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idées pour le débat

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The Role of the Research Sector in ABS Governance

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Ce texte a été élaboré dans le cadre des recherches menées au sein de l'Iddri en termes « d'Échange des ressources génétiques ». Il porte plus particulièrement sur l'accès facilité aux ressources génétiques et à la répartition équitable des bénéfices tirés de l'utilisation celles-ci (ABS). Ce texte n'engage que ses auteurs. En mettant ce document en ligne sur son site, l'Iddri a pour objectif de diffuser des travaux qu'il juge intéressants pour alimenter le débat.

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Abstract

The aims of this paper are to examine the renewed role of the academic sector in the innovation chain, starting from traditional knowledge and wild genetic resources and ending with a final product marketed by bio-industries; to identify changes in the institutional framework in which scientists carry out their task; and to reorganize their interactions with the holders of traditional knowledge (TK) and genetic resources (GR). In the first part, we describe the role of scientists and the changing institutional environment in which they work. In the second part, we examine examples of institutional solutions set up by scientists to cope with this new institutional environment and to come to terms with their responsibility as an interface between different actors with different norms of behavior.

Résumé

Cet article vise à éclairer le nouveau rôle joué par le secteur académique dans la chaîne de l'innovation, allant des savoirs traditionnels et des ressources génétiques « sauvages » jusqu'à la mise sur le marché par les bio-industries d'un produit fini ; à identifier les changements du cadre institutionnel dans lequel les scientifiques évoluent ; et à redéfinir leurs interactions avec les détenteurs de savoirs traditionnels et de ressources génétiques. Dans un premier temps, cet article s'attache ainsi à décrire le rôle joué par les scientifiques et les changements du cadre institutionnel dans lequel ils évoluent. Puis, dans un second temps l'analyse se porte sur certaines des initiatives institutionnelles mises en place par les scientifiques afin de faire face à ce nouvel environnement, et afin de saisir leur responsabilité en tant qu'interface entre différents acteurs aux préoccupations diverses.

Introduction

The larger part of the current debate on access to genetic resources and benefit sharing (ABS) – at both the national and international levels – consists in a controversial exchange of arguments between the so-called "providers" and "users" (Gehl Sampath, 2005). Whereas what is characterizing the genetic resources value chain is the great diversity of uses and actors concerned, too often debates revolve around the conflicts arising between the representatives of the two extremities of this chain: upstream, local and indigenous communities, and downstream, multinational firms.

Consequently, the main challenge facing negotiators and every actor involved in the international decision-making process is to reveal and take into account the different expectations of the plethora of players concerned by the use of genetic resources (companies, local communities, botanical gardens, researchers, private brokers, etc.) who have major stakes in the design of any legitimate and efficient regulatory framework.

Among these players, we argue in this paper that researchers are keys actors because they play a pivotal role in the "paradigmatic" GR value chain that serves as a reference in the bioprospecting debates.

In the first part, we describe the role of scientists and the changing institutional environment in which they work. In the second part, we examine institutional solutions set up by scientists to cope with this new institutional environment and to come to terms with their responsibility as an interface between different actors with different norms of behavior.

The role of scientists and their institutional environment

Researchers as intermediaries in the GR value chain

In the international negotiation processes, and even more so in the media, the bioprospecting process is regarded as an opposition between two human groups, i.e. local communities and multinational corporations with sharply conflicting views and interests concerning the use of genetic resources and traditional knowledge. However, it is now clear for any close observer that the situation is far more complex and that public researchers often play an important role as intermediaries. As observed by Sarah Laird *et al.* (2002), "*Almost without exception, every biodiversity-prospecting collection effort undertaken on behalf of companies is done through intermediaries. In most cases, these are research institutions, botanic gardens and universities [...] because biodiversity prospecting is at heart a scientific undertaking.*" By transporting biological samples, knowledge, technologies and institutions between different knowledge production sites, localities and cultures (Scholz, 2004), biological scientists found themselves in a pivotal position between local and global actors, North and South, marginalized people and economic actors, and biodiversity-rich and technology-rich regions (Laird, 2002).

