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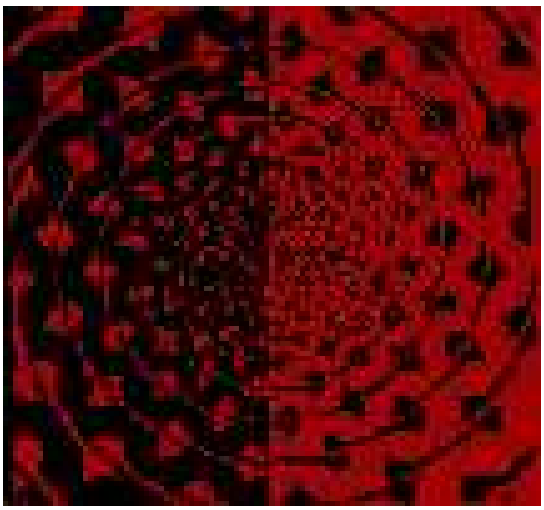

Titre: *The Contribution of Databases and Customary Law To the Protection of Traditional Knowledge*

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This working paper is published as a result of joint research between the research unit on Biodiversity Governance of the Centre for the Philosophy of Law (CPDR) and the Biodiplomacy Initiative of the United Nations University Institute for Advanced Studies (UNU/IAS). The Biodiplomacy Initiative has developed extensive research on the governance of biological resources and provided input to the international negotiations through workshops and policy briefs, in particular on the issues of access to genetic resources and benefit sharing and protection of traditional knowledge (cf. www.ias.unu.edu). The research unit on biodiversity governance focuses on the role of institutional design, with a particular focus on the role of the evolution of norms and beliefs (www.cpdr.ucl.ac.be). The analysis developed in this working paper contributes to these research programs through a case study on the role of databases in the protection of traditional knowledge. It shows the necessity to develop the reflexivity of the actors on their informal norms as embedded in customary law, while anticipating in the same time the codification of traditional knowledge into formal intellectual property rights systems.

Tom Dedeurwaerdere, 15th of November 2005

The Contribution of Databases and Customary Law To the Protection of Traditional Knowledge

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(to be published in *International Social Science Journal)*

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Introduction

Traditional knowledge (TK), broadly defined, refers to any knowledge, creation, innovation or cultural expression, which is held by local or indigenous communities and has generally been transmitted from generation to generation. Traditional Knowledge is generally regarded as pertaining to a particular people or its territory, and is constantly evolving in response to a changing environment.[2] Types of traditional knowledge include agricultural knowledge, medical knowledge, ecological knowledge and cultural knowledge. This article focuses on traditional knowledge *sensu stricto*[3], sometimes referred as ethnobotanical knowledge, i.e. knowledge concerning the uses of genetic resources that can be useful for agricultural and pharmaceutical research and development (R&D) and for environmental conservation.

The current state of traditional knowledge is somewhat paradoxical. At its source, TK has been greatly eroded. This is for a series of reasons: (i) the economic and political conditions of local and indigenous communities are often fragile, (ii) the transmission of knowledge from one generation to another is weakened as younger generations become attracted to a more modern way of life, and (iii) the environment and biodiversity surrounding TK holders is also disappearing.[4] This is all happening while the value of traditional knowledge is increasing as scientists demonstrate a growing interest in TK as a source of information for their research. In this context, TK holders complain about the "misappropriation" of their knowledge. Misappropriation occurs when firms or scientists patent TK related inventions without prior informed consent. Misappropriation also occurs when scientists place TK in the public domain by documenting it in academic publications without prior informed consent.

As a reaction to this misappropriation, TK holders have enounced a series of claims that can be summarized as followed:[5]

to be identified as author or inventor of their knowledge.
to be able to control access to their knowledge.
to be compensated for its use.
to preserve their cultural identity.
to preserve the organizational structure that enables the continuous production, use and conservation of their knowledge.

These claims can be divided into two sets. The first set gathers the three first claims that are directly related with intellectual property protection. The second set of claims includes the

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[2] WIPO (2001) *Intellectual Property Needs and Expectations of Traditional Knowledge holders,* WIPO Report on Fact-Finding Missions on Intellectual Property and Traditional Knowledge (1998-1999), Geneva

[3] In the same way, in its work on traditional knowledge *sensu largo,* WIPO distinguishes traditional knowledge (*sensu stricto)* traditional cultural expressions or expressions of folklore which include more cultural aspects of knowledge. See for instance WIPO (2006), The Protection of Traditional Cultural Expressions/ Expressions of Folklore: Revised Objectives and Principles, WIPO/GRTKF/IC/9/4

[4] For more information on the threat to TK see for instance the report of a recent technical workshop organized by the Inter-Agency Support Group on Indigenous Issues and the Permanent Forum on Indigenous Issues. The report is accessible at http://www.wipo.int/tk/en/cooperation/documents/panama_report.pdf

[5] Ruth L. Okediji (2002), "Making Room at the Table: The Protection of Indigenous Knowledge at the Interstices of International Law, Human Rights and Intellectual Property", in CILP, Lecture Series Pub., University of Toronto. Hereafter "Making Room at the Table…"

two last demands; they are more loosely related to intellectual property but they do concern the conditions producing TK innovation. Often, TK holders, notably indigenous peoples, use a different vocabulary and ask for the respect of their customary law in a broader claim of self-determination. It is worth looking at this second set of claims in order to account for the conditions producing TK innovations.

After a few years of international debate, there seems to be a consensus on the need to answer to the above claims –at least for the first set. However, there has been little progress in proposing and implementing any effective solutions. As for the first set of claims, TK holders have a kind of "virtual" right in their knowledge. It is virtual in the sense that it is still ambiguous whether or not the right exists and is just ineffective, or whether it is yet to be created. Regarding the second set of claims, no real progress has been observed.

In the first part of this essay, I argue that lack of progress in providing effective protection for TK (claim set one) can be explained by the fact that most participants to the debate explicitly or implicitly refer to justifications in terms of moral or natural rights for TK protection. These rights-based justifications have been useful and effective in creating a consensus on the need to protect TK. However, they offer little help to design effective and transferable property rights because they do not take into account the conditions of TK use or the effectiveness of property rights.

In an attempt to overcome the above difficulties, I suggest following a double approach. First, I look at how TK holders attempt to protect their knowledge by creating TK databases in the field. Second, I adopt a utilitarian approach that provides a better understanding of the practices developed by TK holders to protect their knowledge. This approach further enables me to propose a complementary justification for TK protection that provides useful elements to create[6] a customized and effective protection mechanism. I conclude that there are strong arguments in favor of the creation of databases of TK.

In the second part of this essay, I argue that little progress has been made in the recognition of customary law (claim set two) because it is perceived solely as a political demand for self-determination. Again I suggest adopting a utilitarian approach so that we may view these claims as a demand of recognition of the existence of norms-based systems of innovation and a demand to find mean to articulate them with the legal system of intellectual property law. This will enable us to look at solutions that have already been tested on other norms-based systems of innovation that were forced to articulate themselves within the legal system of intellectual property. I conclude by suggesting combining property rights on databases and contracts to arrange this insertion.

1. Protecting traditional knowledge…

The Convention on Biological Diversity (CBD), which entered into force in December 2003, calls for the protection of TK. This assertion of protection for TK in article 8J, however, is more of a political concept assigning objectives to states rather than a clear property right for TK. Therefore, there is need for further (legal) action at international or national level to implement the intention behind article 8J.

[6] Or suggest resorting to an existing form of intellectual property.

1.1 The Current Debate on Traditional Knowledge Protection

At the international level, the most dynamic forum on TK protection is the Intergovernmental Committee on Intellectual Property, Genetic Resources, Traditional Knowledge and Folklore of the World Intellectual Property Organization (WIPO-IGC). This committee is in charge of preparing guidelines, model laws and/or an international treaty on the protection of TK. Through the reading of WIPO-IGC documents; it appears that the notion of "misappropriation" acts as an organizing principle in the design of a protection regime, and to some extent as a justification for the protection of TK.
At the national level, some states have enacted *sui generis* legislation attempting to implement article 8J.[7] Some of these national laws contain provisions for the creation of TK registries. These legislative provisions could provide a model for an international regime. For now, however, the effect of these national laws is limited by the fact that they only apply in the territory of their respective state (*cf. infra).*

1.1.1 The Notion of Misappropriation

There appears to be a large consensus on the objectives of protection. Preventing misappropriation involves both defensive protection, i.e. preventing the acquisition of intellectual property rights over TK by parties other than customary TK holders, and positive protection, i.e. providing legal means to enable TK holders to restrain third parties from unauthorized uses of protected material, and to empower TK holders to negotiate for compensation if and when unauthorized acts occur. Thus, the objectives of protection drafted by WIPO-IGC correspond to the first set of claims of TK holders.

However, there is much less clarity and consensus on the design of the protection mechanism. Document GRTKF/IC/8/5 of the WIPO-IGC, entitled "Protection of Traditional knowledge: Revised objectives and Principles", mentions broad rights but poorly defines them.

The "object of protection" is defined in a comprehensive but vague manner. Article 3 on the "General Scope of Subject Matter" provides a useful definition of TK and states that protection should not be limited to any technical field. Article 4 on the "Eligibility for Protection*"* establishes the traditional character of knowledge as the requirement for its protection. Knowledge must come from a traditional context, be associated with a traditional or indigenous community, and be part of the cultural identity of this community. However, if the traditional character of knowledge is to be selected as a criteria for protection, one must explain how to verify that the conditions for protection are met, who will undertake the verification, whether there will be an *ex ante* (like in the case of patents) or an *ex post* examination, during which TK custodians will claim that part of their knowledge has been misappropriated, and whether there will be a system to notify third parties which knowledge is protected (e.g. a registration system). In addition, identifying knowledge by its traditional character comes down to identifying the object for protection by its right-holding beneficiaries. This may lead to confusion between two different questions, i.e. the requirements for protection and identification of the rights holder. The problem is further complicated by the fact that the next article identifies beneficiaries of protection as TK holders. As such, the definition appears to be somewhat circular: the object of protection is

[7] See WIPO (2003) *Comparative summary of Existing National Sui Generis Measures and Laws for the Protection of Traditional Knowledge* WIPO/GRTKF/IC/5/INF/4

defined by its beneficiaries and beneficiaries are identified by the object of protection and none of them is defined independently.[8]

Furthermore, beneficiaries are comprehensively but vaguely identified. Article 5, "Beneficiaries of Protection" identifies beneficiaries as the holders of knowledge in accordance with the relationship described under Article 4 on the eligibility of protection. The relationship between peoples and knowledge is essential in identifying beneficiaries of protection. However, further precision is needed to make the system of protection work. In addition, as I mentioned in the previous paragraph, there is a problem of the circular definition between the provision on the eligibility of protection and the provision on the beneficiaries of protection.

