the negative impact they may have on trade and the transfer of technology. There is the danger in most intellectual property rights regimes that granting a patent to an inventor creates a potential for abuse by that inventor of his or her monopoly. This article recognises this problem and seeks to address it. The article specifically allows a member to adopt

"appropriate measures" to control practices that may "constitute an abuse of intellectual property rights having an adverse effect on competition in the relevant market". Once again however, as in the case of Article 31, there is no way to understand what terms such as "appropriate measures" or "adverse effect" exactly mean.

The problem arises because of the potential for conflict as a result of different interpretations of words such as "reasonable". Since these words are not adequately defined in the agreement, and given the present conflict between the holders of technology and the holders of genetic material, their interpretation is more likely than not going to exacerbate these conflicting positions. The potential for further disagreement on these terms is therefore likely to remain. Presumably, any conflicts between countries will be resolved through the WTO's Dispute Settlement Mechanism. However, instead of waiting until these issues are raised in front of the Dispute Settlement panel, it would be in both the WTO and the CBD's interest to try and define these terms more narrowly, so that they can then be used judiciously by both industrialised and developing countries.

Country of Origin

While IPRs protect biotechnology inventions and release some information about the invention into the public domain, the CBDs focus is on ways to identify and protect biological material. Here, it has been suggested that the disclosure requirements of patent conventions and of TRIPs could ensure that the origins and characteristics of the germplasm utilised in the invention must be released into the public domain for further research. Most IPR systems, require that when filing patents, the inventor has to disclose a certain amount of information to the patent office which is then released into the public domain. This information can then be easily accessed by anyone.

The TRIPs agreement as with international IPR conventions such as the European Patent Convention, requires that an "applicant for a patent shall disclose the invention in a manner sufficiently clear and complete for the invention to be carried out by a person skilled in the art" (article 29 of the TRIPs agreement). This requirement has resulted in the patent applicant having to reveal the origin, and often characteristics of the original genetic material used to produce the biological invention (Gadgil and Devasia, 1995). It has been argued, that if this requirement were to be formalised in the agreement, it would be a first step in towards recognising countries or geographical regions of origin and indigenous communities (Gadgil and Devasia, 1995).

Detailed research of the patent system in a number of countries (Sukhwani, 1996) has generated some interesting ideas on synergies between national IPR regimes and the goals of the CBD. Companies or individuals, when applying for a patent based on biological material, as a matter of course disclose information about the common and scientific names as well as source of origin for material whose properties are not well known. Thus, information on the origin of plants such as rosemary, sage, lemon etc., is not usually necessary because a patent examiner will either know the properties of these plants or will be able to obtain further information about their place of origin. However, in the case of plants whose properties are not well known, patent applicants usually disclose the origin of these plants in the application, so that the patent examiner can have access to the original biological material in order to carry out an examination of the invention. For example, in the European Patent Convention (EPC) Article 83 requires that "the European patent application must disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art". A number of patent applications reveal such disclosure in a variety of ways. For example, the following patent discloses information on the region of origin:

> Patent no. EP 0513671: The present invention relates to new therapeutical applications of extracts, fractions and single active ingredients prepared from Cammiphora mukul: the invention further relates to processes for the preparation of the total steroidal fraction

> which is present in the exudate of the above plant. The Commiphora mukul (Hook ex Stocks) Engl. (syn. Balsamodendron mukul Hook) is a small tree of the Berseraceae family, endemic in the Indian peninsula, growing spontaneously in the dry and semidry Rajasthan, Gujarat and Madhya Pradesh districts in India and in Beluchistan district in Pakistan".

Similarly, in the case of patents filed at the United States Patent Office, reference to origin can also be found:

> Patent US 3743722 which refers to the anti-coagulant properties of two pit vipers: "These species are found in different parts of the world, predominantly in Southeast Asia (Agkistrodon rhodostoma) and South America (Bothrops atrox).

whereas the following patent does not include specific information on the region of origin but reveals the scientific and common names of the biological material used, along with a description of the process itself.

> Patent no. US 5204101: It has been discovered that if an HIV infected patient with AIDS is administered a compound misture of constituents found in two naturally occurring plants, i.e., Rumex acatasella and Phytolacca americana and a naturally occurring fruit, i.e., Citrus limonia a substantial improvements in the condition of the patient.
> The three plants are identified as:
>
> COMMON NAME: Sheep Sorrel
> FAMILY: Polygonaceac (Buckwheat)
> GENUS: Rumex
> SPECIES: acetosella
>
> COMMON NAME: Pokeweed or pokeberry
> FAMILY: Phytolaccaccea
> GENUS: Phytolacca
> SPECIES: americana
>
> COMMON NAME: Lemon
> GENUS: Citrus
> FAMILY: Rutaceae
> SPECIES: limonia

Rule 27.1(b) requires that the content of the description of the patent should "indicate the background art which, as far as known to the applicant, can be regarded as useful for understanding the invention, for drawing up the European search report and for the examination, and, preferably, cite the documents reflecting such art."