The role of academic researchers is even more important when it comes to traditional knowledge. It appears that their work transforms the nature of TK, allowing it to be used by corporations and appropriated by third parties. Bannister (2005) observes that "*Ethnobotanists who record cultural information on medicinal plants do so by isolating and recording this knowledge in a discourse and a format digestible to 'western' scientific legal and political systems. In doing so, they are creating an object to which property rights can attach. Once rights affix in a legal sense, such that the knowledge can become 'property', the object is commodifiable and tradeable within a world market system. Further, the owner is entitled to* *exclude others from appropriating or exploiting it. Hence, the implications are very direct for the act of research in establishing intellectual property rights in cultural knowledge. Such research is not only a transformation of the knowledge into tangible form, but constitutes a kind of 'discovery' from the point of view of dominant legal and economic frameworks. Science provides the language and methods for the tangible/physical expression of our understanding of the natural world. Once scientifically documented, this physical manifestation of medicinal plant knowledge is subject to the potential application of intellectual property laws, which facilitate commo and commercial exploitation*." In addition, in a survey on the use of TK by third parties, Russel Barsh (2001) identifies only a limited number of patents derived directly from traditional knowledge. Among these patents, very few are based on the applicant's own field of research; most patents with traditional knowledge as their origin are inspired by data already placed in the public domain through the publications of academic researchers. By contrast, Barsh and others[1] identify countless books and academic journal articles that disseminate detailed information on the identities and traditional uses of hundreds of plants. In addition, a large proportion of the authors of these publications are located in developing or transition countries, which should qualify the North-South tension in discussions on TK protection.

It therefore seems that managing the flow of knowledge and information on living biodiversity is not just a technological problem, but is linked to a complex social process in which researchers are central. The intervention of scientists in the chain may take a wide variety of forms. They may act as direct intermediaries, for instance when they act as sub-contractors for industry and collect TK and GR on its behalf. In this case, there is usually a bioprospecting contract organizing the relations between, TK and GR holders, scientists and bio-industries. By contrast, they may also play an indirect role, for instance when they have collected GR or published TK and later these resources or TK are used by a firm in the development and marketing of a product. The nature of their intervention may depend on the nature of the resources: they can collect and transform genetic resources while they can use or publish traditional knowledge. Their intervention may involve several degrees of transformation. They may collect and classify GR or translate, classify and publish TK to put them at the disposal of other scientists. They may use GR and TK as input in their R&D without placing them at the disposal of other scientists. In this case, they may transform GR or TK in such a way that it becomes difficult to identify whether the transformed product is the same as the received product and difficult to track the moves of TK and GR.

Despite this, the situation continues to be discussed as a mere confrontation between local communities and major corporations within ABS negotiation circles and very little energy is dedicated to dealing with the issue of intermediaries. It is also true that the only voice we hear from the academic sector is very often a defensive one, arguing for an exemption for what it considers as a possible threat to its activities.

A role often contested by scientists

As a starting point to the claim for a "research exemption", there is the denial that researchers participate in a value chain transforming biodiversity into commercial products. First, scientists often perceive their role as 'mere' producers of science and deny any commercial purpose to their work. Scientists are very often firmly (and sincerely) convinced that, for instance, taxonomic work or publication in scientific journals are very far from the world of commerce. Second, even if this position is less and less common, some researchers still think that they do not have to worry about the social and political context in which their research results are used. Less naïve than the first position and more socially responsible than the second one, a third position consists in rejecting the 'linear' vision of the value chain. They

[1] See for instance William Milliken (2002), "Peoples, Plants and Publishing" in Sarah Laird (ed.), "Biodiversity and Traditional Knowledge: Equitable Partnerships in Practice", London: Earthscan, p. 79.

argue with some accuracy that the reference case on which the ABS debates are built is a theoretical one and does not reflect the reality of the exchange and valuation processes (Villegas, Hirsch, Lee, 2005). Whatever the reasons put forward, a common ground between researchers is the demand for an exemption.

It should also be recognized that very often their role as intermediaries is played unwittingly or at least without any direct link with the users of their work. Indeed, in the use of biodiversity and traditional knowledge, several elements disrupt the innovation chain:

- a long time-lag between research activities and end product development;
- a lack of linkage between more fundamental disciplines and more applied ones;
- a "legal disconnect" (Bannister, 2005) between the original knowledge holders and third-party appropriation by scientific publication (see below).

Be that as it may, it is no less true that, first, all researchers working with biological material or traditional knowledge, even those who are truly removed from commercial matters, are key players in the circulation of genetic resources and traditional knowledge and, second, that they are affected in their everyday work by the international discussions on ABS regulation.

A series of changes makes this role more tricky nowadays

The new technological and regulatory environments oblige the different stakeholders to reconsider their practices regarding the use of genetic resources and, more generally, of all the elements of biodiversity. These changes relate to the scientific and technological context regarding life science research as well as the legal context in which they operate.

Technological changes

Some technological changes have led to a reconfiguration of the issue of ownership and the genetic resources exchange process (the way they are collected, manipulated, stored and disseminated).

In the first period, the development of biotechnologies has dramatically increased the value of genetic resources (or at least sparked hope of such an increase), which has led to considerable emphasis on the commercial use of biodiversity as a way of conserving it. One argument used to convince the general public and governments of the need to preserve biological resources is that there are many potential uses for unknown plants, animals or micro-organisms: new medicines, foods, chemicals and genes are there to be discovered (Gomez-Pampa, 2004).