Regarding the content of protection itself, WIPO-IGC documents mention a series of contract, tort and property rights but these rights already exist and are badly defined.

Article 1 mentions the possibility of protecting TK through contract law. This has little value as TK holders currently can and sometimes do negotiate access to their TK by means of contract, usually in the broader context of a bioprospecting contract. In addition, there are some serious difficulties in contracting over TK subject matter. The first difficulty in contracting over TK subject matter arises from the characteristics of knowledge as an economic good (public good). It is difficult to control access to knowledge in the absence of a property right. If TK holders do not have the legal right to prevent third parties from accessing their subject matter, the ability to contract is little useful. Similarly, knowledge is difficult to show to a potential buyer. A potential buyer may need to see the knowledge to decide whether he wants to buy it. Once the knowledge is seen, however, there is no incentive to buy it unless there is a property right. The second obstacle derives from a limit of contracts. They only rule relations among contracting parties; they usually have no effect on third parties. By contrast, property rights are opposable against the world. The third difficulty is inherent in the nature of TK. For the most, TK can be regarded as tacit knowledge. Tacit knowledge is difficult to transfer, value, identify and delineate which makes it very difficult to contract. *(Cf. section 1.3)*.

Article 1 also envisages the use of tort law to protect TK. For the purposes of illustration this Article enumerates a long list of torts that could be invoked by TK holders. The most notable are unjust enrichment, public order and morality, and unfair competition. Once again, these mechanisms for protection are currently legally available. In addition, protection by tort law depends on there being an unauthorized use of knowledge that causes actual damage. The TK holder will only receive protection (i.e. a remedy) if the use of the knowledge resulted in an identifiable damage. Moreover, those torts are outlined in a vague manner and as such it is difficult to foresee the level of protection intended before going to court and obtaining a decision. The tort of unfair competition may be a bit more precisely drafted than the others, but it is only relevant in a limited number of circumstances. In general, unfair competition is a tort providing a remedy for the loss of market share or commercial reputation in the sale of knowledge goods. There are, however, variations in national understandings of unfair

[8] It could be argued that this is also the case in other sectors of intellectual property law. For instance, in patent law, the object of protection is an invention and the beneficiary of the right is the inventor. However, the situation is different in patent law. Protection requirements identify what is eligible for protection. For each individual patent, the patentee's claims identify the scope of protection; the examination process decides whether the invention is protected or not and provides a kind of registration and evidence of the right. Patent law therefore includes mechanisms to identify the object of protection.

competition law. TK holders may acquire goodwill as producers of medicinal preparations, cosmetic products, or cultural products and they may suffer harm to their commercial reputation or market share by unauthorized uses of their TK. However, this hypothesis only concerns a limited proportion of TK and may apply more to cultural products such as craft or folklore.[9] Therefore, it seems unlikely that unfair competition law can provide strong protection to TK holders.[10]

Article 1 also contains an allusion to a property right by recalling the principle according to which TK cannot be accessed by third parties without the prior informed consent of its holders. However, there is no more precision on this property right.

In total, I am afraid misappropriation as currently described in WIPO-IGC documents only contains badly defined rights likely to result in high transaction costs.

1.1.2 Limits of Misappropriation: Rights Badly Defined and High Transaction Costs.

From the standpoint of a TK holder, misappropriation offers comprehensive, affordable and easily accessible protection because there is no condition for its use. Unfortunately, it will be hard to enforce such a vague right over such a vaguely defined object. It will be difficult to monitor all possible violations as they are likely to occur simply because third parties do not know what is protected and the identity of the right holder. Similarly, TK holders wanting to enforce their rights will have to go to court in the country where TK is accessed. It will be difficult and expensive for TK holders to provide evidence of their rights and of their violation. Therefore, the protection offered by misappropriation seems rather costly and inefficient; indeed it might often not be economically worthwhile enforcing a right under this claim.

From a potential user's point of view, there is the risk of very high transaction costs. It may prove difficult to identify the TK rights holder who has the authorization to give access to the TK in question. As it stands, the rights of TK holders are uncertain and badly delineated. In other words, potential user will face legal uncertainty that will act as a disincentive to use TK.

In sum, misappropriation as described in WIPO-IGC documents neither prevents the unauthorized use of TK, nor encourages its use when it is the desire and goal of TK holders and users.

1.1.3 Limits of Rights-Based Justifications

One explanation for the difficulty in designing clear rights to TK may come from the justification of those rights. The concept of misappropriation does not only include the notion that TK holders should have a right to be protected against acts which violate the principles of equity and fairness, but it also contains, more or less explicitly, a justification for a protection regime for TK. Indeed, the concept of misappropriation echoes academic and NGO literature that justifies the need for a protection regime on the basis of natural, moral or human rights (hereinafter "rights-based justifications").

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[9] Agnes Lucas-Schloetter (2004), "Folklore" (Part III, Section 4) in Silke von Lewinski (ed.), *Indigenous Heritage and Intellectual Property –Genetic Resources, Traditional Knowledge and Folklore*, Kluwer Law International, The Hague, London and New York, p. 314.

[10] In the circumstances in which TK could be protected by unfair competition, it might be more interesting for TK holders to consider the protection offered by trademark and geographical indication.

Rights-based justifications for intellectual property are loosely derived from the labor theory originating in the writings of John Locke, or the personality theory inspired by the works of Kant and Hegel. According to the labor theory, a person who labors upon resources that are "held in common" has a natural property right to the fruits of his or her efforts – and the state has a duty to respect and enforce that natural right. As facts and concepts, the raw material of intellectual property, seem to be held in common, the labor theory is widely thought to be especially applicable to the field of intellectual property.[11] As for the personality theory, it suggests that private property rights are crucial to the satisfaction of some fundamental human need. They should be created in the fashion that best enables people to fulfil those needs. In that perspective, intellectual property rights are justified as a protection against appropriation or modification of artifacts regarded as a vessel for the personality of authors, artists and inventors,[12] or in the case of TK, the vessel for the cultural heritage of communities.

Similar arguments are also phrased in terms of human rights, notably with a reference to article 27.2 of the Universal Declaration of Human Rights, which provides that "everyone has the right to the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he is the author".[13] Arguments based on human rights, the labor theory or the personality theory are often mixed, that is why they are some times collectively referred as rights-based theories as opposed to utilitarian justifications.

The numerous advocates of rights-based justifications observe that there seems to be a growing consensus that there is something wrong with the use and appropriation of TK without prior permission and compensation of TK. The strength of such justifications can be observed in the fact that TK protection is now discussed in many international forums, and the World Intellectual Property Organization (WIPO) is considering the negotiation of an international agreement. However, if rights-based justifications play an important role in convincing people of the need of a protection regime, they do not lend themselves so easily to designing the precise content of such a regime. These moral justifications do not take into account the conditions of use of knowledge and the effect of the protection regime on the production and diffusion of knowledge Therefore right-based justifications are of limited help to create effective, customized and transferable property rights. They do not provide criteria precise enough to identify the object of protection, the form, the scope of protection, or the beneficiaries of the rights.[14]

The limits of misappropriation as a protection mechanism and as a justification for such mechanism suggest that there is a need to complement article 8J of the CBD and misappropriation with rights that are better defined and easier to trade. From that perspective it might be worthwhile to complement the rights-based justification of TK protection with a utilitarian justification. Utilitarian justifications are the dominant justification for intellectual property except in the debate on TK protection where they are curiously absent (*Cf.* section

[11] William Fisher III (2001) "Theories of intellectual property", in Stephen Munzer (ed*.), New Essays in the Legal and Political Theory of Property*, Cambridge Studies in Philosophy and Law. See also Peter Drahos (1996), *A Philosophy of Intellectual Property*, Ashgate, Burlington

[12] *Ibidem*

[13] Universal Declaration of Human Rights adopted and proclaimed by the United Nations General Assembly resolution 217 A (III) of 10 December 1948

[14] Padmashree Gehl Sampath (2004), "Defining an Intellectual Property Right on Traditional Medical Knowledge: A Process-oriented Perspective", 7 JOURNAL OF WORLD INTELLECTUAL PROPERTY, 711 hereafter Padmashree Gehl Sampath (2004), "Defining an Intellectual Property Right…"

1.3). First, however, I would like to have a look at how TK holders currently attempt to protect their knowledge.

1.2 How to Protect TK: The Lessons of Practice

In this essay, I cannot look at all attempts to protect all categories of TK. In the following paragraphs, I look at one practical attempt to protect TK: the creation of databases or registers as a mechanism of protection for ethnobotanical TK.

1.2.1 TK Databases and Defensive Protection

Documentation of TK and creation of databases had been done by academics for a long time[15] and by some TK holders since the mid 1980s. However, it is the patenting by corporations of inventions derived from TK that started a larger movement to document and create TK databases as instruments for defensive protection**.** TK holders realized that third parties could obtain patents derived from their knowledge because TK was not sufficiently taken into account by patent offices when assessing the novelty and non-obviousness, or inventiveness requirements for obtaining a patent.[16] In practical terms, patent offices reviewing prior art had difficulties in accessing TK not widely known and often orally transmitted. In addition, under US Patent law (not under European patent laws) prior art includes inventions patented or described in a printed publication in either the United States or a foreign country, and inventions known or used by others in the US. Unpublished or unpatented uses of TK in a foreign country are not taken into account.[17] As a result, documenting TK and compiling TK databases was a means to make the information available to patent offices and to ensure its inclusion in the prior art so as to prevent abusive patenting.

The best-known example is the Traditional Knowledge Digital Library (TKDL)[18] that was created in India as a reaction to the Turmeric case.[19] Following the Indian example, other TK databases have been created and placed in the public domain for defensive protection, notably

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[15] The Secretariat of WIPO has identified a large number of journals and databases containing traditional knowledge data see WIPO/GRTKF/3/5 and WIPO/GRTKF/IC/3/6.