While important patent treaties such as the EPC do not formally require mention of the country or region that the biological material originates from, most applicants seem to include reference to the origins of the biological material in their patent applications, especially of "rare" biological material. This is indeed the case in present patent applications made at the European Patent Office. Moreover, the "background art" mentioned in Rule 27.1(b) usually includes reference to traditional uses of the biological material and its properties, in its country or region of origin.

Thus, in the case of the previously cited patent, No. EP 0513671, reference is made to traditional uses of the biological material used:

> "In the ancient Sanskrit, this gum resin is called guggulu and is a product which is still used in Indian popular medicine for the treatment of obesity and some arthritic forms."

This not only ensures that the source of the biological material used in modern biotechnology innovations is often mentioned in patent applications, but reference is also made to traditional uses and knowledge in the host country.

By revealing both source and indigenous knowledge, the patent system indirectly acknowledges the need for this information in order to carry out a complete examination of the application. A formalisation of this procedure which is already widespread in international patent systems, would ensure that such disclosure happened with each patent application in a systematic fashion.

Although this would not imply significant changes in terms of the obligations of the inventor in sharing the benefits of his or her invention, it would aid in the enormous task of identifying potentially useful genetic material and documenting the tacit or informal knowledge contained in indigenous communities. This would be a first step in capturing value since it is the informational value of biological diversity and the characteristics of biological diversity that are important for industrial processes (Swanson, 1995), and should therefore be emphasized by the holders of biological diversity.

Sui-Generis Systems of Protection

As mentioned, plant varieties need not be patented but can instead be protected through a sui generis system of protection. Plant Breeders Rights (PBRs) in the 1991 version of the UPOV Convention have gained a broader scope and have become more restrictive. For example, the "farmer's privilege" which allows reuse by farmers of seed for planting, is no longer universally applicable. Instead, the 1991 revision left it up to national legislation. Moreover, access by breeders to material protected by this method is no longer guaranteed in some instances.

Despite this, there is some flexibility in the UPOV convention, notably the acceptability of protection granted to natural products or products which are "discovered" (article 1.4 of the 1991 UPOV Convention), which patent protection does not apply to. This would enable national governments to protect biological resources, thereby increasing added value for these resources. Those countries uneasy about the restrictiveness of the 1991 UPOV Convention could also design their own sui generis regimes as is allowed under the TRIPs agreement, although it is subject to a review by the WTO by 1999. However, if it is possible to define the adequacy of an alternative sui generis regime [16], it would enable developing countries and the Convention to ensure that the protection of plant species would not be detrimental to the conservation of biological diversity. This may result in a greater proliferation of INBio type prospecting arrangements which, if handled correctly, could also ensure the distribution of the benefits to indigenous peoples, while providing taxonomic exercises where they are badly needed and are underfunded. An INBio type arrangement in contrast to point 2 above, provides value added through the collection of biological material itself, rather than the information contained in biological diversity.

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[16] For example, no time period for protection of varieties is specified in the agreement, although presumably, any alternative system to UPOV would have to provide similar protection in order to be acceptable to the international community.

5. Conclusions

Although it is stated quite clearly in the Convention on Biological Diversity, that its implementation should not be prejudicial to the TRIPs agreement, it is clear that it would be more beneficial to the holder of intellectual property and to the holders of genetic material, if there was compromise and cooperation rather than confrontation.

This paper has shown that while there are few explicit references to the TRIPs agreement in the Convention on Biological Diversity and no reference to the Convention on Biological Diversity in the TRIPs agreement, there are a number of ways in which the TRIPs agreement affects the Convention. The potential for contradictions between the two arise primarily for two reasons:

1. The linkages between biotechnology and biodiversity, especially the use of the latter by the former, but also the use of the former to conserve the latter, are not acknowledged in the TRIPs agreement. As a result of this, it is even more difficult to acknowledge the links between intellectual property rights granted to biotechnology inventions in the TRIPs agreement and the potential depletion of genetic resources which is the concern of the Convention.

2. The TRIPs agreement does however accept the importance of issues that are of concern to the CBD, such as technology transfer, environmental pollution, and articles 31 and 40 try to address these problems by granting Members exceptions under certain circumstances. However, the definitions of a number of these exceptional circumstances are not clear and may cause misinterpretations of the articles and further and misunderstandings between those who hold technology and those who want access to it.

Finally, the last section of the paper shows that despite the possible areas of contradiction between the two agreements, both still allow a great degree of flexibility in their interpretation in order for cooperation between the two to be developed further. This paper has pointed to three specific areas where the flexibility provided in the TRIPs agreement can be useful in implementing the goals of the Convention on Biological Diversity. The case of disclosure regarding country of origin and traditional usages of biological material used in the invention, is especially useful in suggesting modifications that could be made to patent legislation, enabling the formalisation of such disclosure. The disclosure would provide vital information for the identification and conservation of biological material and indigenous knowledge.

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