[16] On the Turmeric case see A. Agarwal and S. Narain (1996) "Pirates in the Garden of India", NEW SCIENTIST, October 26, pp. 14-15 or Graham Dutfield (1999), "Protecting and Revitalising Traditional Ecological Knowledge: Intellectual Property Rights and Community knowledge databases n India", 6 PERSPECTIVES ON INTELLECTUAL PROPERTY 103, p.112. On the neem patents see J. Kocken and G; van Roozendaal, (1997), "The Neem Tree Debate". 30 BIOTECHNOLOGY AND DEVELOPMENT MONITOR 8 or Shayana Kadidal (1997) "Subject-Matter Imperialism? Biodiversity, Foreign Prior Art and the Neem Patent Controversy", 37 IDEA 371. Also on the Quinoa patent see J.-A. Gari (1997) "The Role of Democracy in the Biodiversity Issue: The Case of Quinoa", Center for Latin America Research and Documentation Papers, Amsterdam 1997

[16] 35 USC § 102

[17] *Ibidem*

[18] TKDL has been described in several publications, notably in Merle Alexander *et al.* (2003), *The role of Registers & Databases in the Protection of Traditional Knowledge, a Comparative Analysis,* United Nations University Institute of Advanced Studies. Hereafter "*The role of Registers & Databases…"*

[19] In 1995, two U.S. based Indians were granted U.S. Patent 5,401,504 on Use of Turmeric in Wound Healing. Most people in India greeted the news with disbelief and surprise because turmeric has been traditionally used in India for its many special properties in wound healing. The Centre for Scientific and Industrial Research an autonomous institution under the Department of Science and Technology, Government of India, decided to file for re-examination of the patent at the United States Patent and Trademark Office. After an extensive search, 32 references were located, some of which were more than 100 years old, and in the languages of Sanskrit, Urdu and Hindi. The USPTO revoked the patent, stating that the claims made in the patent were obvious and anticipated, and agreeing that the use of turmeric was an old art of healing wounds. See references in footnote 13

in China[20], in the United States,[21] and in Peru[22]. More recently, the member-states of the South Asian Association for Regional Cooperation have decided to set up a common TK digital library, notably for defensive purpose.[23]

In addition to these databases created for defensive protection, a larger movement of documentation of TK for positive protection is under progress.

1.2.2 TK Databases and Positive Protection

The rationales for documentation and creation of databases go beyond defensive protection. Some communities resort to databases for their internal use: to preserve knowledge, to facilitate the use of knowledge among the community of TK holders, as in the TK databases of Inuit of Numavik, Canada,[24] and/or to foster traditional innovation like the People's Biodiversity registers[25], the Honey Bee Network[26] or the Farmers Right Information System in India. Some communities also use databases in their relations with third parties, either as an instrument for attracting potential users, to negotiate compensation for access, or as evidence of the existence of some right to knowledge.

Among the existing databases, some are public, some are confidential and some combine different levels of access for different categories of uses and users.[27] Some of these databases have been created by law and created by governmental institutions[28] but most of them are the fruits of collaboration between NGOs and TK holders themselves.[29]

1.2.3 Critics and Unresolved Issues

Unfortunately, this ongoing creation of TK databases has been slowed down by criticisms and unresolved issues. A first set of criticisms focus on the notion of TK protection and the public domain. It has been observed that there is a contradiction between defensive and positive protection. Compiling TK in databases available to the public may protect the knowledge from monopolistic commercial exploitation but it does not prevent unauthorized uses of TK.[30]

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[20] China Traditional Chinese Medicines Patent Database, for more information, see doc WIPO/GRTKF/IC/3/6

[21] The Traditional Ecological Knowledge Prior Art Database, developed by the American Association for the Advancement of Science, available for consultation at http://ip.aaas.org/tekindex.nsf

[22] Law 27811 of 2 July 002 Established the Regime for the Protection of Collective Knowledge of Indigenous People Related to Biodiversity. It provides for three types of register: a notational public register for defensive protection and a national confidential register and local registers for positive protection.

[23] Business India (2004) "Digital Library for Traditional Knowledge in SAARC region", New Delhi, 27 December and The Financial Express (2005) "SAARC to Set Up Traditional Knowledge Digital Library", New Delhi , 3 January.

[24] S M. May and L. Brooke (1997) "Inuit Science: Numavik's Experience in Canada" in IUCN Inter-Commission Task Force on Indigenous Peoples, *Indigenous Peoples and Sustainability: Case and Actions,* p 353-361

[25] Madhav Gadgil *et al.* (2000), "New Meanings for Old Knowledge: The People's Biodiversity Registers Program", 10 ECOLOGICAL APPLICATION 1307

[26] Anil K Gupta (2001) "Framework for rewarding indigenous knowledge in developing countries: Value chain for grassroots innovations", Paper presented at WTO Expert Committee, 3 September

[27] In the United States, The Tulalip Tribes are compiling their traditional knowledge and they distinguish "Type A knowledge" reserved exclusively for members of the tribes and "Type B knowledge" that they wish to make available to the public at large

[28] See for instance the BIOZULA Database in Venezuela and Peruvian registers described in WIPO/GRTKF/IC/3/6 or in Merle Alexander *et al.* (2003), *The role of Registers & Databases…"*

[29] See Merle Alexander et al. (2003), The role of Registers & Databases …"

[30] Preston Hardison (2003) "Communication to Canadian Indigenous Information Network" 4 August

Rather, it places TK in the public domain and amounts to a renunciation of rights over such knowledge.[31] In other words, defensive protection is incompatible with positive protection. A related criticism points out the absence of clear rights on TK databases and the elements of knowledge it contains.[32]

A second set of criticisms argue that placing TK in databases changes the nature of the knowledge, freezes it and interrupts the process of traditional innovation.[33]

A third set of criticisms focus on the relation between TK holders and the database. A database does not provide a right over the knowledge, as such, to the benefit of TK holders. Furthermore, in cases where TK holders do not themselves compile the TK database, the articulation of rights between the TK holders, who have rights in the TK data, and the database compilers, who have rights in the database containing the TK data, is unclear.[34] In the same spirit, some databases have been blamed for not taking into account customary law and local context of innovation.

1.3 Why Protect TK: Utilitarianism as a Complementary Justification[35]

After explaining how TK holders attempt to protect their knowledge, and before coming back to the criticisms and unresolved issues, it is worth discussing the justification for TK protection. In this section, I explain how a utilitarian approach is useful to justify TK protection and design a protection mechanism. Looking at the grant of property rights from a utilitarian perspective is to regard property rights as an instrument to obtain the greatest good for the greatest number. In order to translate this ideal, most scholars use wealth maximization as the criterion and economics as a methodology to assess the effect of rights.

To consider a regime of protection for TK from a utilitarian perspective, one must look at the consequences of the creation and attribution of property rights in terms of the increase of utility. When used to explain how intellectual property laws or other forms of knowledge control and exchange function, utilitarianism looks at the nature of knowledge and its usefulness as the key criteria to identify the object of protection and the beneficiaries. Rights are regarded as an incentive to produce and/or disseminate the desired knowledge. Therefore, a possible contribution of a utilitarian approach might be to identify different types of knowledge, their respective usefulness, and the effect that different protection mechanisms could have on the provision and/ or dissemination of different types of knowledge.[36] Because

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[31] Brendan Tobin (20014) "Towards an international Regime for Protection of Traditional Knowledge: Reflections on the role of Intellectual Property Rights" paper presented at the International Conference on "Bioethical Issues of Intellectual Property in Biotechnology", Tokyo, Japan, 6-7 September available at www.shef.ac.uk/ipgenethics/conference/papers/Tobin.pdf

[32] *Ibidem*

[33] Graham Dutfield (1999) "Protecting and Revitalising…"

[34] Merle Alexander *et al*. (2003), *The role of Registers & Databases…*, p. 35

[35] This analysis of utilitarian arguments as a justification for the protection of TK relies heavily on the similar analysis developed by Padmashree Gehl Sampath. However, we reach very different conclusions. She suggests resorting to trade secret while I suggest codifying TK and creating databases. See Padmashree Gehl Sampath (2003), "Defining an Intellectual Property Right …"

[36] This does not mean that there is no reason for a comprehensive international treaty on TK protection or model legislations by which states set themselves general objectives in terms of TK protection. However, the implementation of those objectives will require different mechanisms for different forms of TK with different usefulness. Actually, WIPO has already divided TK in two categories: traditional knowledge *sensu stricto* and traditional cultural expressions because of the difference of nature and usefulness of these categories of knowledge, but further divisions might be necessary.

it takes into account these elements, a utilitarian or goal-based approach is more helpful to create effective, customized and transferable property rights and to provide criteria precise enough to identify the object of protection, the form, the scope of protection and the beneficiaries.

An additional advantage of a utilitarian justification of intellectual property lies in the possible benefit from the lessons of knowledge economics. Knowledge economics focuses on the conditions and the costs of knowledge production and dissemination. It plays an important part in the justification of intellectual property law whose main rationale –in a utilitarian perspective – consists in creating the best conditions for the production and the use of knowledge within society to further its progress. Some recent evolutions in knowledge economics might be particularly relevant to design accurate protection mechanisms for TK.

In this article, I cannot identify the useful characteristics of all categories of TK. I focus on the useful characteristics of ethnobotanical knowledge, which can be used for R&D in various bio-industries. It is likely that part of the analysis could be relevant for other elements of TK such as traditional environmental knowledge. In the following, the expression TK actually designates ethnobotanical knowledge. According to the proposed approach in the following paragraphs, I look at (1) the usefulness of ethnobotanical knowledge, (2) its characteristics, and (3) the incentive effects of intellectual property rights.

1.3.1 Contribution of Ethnobotanical Knowledge to Bio-Industries' R&D

To understand the contribution of TK, one must first understand the input provided by biodiversity in the R&D process in bio-industries. Bio-industries can be conceived as defense efforts against a hostile biological world that are perpetually eroding and must be constantly renewed. In agriculture, we perpetually renew a system that faces the always-evolving pests and predators of our food crops. In medicine we similarly defend human beings against direct aggressions. In both sectors, our defense effort is perpetually eroding and must be constantly renewed. Plants and other biological resources are essential ingredients in the defense of the human domain because they contain relevant information. The same forces that are operating against the human domain are also at work against other living organisms. Any life form that survives has developed resistances that are successful in a contested environment.[37] It is for the retention of these existing strategies of resistance that bio-industries collect plants or other biological resources and screen them to identify pharmacologically active compounds[38]. It is in this collection of plant for screening that TK can provide a valuable contribution. There are three strategies for collecting plants for screening programs: random, taxonomic and ethnobotanical. Random collecting is an attempt to sample as much taxonomic diversity as possible. The taxonomic approach is a more guided approach is to select for screening species

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[37] Timothy M. Swanson (1996), "The Reliance of Northern Economies on Southern Biodiversity: Biodiversity as Information", 17 ECOLOGICAL ECONOMICS, p. 2

[38]Natural product research is far from being the only source of novel active compounds; it is rather a complement to the chemical synthesis of new drugs. However a study made in 1989 in the US estimated that, 25% of drugs' active ingredients were extracted or derived from plants. Another study carried out in 1993 estimated that in the US 57% of the prescriptions contained at least one major active compound now or once derived after compounds derived from biodiversity. See Peter P. Principe (1989) "The Economic Significance of Plants and Their Constituents as drug", in H. Wagner, H. Hikino and N.R. Farnsworth (eds.) ECONOMIC AND MEDICINAL PLANT RESEARCH, Volume 3, pp. 1-17, Academic Press, London, U.K. and Grifo, F. T. and D. R. Downes (1996), "Agreement to Collect Biodiversity for Pharmaceutical Resource: Major Issues and Proposed Principles", in Brush, S. and D. Stibansky, Eds, *Valuing Local Knowledge*, Washington D.C. Island Press.

that belong to certain families or genuses that are likely to contain certain classes of compounds. The ethnobotanical approach consists in selecting the plants to be collected on the basis of their uses in traditional medicine. Once the plants have been selected and collected according to ethnobotanical knowledge, they can be randomly screened. In that case, the contribution of ethnobotanical knowledge consists of increasing the probability to identify active compounds. Ethnobotanical knowledge can provide an additional contribution when scientists look at the uses of plants in traditional medicines and test their effectiveness.[39] Finally traditional modes of preparation can provide further clues to active chemical compounds.[40]

The contribution of ethnobotanical knowledge to drug R&D is very often mentioned and illustrated by examples but there actually exist few serious estimations of its value. However, some studies comparing the random collection and ethnobotanical collection approaches observe a four-fold increase in the probability of drug discovery.[41] Otherwise, many pharmacological or chemical studies report the use of TK without estimating their value.[42] The value of TK is also attested to by the existence of a series of related disciplines and journals dedicated to its documentation: ethnobotany, ethnobiology, ethnopharmacology, ethnoecology, economic botany, and so forth. Finally, it has been observed that seventy-four percent of chemical compounds used in drugs today have the same or related use in western medicine as they do in traditional medical systems.[43] It is therefore reasonable to state that TK has and will continue to play a valuable role in drug R&D either in terms of identification of plants for screening or as clues of their pharmaceutical activity.[44]

Furthermore, large chemical and pharmaceutical companies are used to resorting to all sorts of collaborations with a large range of "knowledge providers". Indeed, given the large array of discoveries in molecular biology, genetics and related fields, biotechnology has become such a diverse industry, in terms of its underlying science and discoveries that not even the largest pharmaceutical companies have the internal capacities to cover all the areas.[45] In this context, it seems that TK holders willing to do so could work as "knowledge providers" for those large chemical or pharmaceutical companies.

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[39] James S. Miller (1992), "The Discovery of Medicines and Forest Conservation" in, Robert P. Adams and Janice E. Adams (eds.), *Conservation of Plant Genes. DNA Banking and in vitro Biotechnology*, San Diego: Acad. Press, p. 123

[40] Elaine Elisabethsky (1991), "Folklore, Tradition or Know-How?", CULTURAL SURVIVAL QUARTERLY, SUMMER, pp.9-13

[41] See Michael Balick (1990), "Ethnobotany and the identification of Therapeutic Agent from the Rainforest", Bioactive Compounds from Plants, Ciba Foundation Symposium p. 26-28.

[42] Lieting and van den Berghe (1998). "Leads for Antivirals from Traditional Medicines" in Prendergast et al.(eds.), Plant for Food and Medicine, The Royal Botanical Gardens, Kew, pp.333-344, Labadie, R.P. et al. (1989) "An Ethnopharmacological Approach to the Search for Immunomodulators of Plant Origin", PLANTA MEDICA 55:339-348

[43] N. R. Farnsworth (1988), "Screening Plants for New Medicines" in E. O. Wilson, (ed.) *Biodiversity*, Washington, DC: National Academy Press, pp. 83-97

[44] Elaine Elisabethsky (1991), "Folklore, Tradition or Know-How?", CULTURAL SURVIVAL QUARTERLY, Summer, pp.9-13

[45] Walter W. Powell (2001), "Networks of Learning in Biotechnology: Opportunities and Constraints Associated with Relational Contracting in Knowledge-Intensive Field", in Rochelle Dreyfus, *et. al.*, *Expanding the Boundaries of Intellectual Property, Innovation Policy for the Knowledge Society*", Oxford University Press and Paul P. Saviotti (1998), "Industrial Structure and the Dynamics of Knowledge Generation in Biotechnology" in Senker and van Vliet (eds.), *Biotechnology and Competitive Advantage; Europe Firms and the US Challenge,* Edward Elgar, pp. 19-44

1.3.2 The Tacit Dimension of Traditional Knowledge

Once one has identified the nature of the actual or potential contribution of TK to drug or other bio-industries R&D, one has to look closer at the characteristics of this type of knowledge. TK includes identification of plants, identification of their use and possible recipes for their use.

Part of TK fits into the definition of tacit knowledge or can be assimilated to tacit knowledge. Tacit knowledge refers to particular know-how or undeveloped ideas that are best communicated through personal communication between people. Often the holder is only partly aware that he owns tacit knowledge. Well-known examples of tacit knowledge include a famous rugby player that knows how to score a try but is only partly aware of what he does and unable to describe it in such a way that someone reading his description could easily reproduce his gestures.[46] Actually, the same is true for much knowledge involved in the innovation process, especially in the field of biotechnology. Tacit knowledge is the opposite of codified knowledge. Codification of knowledge is the process by which knowledge is converted into a message that can be processed as information. Codification locates knowledge on a support that liberates knowledge from its reattachment to the person who had incorporated tacit knowledge. Codified knowledge is therefore more similar to a commodity[47]. The tacitness of knowledge hinders a series of operations. The exchange, the diffusion, and the learning of tacit knowledge require the displacement and the voluntary demonstration of knowledge holders. These operations are therefore costly and difficult to implement. The storage and the memorization of tacit knowledge are conditioned by the permanent renewal of peoples holding this knowledge. Finally, tacitness of knowledge slows down the cumulativeness of innovation. The identification of complementary pieces of knowledge and their holders is limited by tacitness and this impedes systematic identification and classification. [48]

More broadly, an important part of TK can be assimilated to tacit knowledge in the sense that there are serious hindrances to its transmission outside the community of knowledge holders. Most of TK is orally transmitted. It is often unsystematically conserved or conserved with a classification that does not correspond to ones used in Western science. It is sometimes mixed with magic formula –often used as a smoke screen meant to control the diffusion of knowledge. Finally, yet importantly, it is often expressed in languages with a limited number of speakers. Therefore, it is reasonable to assimilate to tacit knowledge the actual or potential contribution of TK to bio-industries R&D. The tacitness of TK is probably one of the major obstacles to its further use in R&D. Both the importance of ethnobotanical knowledge and the problem of tacitness are well illustrated by the largest study on the commercial use of biodiversity. Kerry Ten Kate and Sarah Laird observe that close to half of the companies they interviewed make use of TK. However, they immediately add that 80 percent of all companies that use ethnobotanical knowledge rely solely on academic literature and databases as their primary source for this information.[49]

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[46] P.A. Mangolte (1997), « La dynamique des connaissances tacites et articulées : une approche socio-cognitive», ECONOMIE APPLIQUEE, Tome L.2

[47] Dominique Foray (2000), *L'économie de la connaissance*, Paris, La Découverte, p. 48

[48] *Ibidem,* pp. 47 and 71.

[49] Kerry Ten Kate and Sarah Laird (1999), The Commercial Use of Biodiversity" Earthscan, London, p. 62. See also Russel L. Barsh (2001), "Who Steals Indigenous Knowledge?" 95 AMERICAN SOCIETY OF INTERNATIONAL LAW PROCEEDINGS, 153

This has three implications. First, TK is rarely accessed as tacit knowledge through field collection. Second, the knowledge used by bio-industry is the part of TK that has been codified or translated in academic journals or databases. Third, at present most of this codification or translation of TK is carried out by academics with little involvement of TK holders.

1.3.3 An Incentive to Codify

Once one has identified the possible contribution of TK to the R&D process in the bio-industries, the next step is to identify property rights that will have an appropriate incentive effect on the production and/or the dissemination of TK. If one considers the theoretical evolution of knowledge economics, it appears that there is not so much a need to restrict access – as for most of TK, its tacit dimension already limits access. There is rather a strong need for an incentive to reveal knowledge and to provide mechanisms that favor trade of knowledge.

Under the classical economic understanding of innovation developed by Arrow[50] and Nelson[51], it is not clear that there is a justification to protect TK through exclusive property rights. I briefly recall Arrow and Nelson's few central points. First, from a firm standpoint, undertaking R&D activities is regarded as an investment decision. Second, R&D can be conceived of as an activity intended to produce information or knowledge. Third, knowledge is a public good, i.e. a non-excludable and non-rival good. As a non-excludable good, knowledge is likely to be underprovided, from society's perspective, because the social return for investment in R&D exceeds private return. By providing a legal mechanism to exclude third parties from knowledge use, IPRs enable knowledge producers to capture a greater part of the benefits of their investment in knowledge production, therefore acting as incentive for the production of knowledge. However, knowledge is also a non-rival good, which means that it should be freely available. There is thus a dilemma or a tradeoff between investment and access or, in other words, between dynamic efficiency and static efficiency.

Under such an understanding of knowledge production and dissemination, is there an economic reason to protect such knowledge and by what kind of protection mechanism? TK could itself be regarded as R&D because it consists of knowledge that has resulted from a long process of innovation by TK holders; some people want to acquire it and TK holders want to protect it, it is therefore valuable knowledge. Valuable knowledge is a public good, as such, there seems to be reasons to protect TK by IPRs mechanisms. On the contrary, TK already exists, so there is no need to create IPR incentives to produce it; it has been created without such incentives. Moreover, TK is also a non-rival good, which suggests that it should be open-access. In economic terms, there appears to be no gain in dynamic efficiency that justifies losses from static inefficiency, such as the under-utilization of knowledge induced by IPRs. Therefore, there is no apparent economic or utilitarian argument to protect TK. That is probably why most proponents of TK protection reject utilitarian justifications.

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[50] Kenneth J. Arrow (1962), « Economic Welfare and the Allocation of Resources for Inventions » in Richard R. Nelson (ed.) *The Rate and Direction of Inventive Activity: Economic and Social Factors*, Princeton University Press, Princeton

[51] Richard R. Nelson (1959), « The Simple Economics of Basic Scientific Research », JOURNAL OF POLITICAL ECONOMY, vol. 67

As suggested by Padmashree Gehl Sampath, one cannot stop the analysis at this point. Indeed, both the increasing cumulative and collective dimension of innovation,[52] especially in biotechnologies and the increased awareness of the role of tacit knowledge, have led to some changes in the economic theorization of innovation and/or knowledge production that are relevant in our examination of the justification of TK protection.[53] First, the collective and cumulative dimension of innovation implies that access to previous inventions and preexisting knowledge become important incentives to innovate whereas transferring and exploiting preexisting knowledge is difficult and costly. Second, it is important to realize that describing knowledge as a public good only applies to codified knowledge.

Indeed, tacit knowledge does not qualify as a perfectly non-exclusive good. When knowledge is expressed under the form of perfectly codified instructions that enable an easy reproduction of knowledge, it is uncontrollable or non-excludable.[54] Actually, knowledge is often a mix of codified instructions and tacit knowledge based on practical experiences that can only be acquired in the specific laboratory where the research has been undertaken. The tacit dimension of knowledge gives some control to its owner because it can only be transmitted by voluntary demonstration and apprenticeship. Therefore, tacit knowledge has some excludability.[55] As most TK consists of tacit knowledge, or can be assimilated to tacit knowledge, it might be said that it is partly excludable and can only be accessed by a voluntary demonstration of knowledge holders. When TK has been codified in academic databases or journals, TK holders have already willingly demonstrated it. However, they may have been unaware of the consequences of this revelation.

Several costs of knowledge also limit the benefit of non-rivalry. The effect of non-rivalry, i.e. the capacity of knowledge to be used an infinite number of times by an infinite number of persons, can be seriously limited by three categories of costs: the cost of codifying, transmitting, and acquiring knowledge. This implies that the tacitness of knowledge reduces the benefits of its non-rivalry. The cost of transmission includes the cost of transferring knowledge including the cost of the medium.[56] The costs of acquisition refer to the costs of training a large audience able to understand and use the knowledge. Without those investments, the value of non-rivalry is limited or void.[57] One can therefore distinguish specific non-rival goods like esoteric or very up-to-date knowledge from quasi-universal non-rival goods like the law of gravitation. The presence of those costs implies that TK cannot be used as widely as its potential. In economic terms, one would say that TK is not available for diffusion at marginal costs.[58] However, two categories of costs have been reduced. The development of the information and communication technologies, notably in TK-rich countries like India and China, lowers the cost of transmission. Similarly, the development of scientific disciplines like ethnobotany, ethnopharmacology, or economic botany creates a new audience able to understand TK. Therefore, the costs of codifying appear to be the main limit to the benefits of non-rivalry.

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[52] See notably Robert P. Merges & Richard R. Nelson (1990), « On the Complex Economics of Patent Scope », 90 COLUMBIA LAW REVIEW 839 or Jerome H. Reichman (2000), "Of Green Tulips and legal Kudzu: Repacking Rights in Subpatentable Innovation", 53 VANDERBILT LAW REVIEW 1743

[53] Padmashree Gehl Sampath (2003), "Defining an Intellectual Property Right …", p.24

[54] Except obviously when it is codified with a secret code.

[55] Dominique Foray (2000), *L'économie de la connaissance*, pp 67-68

[56] Dominique Foray (2000), *L'économie de la connaissance*, pp. 69-70

[57] Michel Callon (1994), «Is Science a Public Good? Fifth Mullins Lecture", SCIENCE TECHNOLOGY AND HUMAN VALUE, 19(4)

[58] Padmashree Gehl Sampath (2003), "Defining an Intellectual Property Right on…"

Therefore, I believe an important part of TK consists of tacit knowledge that does not correspond to the notion of public good. There is not a need to restrict access in order to provide an incentive to invest in the production of TK. Rather, there is a need for an incentive to codify TK so as to increase its transferability and use.

In addition, it is important to understand the relationship between codification and intellectual property. Codification is a condition for the granting of an intellectual property right. A property right can only be granted on well-identified and described pieces of knowledge.[59] Codification also provides an argument for the granting of IPRs. Indeed, codification is a public good, or in other words, knowledge becomes a public good when it is codified, as such there might be a need for protection and incentives.

In conclusion, the lesson of this utilitarian approach is twofold. From the perspective of lawmakers willing to promote the conservation, use, and creation of TK, there seems to be a strong argument for incentives to codify TK. The lesson of this utilitarian approach is not an argument against the creation of property rights in TK, as it is called by article 8J of the CBD, as it is enacted in some national legislations and as it is discussed in WIPO-IGC. The lesson is that even if this property right exists, the transferability and the use of ethnobotanical knowledge, at least outside of the community, will remain very limited in the absence of codification. This assertion is confirmed by the figures mentioned above: eighty percent of firms using ethnobotanical knowledge use codifications of TK done by academics. From TK holders' standpoint, an important choice must be made. If their priority is to keep control of their ethnobotanical knowledge in the absence of a clear possibility to obtain intellectual property protection, the best option consists probably in keeping their knowledge tacit. If they want to open access to their knowledge and obtain compensation for its use, they should consider codifying their knowledge and search for relevant intellectual property protection.

1.4 Theory and Practice: Codification and Databases

The analysis of the justification for TK protection from a utilitarian perspective supports those TK holders that have launched into creating databases. Indeed, the material result of TK codification might be academic journal articles or databases. As the publication in academic journals implies a total loss of control on published knowledge, databases appear to be the best way to codify TK. It is not sufficient to give theoretical support to the creation of TK databases; first one must examine whether there is a property right on databases that works as an incentive to codify or whether it is necessary to envisage the creation of new IPRs and then return to the criticisms of TK databases.

1.4.1 IPRs and Databases

Is there a right available or is it necessary to envisage the creation of a new IPR? Countries interested in fostering codification of TK in their territory could enact national legislation on the condition of access to TK databases. National laws may not be the answer because they only extend as far as national borders. One of the benefits of digital databases is their ability to increase the international transferability of knowledge. Therefore, the creation of a new IPR may be more effective at the international level so that it may have an effect on the use of TK outside of national borders. It is not the purpose of this essay, however, to give a detailed analysis on the international protection of databases.

[59] For example, in copyright law, protection is given to expressions but not ideas; and in patent law, protection is given to described inventions but not know-how.

In brief, in most countries databases are protectable under copyright and/or through technological measures. In the EU, databases may additionally qualify for protections under the *sui generis* database right.

With regards to copyright, the conditions and scope of protection vary among states. Regarding the conditions of protection, under the "intellectual creation" approach to the originality standard that is taken by most civil law jurisdictions and some common law countries, most notably the U.S., the author of a database must demonstrate a limited modicum of creativity in the selection and arrangement of data while under the "sweat of the brow" approach, he must demonstrate investment in time and/or money in the compilation of the database[60]. Despite the differences in the conditions of protection, there is little doubt that a TK database would qualify for copyright protection in most countries. As for the scope of protection, in countries resorting to the "intellectual creation" doctrine, it is very limited: it is the copy of the selection and/or arrangement of data that constitutes infringement, not the copy of data. In countries following the "sweat of the brow" doctrine, the scope of protection is broader but still limited: the copy of a substantial proportion of the data infringes the copyright but not the copy of small amounts of data.[61]

It is also possible to protect databases through a *sui generis* right database first enacted in the European Union and soon to be in force in close to fifty states. The makers of a TK database should have no difficulty in qualifying for protection. The means of qualifying for protection are similar to copyright under the "sweat of the brow" approach, in that in order to qualify for the right the maker of the database must make a substantial investment in obtaining, verifying, or presenting the contents of the database. The scope of protection is slightly different; if a database qualifies for the *sui generis* right, database maker may prevent the unauthorized extraction and/or re-utilization of substantial parts of the database, and the repeated and systematic extraction/or re-utilization of insubstantial parts of the database's contents. The *sui generis* database right therefore provides stronger protection than copyright. However, it is only in vigor in a limited number of countries and protection is only available for nationals or residents of these countries.[62] It is beyond the scope of this article to discuss whether countries rich in TK should consider enacting similar legislation, as the protection of databases is a much broader issue than TK databases.

Last, it is possible to protect online databases by conditional access systems that serve to control access to an information service[63]. Here, I must introduce a theoretical distinction. The notion of property rights is slightly different for lawyers and economists. Property rights in

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[60] Mark J. Davison (2003), *The Legal Protection of Database,* Cambridge: Cambridge University Press, pp. 13-21

[61] *Ibidem,* pp. 26-27

[62] Nevertheless, even if countries rich in traditional knowledge do not wish to enact an EU-like *sui generis* right on database, there might be a possibility to benefit from the protection in countries where this right exists even thought the EU directive says the opposite. After a very detailed comparison between the two forms of copyright protection and the *sui generis* right, Professor Davison argues that except differences of terminology, the *sui generis* right is not different from copyright. Such a difference cannot mask the substantive reality that it is a copyright for databases. If his analysis is right, the EU Member States have an obligation to accord national treatment to all nationals of states that are signatories to international agreements such as the TRIPS agreement and the Copyright Treaty. Therefore, the maker of a TK database (or the state from which they are nationals) could use this argumentation to claim the protection of the EU *sui generis* right within the territory of the states in which it is in vigor. See Mark J. Davison (2003), *The Legal Protection of Database*, pp. 221-226.

[63] Bernt Hugenholtz (1999), "Code as Code, Or the End of Intellectual Property as We Know It", MAASTRICHT JOURNAL OF EUROPEAN AND COMPARATIVE LAW, Vol.6, No3 p. 308-318

the economic sense include not only legal property rights but also other forms of control that produce the same effects of creating some degree of exclusiveness and transferability.[64]

While copyright and the *sui generis* right provide control over copying parts of a database, conditional access systems provide complete control over access to a database. Under conditional access systems a database owner can condition access to a database through contractual licensing terms, which fix the conditions and payment for use. Therefore, for on-line databases, conditional access systems offer convenient protection for TK holders. However, it might be worth combining the three different types of protection because once access has been given to a user, copyright, or the *sui generis* right provide stronger protection against third parties. One must recall the distinction between contract and legal property rights. For the most, contracts only bind the contracting parties; they cannot be opposed to third parties. By contrast, legal property right can be opposed to anyone. To illustrate, imagine A has some TK and makes it available to B under certain conditions including an obligation not to communicate the knowledge to third parties. In violation of the contractual terms B makes the knowledge available to C. If A protects his database with a conditional access measures, he can sue B for breach of contract but he has no direct action against C. By contrast, if A has a legal property right, he can sue B for breach of contract and C for infringement of its property right.[65] For this reason, TK holders might combine technological measures and IPRs.

In sum, there already exist some forms of international protection for databases that can incentivize the codification of TK. Some additional forms of protection may appear in the future as a result of the discussions within WIPO on database protection that have been interrupted by the lack of consensus within the United States on the best form of protection.

1.4.2 Replies to Database Critics.

Sceptics argue that the use of databases for defensive protection is incompatible with positive protection because it would effectively place TK in the public domain. This assertion confuses notions of patent law and copyright law and deserves to be qualified. It is true that an invention described in a text or a database can no longer be patented, as it would lack novelty. In that sense, it can be said that it is placed in the public domain. However, the description itself can still be protected by copyright, the *sui generis* database right, or above all technological measures. Therefore, TK described in databases can be taken into account as prior art by patent offices even if access to the database is not freely accessible. As an illustration, let us compare with a scientist who makes a discovery and describes it in an online academic journal. This discovery can no longer be patented as it would lack novelty. However, the article is protected by copyright and access to the journal can be limited by technological measures, i.e. only subscribers may access. In practice, people accept to pay high subscription fee to access description of valuable scientific information. There is now reason why peoples interested in accessing valuable TK would not accept to pay a fee to access a TK database. In addition, access to the database could e conditioned not only to the payment of a fee but also to an obligation not to share the knowledge with third parties. Lastly, the European Patent Office (EPO) and the maker of the Traditional Knowledge Digital Library (TKDL) recently concluded an agreement according to which the EPO will have

[64] Yoram Barzel (1997), *The Economic Analysis of Property Rights,* Cambridge University Press, (2nd ed.), p. 3
[65] This is the legal strategy used in open-software, see David Mc Gowan (2001) "The legal Implications of Open-Source Software", UNIVERSITY OF ILLINOIS LAW REVIEW, vol. 2001, p. 242 *(Cf. section3.4)*

access to the TKDL while it will remain inaccessible to third parties.[66] This agreement is practically very helpful but it should not give the impression that similar agreements are a legal necessity to combine defensive and positive protection.

Similarly, some TK holders complain about the notion of the public domain. Either they claim that the notion of public domain does not exist in their customary law or they complain that their knowledge has been placed in the public domain by third parties without their prior consent[67] and they want protections for their knowledge that is in the public domain. In that latter case, databases enable some control over the use of knowledge in the public domain. A database made up of pieces of knowledge in the public domain (either because they are unprotected, no longer protected or unprotectible) can be protected by intellectual property or by technological measures.[68] Obviously, the person interested in accessing that knowledge can find another source but he might prefer using the database that offers a large collection of knowledge and a classification system. Facilitating access to knowledge is the very raison d'être of databases. In that case, the users might be ready to accept the conditions of access settled by the database maker.

Critics of databases also argue that codifying TK and placing into databases could be dangerous for traditional innovation because it would fix knowledge in its current state and interrupt the innovation process. This criticism may be legitimate but it is badly formulated. Modern science mixes tacit and codified knowledge. Codification of new discoveries is an important task and it cannot be argued that codification freezes the innovation. To the contrary, some degree of codification is necessary to share knowledge and further innovate.

This criticism highlights the question of the mode of devolution of TK. Indigenous and local communities holding TK face the same options as any organization managing knowledge. The first strategy consists in codifying knowledge systematically so that it can be stocked in databases. In that case, it can be easily accessed and used by members of the organization. Alternatively, they can adopt a strategy of personalization in which knowledge is kept tacit. It remains very bound to the person who developed it, and it is transmitted by personal contacts among members in the organization. Dialogue among individuals is preferred to storage of knowledge into databases. This strategy entails important investment in the development of interpersonal networks and a culture of mobility and personal communication within the organization. For that reason, a high degree of stability in the membership of the organization and a process of training from one generation to another are essential.[69]

It is reasonable to affirm that thus far indigenous and local communities holding TK have relied for the most on a strategy of personalization to ensure the devolution of their knowledge. The very problem is that for many communities this strategy of devolution is in a deep crisis. Without going too deep in to this issue, it can be observed that even the existence of language is threatened. Nettle and Romaine point out that of the 6600 languages spoken today, fewer than nine percent, or 600 have enough speakers to ensure their continuity into the next century. This loss of language includes ninety percent of the 250 Aboriginal

[66] Presentation of a representative of the European Patent office at the 8th session of WIPO-IGC, June 2005

[67] See for example Tulalip Tribes of Washington (2003), "Statement on Folklore, Indigenous Knowledge, and the Public Domain" at the fifth session of the WIPO- IGC, July 09, in WIPO/GRTKF/IC/6/14

[68] This is precisely why proponents of a strong public domain are very wary about strong protection on database; see notably Jerome H. Reichman and Paul F. Uhlir (2003) "A contractually Reconstructed Research Commons for Scientific Data in A Highly Protectionist Intellectual Property Environment", 66 LAW AND CONTEMPORARY PROBLEMS 315

[69] Dominique Foray (2000), *L'économie de la connaissance*, Paris, La Découverte, pp. 47, 54, 95-96

languages in Australia near extinction with only eighteen having at least 500 speakers each. They also note that no children are learning any of the 100 native languages spoken in the state of California.[70] Also, the devolution of TK from one generation to the next is less and less effective. As modernization spreads over the world, young peoples seem unable to recognize value in traditional ways and they do not perceive any potential economic return from engaging in traditional activities. As an illustration, Lee *et al.* report that "traditional leaders in Micronesia were concerned that […] over the last two generations a large percentage of traditions and skills specific to Micronesia have not been passed on, and will become extinct if an active program is not put into place to keep them an active part of local life."[71] Therefore indigenous and local communities could consider replacing or complementing their strategy of personalization by a strategy of codification.

What is true is that if we want to maintain the traditional innovation process, codification must be carried out by or with TK holders, and their organization of innovation must be taken into account. This will be the subject matter of the second part of this essay.

Furthermore, critics of databases rightly point out that there exists a problem of articulation between TK holders and the makers of a TK database when TK holders themselves do no make the database.

What TK holders claim is a right to TK as such, not a right to a database. Similarly, article 8J of the Convention on Biological Diversity, as well as some national laws, and discussions on misappropriation in WIPO recognize or consider the possibility of a right to TK as such. By contrast, a utilitarian approach suggests that codification might be a practical means for effective protection of ethnobotanical knowledge and that we should consider the possible incentives. In the current state of the law, there exist some property rights to databases that could work as an incentive to codify ethnobotanical knowledge. Those property rights are granted to the codifier, i.e. the person that makes the database. Therefore, they encourage TK holders to codify their knowledge. However, if the codification, or creation of the database, is not carried out by TK holders themselves, the respective rights of TK holders and the database maker must be respected. This not a problem specific to ethnobotanical knowledge – it is present each time the maker of a database wants to integrate protected material in its database. The database maker and knowledge holders will have to negotiate the conditions of integration of that knowledge in the database and a formula to share the benefits. The situation is more complex with TK because, in the current state of the law, the existence and the outline of a right to TK remain unclear (*Cf. section 1.1.2).* However, TK holders can make up for the weakness of their property right by the tacitness of their knowledge: codification of their knowledge in a database is likely to require their voluntary contribution. In addition, creating a TK database facilitates the enforcement of their rights to their knowledge.

Whether TK holders or third parties carry out the creation of a TK database, it will have organizational consequences. A TK database is most likely to include pieces of knowledge belonging to several owners: several individuals, a community, or multiple communities. The

[70] D Nettle and S. Romaine (2000), *Vanishing Voices: the Extinction of the World's Languages*, Oxford: Oxford Press

[71] R Lee, M.J. Balick, D.L. Ling, F. Sohl, B.J. Brosi, W. Raynor (2001), "Cultural dynamism and change—an Example from the Federated States of Micronesia" ECONOMIC BOTANY 55(1)9-13

database maker may act as a collective rights organization,[72], i.e. an organization managing the rights of several rights holders. If a community of TK holders sets up the database, the latter will manage the rights of the community and act as an intermediary between the community internal regime, which grants property rights and rules governing knowledge exchanges within the community, and the external regime, which settles the conditions upon which the community agrees to give access to its knowledge to third parties. If a third party sets up the database, it will act as an intermediary between the knowledge holders and the potential users.

Therefore, we cannot limit our attention to a limited understanding of TK protection through databases or any other device. We must also consider how these protection devices can enable communities to articulate their internal regime, which organizes innovation within the community, and an external regime, which organizes their relation to third parties. This is the subject matter of the following pages.

2 …while taking into account custom-based innovation systems

The claims of TK holders are not limited to the protection of their knowledge but also include the respect of their customary law or in other words the preservation of their cultural identity and the organizational structure that enables the continuous production, use and conservation of their knowledge. Very often, TK holders argue that they do not need intellectual property rights but rather the recognition of their customary rights.[73]

Usually the demand of recognition of customary law is perceived as deeply embedded in the larger claim of indigenous people for self-determination. Article 8J of the CBD calls for the protection of TK of local and indigenous communities. Even if there is no universally accepted definition of the notion of "indigenous communities", most people refers to the "Cobo' description" requiring three elements: 1) precedence on a territory, 2) non-domination, and 3) an identity claim. "Indigenous communities, peoples and nations are those which, having a historical continuity with pre-invasion and pre-colonial societies that developed on their territories, consider themselves distinct from other sectors of the societies now prevailing in those territories, or part of them. They form at present non-dominant sectors of society and are determined to preserve, develop and transmit their ethnic identity, as a basis of their continued existence as peoples, in accordance with their own cultural patterns, social institutions and legal systems."[74] By contrast, the term "local community" is not strictly defined and is used to refer to communities in the rest of the world, notably in Africa and in Asia that have traditional way of life and maintain TK on biological resources.

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[72] Merle Alexander *et al.* suggest a similar idea in using the term "trust", I prefer the expression "collective right organization" as it does not always fits in the legal definition of trust; See Merle Alexander *et al.* (2003), *The role of Registers & Databases (…),* p. 36

[73] See notably Four Directions Council (1996), *Forests, indigenous peoples and biodiversity*. *Contribution of the Four Directions Council to the Secretariat of the Convention on Biological Diversity*, Lethbridge: FDC or the The Mataatua Declaration on Cultural and Intellectual Property Rights of Indigenous Peoples available at http://aotearoa.wellington.net.nz/imp/mata.htm or see the minutes of the WIPO-IGC, available at http://www.wipo.int/tk/en/

[74] U.N. Subcommission on Prevention of Discrimination and Protection of Minorities (1983) *Study of the Problem of Discrimination against Indigenous Populations*. José Martinez Cobo, special rapporteur. U.N. Doc. E/C.N.4/Sub.2/1986/7 and Addenda 1-4

The struggle of indigenous peoples for the recognition of their rights has a long and proper history[75]. Their demands concern a larger range of issues than the protection of TK. Roughly speaking, their demands can be summarized as a general struggle for self-determination, i.e. accession to statehood or at least some form of larger autonomy. In this context, indigenous peoples view the debate on biodiversity and TK as an opportunity to have their voice heard. On the other side of the table, governments, which have cold feet vis-à-vis demands of self-determination, regard any claim for the respect of customary law as a moral or political issue where the debate on TK protection is only a "pretext" to bring the issue of self-determination to the forefront.[76] As a result, except the insertion of a principle of respect of customary law in WIPO-IGC documents, little headway has been made on this issue.

To progress on this issue, it may be worth adopting a different perspective. Let us divert one instant our attention from the tensions between indigenous communities and their host states and recall that local communities with no demand for self-determination also claim that their knowledge is ruled by customary law or social norms[77] that should be respected by third parties. Then, we could adopt a more utilitarian standpoint focused on the conditions of "traditional innovation".[78]As a result, the protection of TK appears emblematic of a general challenge for intellectual property law and scholarship: recognizing the importance of private or informal intellectual property systems that facilitate innovation by virtue of shared norms or customs. In an article entitled "*From Medieval Guilds to Open Software: Informal Norms, Appropriability Institutions, and Innovation*,"[79] Professor Merges observes the historical permanence of appropriability structures or informal institutions that facilitate innovation by virtue of shared norms. These appropriability institutions are bottom-up institutions in the sense that they are norm-based groups that develop their own internal governance structure. They rely on group norms as opposed to formal legal enactments for the creation and enforcement of some form of IPRs. According to Professor Merges, these appropriability institutions require at least two things: (1) some way to differentiate insiders or members from outsiders and (2) some shared norms determining what knowledge must be shared by all members and what knowledge can be individually appropriated. After examining a series of these appropriability institutions, including medieval guilds, collective innovation in the 19th century steel industry,[80] patent pools,[81] exchange of research results by academic scientists,[82] standard settings organizations, a fashion guild in the 1930s, contemporary entertainment

[75] See for example S. James Anaya (1996), *Indigenous Peoples in International Law*, Oxford University Press, New York – Oxford

[76] However, in some States, case law or statute law gives some recognition to customary law

[77] Social norms and customary law can both be defined by two elements (1) regular behaviors (2) in which people engage out of a sense of obligation

[78] In the expression "traditional knowledge", what is traditional is the process of innovation not the age of the knowledge, (WIPO report of Fact Finding Missions)

[79] Robert P. Merges (2004) "From Medieval Guilds to Open Software: Informal norms, Appropriability Institutions, and Innovation", Conference on the Legal History of Intellectual Property, University of Wisconsin Law School, November 13

[80] Robert C. Allen (1983) "Collective Innovation", 4 JOURNAL OF ECONOMIC BEHAVIOR AND ORGANIZATIONS 1

[81] Robert P. Merges (2001), "Institutions for Intellectual Property Transactions: The Case of Patent Pools" in Rochelle Dreyfus et al. (eds.), Expanding the Boundaries of Intellectual Property: Innovation Policy for the Knowledge Society, Oxford University Press, New York, pp 123-165

[82] Robert P. Merges (1996), « Property Rights Theory and The Commons: The Case of Scientific research", in Ellen Frankel Paul, Fred D. Miller, JR., and Jeffrey Paul (eds.) Scientific Innovation, Philosophy, and Public policy, Cambridge University Press,

industry,[83] and open-source software. Professor Merges observes that "Many scholars – and particularly legal scholars– have tended to have a state-centric, if not legal-centric, view of appropriability. This "top-down" view must give way to a different conception: one where bottom-up institutions of all kinds contribute importantly to appropriability conditions. This view is in keeping with the recent trend in law and economics scholarship toward a discussion of social norms in conjunction with formal law."[84]

In that perspective, I suggest that local and indigenous communities holding TK can be analyzed as appropriability institutions that facilitate innovation by virtue of customary intellectual property law. Next, I argue that the question we have to deal with is the strengthening of these institutions, which are affected by outsider's interest in TK. Then, I examine some proposals that have been made to take into account customary law and observe that they do not answer the right question. Finally, I suggest one possible element of solution.

2.1 Recognition of the Existence of Customary Intellectual Property Law

Debates about international protection of intellectual property and more precisely protection of TK often erroneously assume that intellectual property regulation does not exist within indigenous and local communities.[85] One important lesson from the ongoing discussions on the protection of TK is to force us to revise the often-made assumption that there is no creativity among indigenous and local communities and more broadly in the third world. The second lesson consists in recognizing that there exists some intellectual property protection in these communities.[86] TK holders repeatedly claim that they do not want classical intellectual property law but rather recognition of their customary intellectual property law.

There is plenty of evidence in the anthropological literature and property rights scholarship that local and indigenous communities have developed community based system of property rights on land regulated by community norms or customs.[87] As for intellectual property, Cleveland and Murray observe that there is unfortunately no comprehensive study available.[88] However, they add that ethnographic examples make it clear that local and indigenous communities have notions of intellectual property and that these rights might exist at the individual level and/or group level based on residence, kinship, gender, or ethnicity. Their assertion is confirmed by several reviews of the anthropological literature[89] and the results of

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[83] Robert P. Merges (1996), "Contracting into Liability Rules: Intellectual Property Rights and Collective Rights Organizations" 84 CALIFORNIA LAW REVIEW 5:1293

[84] Robert P. Merges (2004) "From Medieval Guilds…"

[85] Ruth L. Gana (now Ruth L. Okediji) (1995), "Has Creativity Died in the Third World? Some Implications of the Internationalization of Intellectual Property", 24 DENVER JOURNAL OF INTERNATIONAL LAW AND POLICY 109, hereafter Ruth L. Gana (1995) "Has Creativity Died…"

[86] *Ibidem*

[87] See for instance CIEL (2002) *"Whose Resources? Whose Common Goals?" Towards a New Paradigm of Environmental Justice and the National Interest in Indonesia*. See chapter one: "Community-Based Property Rights: A conceptual Note"

[88] David A. Cleveland and Stephen C. Murray (1997) "The World's Crop Genetic Resources and the Rights of Indigenous Farmers, 38 CURRENT ANTHROPOLOGY 477, at 483

[89] Thomas Griffiths (1993) "Indigenous Knowledge and Intellectual Property: A preliminary Review of the Anthropological Literature, unpublished paper, quoted by Graham Dutfield (2000) "The Public and Private Domains, Intellectual Property Rights in Traditional Knowledge", Science Communication vol. 21, No 3 March pp. 274-295, and Paul Kuruk (1999) "Protecting Folklore under Modern Intellectual Property Regimes: A Reappraisal of the Tensions between Individual and Communal Rights in Africa and the United States, 48 AMERICAN UNIVERSITY LAW REVIEW 769-849, Ruth L. Gana (1995) "Has Creativity Died…"; see also Harold E. Driver (1962) The Indians of North-America, p. 221 who observes that all Native American Groups recognized ownership rights in intangible property.

the Facts-Finding Missions of WIPO[90] that identify several forms of intellectual property reminiscent of copyright, trademark or patent.

In addition, these customary intellectual property laws include the two elements Professor Merges identifies as constitutive of appropriability institutions. First, customary intellectual property laws differentiate insiders (members) from outsiders. Second, customary laws or norms determine what knowledge all members must share and what knowledge may be individually appropriated. As an illustration Matthias Leistner observes that "the flexible combination of individual and collective elements in the development of TK leads to various model of ownership depending on the predominance of either collective or individual contributions. Thus, the owning collective is not necessarily the whole local community but may also be a moiety, a clan, a phatry, a lineage, a society (or sodality) or a single household. And even individuals –for example shamans and/or healers in certain Indian Tribes – can distinguish themselves in some case as separate creators or inventors."[91]

In conclusion, it clearly appears that local and indigenous communities holding TK can be regarded as appropriability institutions that facilitate innovation by virtue of customary intellectual property law.

2.2 The Real Issue

It is essential to keep in mind that we do not have to deal with the protection of TK inside the community. Customary law governs protection inside the community. There is no need to accommodate intellectual property for that task.[92] Rather the question is how custom-based innovation systems can be articulated with the existing framework of global intellectual property law.

This can be divided into two sub-issues. The first and most obvious one is the need to enable TK holders to obtain protection for their knowledge vis-à-vis third parties, in other words to enforce customary law against third parties. Indeed, non-members of the community have no incentive to respect the customs in the interest of the community because community leaders have no jurisdiction they cannot impose on outsiders customary sanctions ranging from censure to fines, to ostracism or even expulsion from the community.[93] Second, it is also necessary to protect a community's capacity to organize innovation against internal threat. Indeed, the effectiveness of customary law within communities might be threatened.[94] The CBD regime requiring exclusive rights may create incentives that run counter to customary law. Outsiders' interest in accessing TK and the possibility of selling access or even obtaining IPRs changes the incentive structure that makes individuals comply with customary law. Even if a member of a community strongly believes that he should respect customary law, and that only the community authorities are entitled to grant access to TK, the payoff to breach customary law and negotiate personal compensation for divulgating TK might be high enough

[90] WIPO (2001) Report on Fact Finding Missions on Intellectual Property and Traditional Knowledge (1998-1999), WIPO Publications No 768E

[91] Matthias Leistner (2004) "Traditional Knowledge" in Silke von Lewinski (ed.), *Indigenous Heritage and Intellectual Property. Genetic Resource, Traditional knowledge and Folklore*, Kluwer Law International, p.57; footnotes omitted.

[92] Ruth L. Okediji (2002), "Making Room at the Table…"

[93] Paul Kuruk (1999)) "Protecting Folklore …"

[94] For illustration see Paul Kuruk(1999)) "Protecting Folklore …"

to make one hesitate[95]. In addition, if one concludes that other members of the community could also be tempted to breach customary law, he may be further induced to breach customary law to be sure he secures the benefits. The same reasoning could be applied for small communities belonging to a larger community, or group of communities, sharing the same knowledge and the same customary law. Examples of conflicts between these communities have been observed in some bioprospecting contracts.[96]

Therefore, we need to find a mechanism enabling TK holders to obtain protection for their knowledge against third parties in a way that helps them to strengthen internal compliance with customary law.

2.3 Proposed Solutions and Their Limits

Two possible ways to translate the interests of TK holders into the framework of global intellectual property law are usually envisaged. A first proposal consists of the creation of an international *sui generis* right inspired by the provisions of customary law. A related proposition maintains that existing customary law would provide sufficient protection, if only courts recognized it. However, both proposals seem to be highly problematic.

It is difficult to comment on the proposal to create a *sui generis* right based on customary law because there is no detailed proposal describing what such a right could be. However, this proposal faces practical problems, and above all it does not answer the right question. In practical terms, I have already mentioned above the difficulty faced by WIPO in its attempt to build a *sui generis* regime around the notion of misappropriation. Moreover, the history of intellectual property law reveals a proliferation of *sui generis* regimes, which rarely provide full satisfaction.[97] Then, it implies that customary intellectual property laws have similar provisions, which is far from certain. More importantly, this proposal will not answer issue regarding the articulation of a diversity of customary regimes within a single global legal regime. Any attempt to design a *sui generis* right with a detailed international standard (one size fits all) inspired by one of the customary regimes will have the same rigidity as existing IPRs and will not be able to accommodate the diversity of customary laws. On the contrary, if we create national regimes or community-based legal regimes tailored to include customary law, it points to the second proposal.

As for the protection of TK by customary law and application of customary law by foreign jurisdictions, it presupposes several legal conditions, and as well as facing practical difficulties and objections on principle. As a first legal condition, the state hosting the community must give legal force to its social norms and customary law. The recognition of the customary law is a long-term claim of indigenous peoples and it might take a long time before all their host states recognize it as part of their legal system. The second legal condition that must be met is for states where TK is used must have a provision in their

[95] Following Douglas C. North, I assume that the trade-off between wealth and those other values is a negatively sloped function. That is, where the price of expressing one's values is low / high, they will account much more/ less for human behavior. See North (1991) *Institutions, Institutional Change and Economic Performance*, Cambridge University Press (in chapter 3 on behavioral assumptions). See also, Robert P. Merges (1996) "Property Rights Theory and The Commons.." developing a similar reasoning about academic scientists.

[96] Personal communication with Brendan Tobin on the negotiating process of a contract in Peru and with Bernard Worrle on a contract in Ecuador

[97] Jerome H. Reichman (1994), "Legal Hybrids between the Patent and Copyright Paradigms", 94 COLUM. L. REV. 2432

private international law referring to the law of the state hosting the community, which in turn must refer to the customary law of that community. If ever this condition is fulfilled, it may not be before long. From a practical standpoint, considering customary law as a system of protection of TK elicits a problem of clear identification of the relevant customs and its precise content. It is unclear whether all different customary laws contain precise provisions on the use of TK by third parties. For a potential user, it would create a lot of legal uncertainty because it would be difficult to identify whether an element of TK is protected or not, what are the exact limits of the protected knowledge, and who is the right holder. For TK holders, it would be costly and difficult to go to a foreign court and bring evidence of the content of customary law and its breach.

Last, there is a more fundamental objection. If customary law might be given legal force for ruling the relations among members of the community, and possibly the behavior of third parties when they are in the territory of the community, there is no clear reason why it should apply to outsiders out of the community territory. Law has territorial effect. In some circumstances, law applies to nationals outside national jurisdictions. In principle, law does not apply to non-nationals outside of national territory. The same is true for local, regional or community law.

If these proposals seem inadequate, there might be another possibility to articulate custom-based innovation systems within a global intellectual property law system. It could be called "contracting into customary law" and would combine property rights, contracts and possibly organization.

2.4 Alternative: Contracting into Customary Law

The idea is that TK holders need a property right internationally recognized. This right would acts as a hinge or mediating mechanism between customary intellectual property law in force within the community and global intellectual property law that applies to relationships between the community and third parties. Once granted this right, TK holders can write licenses that embody the provisions of customary law and be in a position to enforce the provisions of customary law either for breach of license or infringement of their property right.

This solution has already been tested for other norms-based systems of innovation that had to organize their articulation with the legal system of intellectual property.

The community of open-source software started as an innovation system regulated by a series of community norms that ruled what knowledge had to be shared among all members and what could be individually appropriated. The challenge is that this norms-based community is located in a legal environment where its knowledge (source code) can be appropriated by third parties or defecting members. The open-source community faced the same double threat as a community of TK holders: the vulnerability of their norms-based regime to both external and internal opportunism. One of the solutions adopted has been to obtain formal IPRs in order to draft and enforce licenses that allow third parties to use, modify and redistribute the knowledge so long as they respect the norms of the community embodied in the text of the license. If a user violates the license, he can be sued for either breach of the license or infringement of the copyright.[98] In addition, to facilitate enforcement, rights are assigned to an

[98] For more details see notably David McGowan (2001) "Legal Implications of Open-source Software" UNIVERSITY OF ILLINOIS LAW REVIEW, vol. 2001, No1, pp. 241-304

organization representative of the community (the Free Software Foundation) that is in charge of legally enforcing the community norms.

A related situation can be observed for exchanges of research results among academic scientists that are ruled by a community norm of shared access. In the USA, this community norm has been challenged by a series of legal changes allowing the patenting of basic research and therefore creating a legal environment where defecting members can appropriate, or patent, their knowledge. To strengthen adhesion to the norm deemed essential to innovation, the community of academic biologists has draft a Uniform Biological Material Transfer Agreement (UBMTA) that embodies the community norm.[99] At first the UBMTA had limited success because it was voluntary and there was no property right to enforce it, or organization in charge of enforcement. The results have been better since similar provisions have been introduced in the guidelines of the National Institute of Health (the main fund provider for biomedical research) endowed with a (limited) capacity to enforce the norm.

Before coming back to TK, it is important to stress that the main common point between communities of TK holders, academic scientists and open-source hackers is not the content of their norms but the fact that they have norms-based innovation systems that must be articulated with a legal intellectual property system.

I will now examine this proposal to "contract into customary law' in relation with databases, as I suggested in the above discussion that database could provide a useful protection for TK. Once granted an internationally recognized property right, or equivalent form of control, TK holders are in a position to design and impose different regimes of access according to the provisions of customary law.[100] Access can be given to different categories of knowledge, users (members vs. outsiders), different uses, like patent office searches of the prior art, research purpose, commercial use, etc.). Additionally, different levels of access can be granted (full access for research or partial access for prior art searches or samples to potential users, etc). This is not at all a pure theoretical suggestion; several communities, including the North American Tulalip Indian tribes, now envisage it.[101]

What would be the legal effect of customary law? The situation is slightly more complicated because the best protection of databases consists in a combination of technological measures (conditional access technology) and/or a legal property rights (copyright and perhaps the E.U. s*ui generis* right on databases). With conditional access technology, TK holders can more or less perfectly control access to the database. Once access has been granted, the use of the TK can be governed by licenses that include the provisions of customary law. Because licenses only rule relations between co-contracting parties, TK holders may combine technological measures with IPRs. In that case, third parties can be sued for infringement *(Cf. section 1.4.1).* Finally, the database maker (either a community or third party acting as a collective rights organization managing the rights of different rights holders) *(Cf. section 1.4.2)* could be in charge of legally enforcing the customary law.

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[99] For more detail see Robert P. Merges (1996) or Arti K. Rai and Rebecca S. Eisemberg (2003), "Bayh-Dole Reform and the Progress of Biomedicine", 66 LAW AND CONTEMPORARY PROBLEMS 289. For a related proposal concerning exchanges of data see Jerome H. Reichman, and Paul F. Uhlir (2003), "A contractually reconstructed research Commons for scientific data in a highly protectionist intellectual property environment", 66 LAW AND CONTEMPORARY PROBLEMS 315

[100] Obviously TK holders willing to negotiate access to their knowledge against compensation are submitted to the law of supply and demand, if they raise the condition of access, demand is likely to go down

[101] Personal Communication with Preston Harrison, June 2005

Regarding the risk of internal defection, i.e. the temptation for a community member to provide access to TK to a third parties in violation of customary law, it will not be suppressed but limited by the creation of a database. A member would still be able to grant access to some elements of TK – recall that a right on database is not a right to each of its elements – but it is likely that potential users who would pay to induce a community member to violate customary law would rather pay to access a complete and classified description of TK contained within the database, as opposed to paying for bits of knowledge.

Conclusion

In this essay, I observed that limited progress has been made in international discussions on the protection of TK holder's intellectual property and more broadly on the recognition of customary law. As for TK protection, I argued that the lack of headway might be due to the fact that participants in the debates resort to implicit or explicit rights-based justifications. These justifications play an important role in convincing people of the need for a protection regime; however, they offer limited guidance on the precise content of a protection regime. I suggested a double approach: first, looking how TK holders attempt in practice to protect their knowledge; second resorting to utilitarianism as a complementary justification that enables one to take into account the conditions of use of TK and the resulting effectiveness of property rights. As for the recognition of customary law, I suggested a similar approach that enables us to regard this issue as a demand for the articulation between customs or norms-based systems of innovation and the legal system of intellectual property, and to look at practical solutions tested on other norms-based systems.

In this article, I applied this reasoning with a special focus on one category of TK, ethnobotanical knowledge, and I suggested that there are good arguments in favor of the creation of databases and for contracting into customary law, which seems to accord with the practices of some TK holders. However, I believe it would be useful to use a similar approach for elements of TK with different utility and characteristics for which other mechanisms might be more adequate.

In the current state of the law, local and indigenous communities have already started creating databases and contracting into customary law, or at least continue to consider the possibility. This suggests that, discussions and research should be less focused on the creation of new laws and more considerate of how this process can be generalized and compatible. From a technological standpoint, TK holders need common technical standards and common classification systems. On the legal side, once a series of compatible TK databases are set up, forms of collective management could be considered to reduce transaction costs.