This well-known development has been accompanied by a second one, whose consequences are not yet clearly understood. With the emergence of new genetic engineering technologies and advances in molecular biology and combinatorial chemistry, collected sample material could be rendered in new ways (as cryogenically-stored tissue samples, as active biochemical extracts, as cell lines or even as DNA sequences). "*These new proxies privilege the informational content of the biological material at the expense of much of its corporeality, which is subsequently divested. Much more lightweight and mobile than the whole organisms from which they are drawn, these proxies may also be circulated, copied, archived, and recombined at speed and with comparative ease*" (B. Parry, 2004). This has considerably altered the existing trade dynamics for genetic resources, leading to new forms of commodity exchanges that mean the transfer of tangible material is often unnecessary. Among others, some consequences of these technological changes can be identified: first a reduction in physical transfers of materials in favor of the transfer of such proxies; second, the transfer of these informational proxies may be even more difficult to track; and third it makes the definition of rights and obligations to share benefits even more difficult, as it is even more difficult to decide whether a scientist is still using the GR when he works on such proxies.

Legal changes

For a long time, scientists were able to conduct their research with great freedom. Their access to knowledge and genetic resources was only limited by practical difficulties. They faced almost no legal restrictions on access:

- wild genetic resources were regarded as the common heritage of mankind and therefore freely accessible;
- breeding exception allowed scientist and plant breeders to use for research purposes new plant varieties (and the genetic resources they included) protected by plant breeders' rights;
- ethnoscientists accessed, documented and published TK without much complaint from TK holders and often with their collaboration (even if or because TK holders did not always realize the impact of this process);
- their colleagues' research results were published and hardly ever patented.

To some extent, the only IPRs with which they were confronted were patents that existed on the material used in their laboratories. In this context, scientists could afford to ignore their role as intermediaries in the innovation chain and pretend that they worked only for the sake of science.

In recent decades, their institutional environment has considerably changed. While interest in genetic resources and traditional knowledge has increased, their access is restricted by a proliferation of new forms of appropriation. As users of GR, researchers have to manage at least two different types of social interactions, downstream and upstream, related to the need to negotiate in advance access rights to information and knowledge.

Downstream

Downstream of the chain, an initial legal change that affected the work of scientists is clearly life patenting. The possibility of patenting inventions consisting of living material has progressively been extended to all living organisms and their components (Hermitte, 2004). In addition, patents tends to replace plant breeders' rights, further restricting access to genetic resources (there is no breeders' exception, but a (very) limited research exception). This first legal change led to a second one: the reform of plant breeders' rights. For the traditional breeding sector and its traditional protection, plant breeders' rights, the extension of patents to living organisms is a direct challenge. The lack of a breeding exception in patent law creates an asymmetry between plant breeders using classical breeding methods and modern biotechnological inventors. Thanks to breeding exceptions, the latter may use genetic resources included in the former's protected varieties. Conversely, from the classical plant breeder viewpoint, they can no longer use a variety for breeding puropose as soon as it contains a patented gene (Hermitte, 2004). This implies that breeders will have to obtain the consent of several patent holders and pay increasing royalty payments. This unbalanced situation led in 1991 to the adoption of a new version of the UPOV Convention. Henceforth, breeders' exclusive rights extend to *varieties that are essentially derived from the protected variety,* that is to say varieties that meet the UPOV protection requirement of distinctiveness, but which have conserved the main biological and commercial characteristics of the initial variety[2]. As a

[2] Article 14 considers a variety as essentially derived from another variety when: 1) it is predominantly derived from the initial variety, or from a variety that is itself predominantly derived from the initial variety, while retaining the expression of the essential characteristics that result from the genotype or combination of genotypes of the initial variety; 2) it is clearly distinguishable from the initial variety; and 3) except for the differences that result from the act of derivation, it conforms to

consequence, a biotechnological inventor wanting to use a protected variety and to introduce a new gene into it must obtain the breeders' permission and pay royalties. In this way, a kind of balance is reintroduced between classical breeders resorting to PBRs and biotechnology companies.

Thirdly, both in the United States and in Europe, the interpretations of the requirements for patent protection led to an upstream shift in the part of the innovation chain that can be patented, especially in the biotechnology sector. Traditionally, the patent law doctrine has attempted to distinguish the upstream and downstream parts of the innovation chain by restricting the scope of patent protection to inventions in applied technology, as distinguished from basic research. In American patent law, this role was assumed by the "utility requirement" (Merges, 1996), while in Europe, it is the discovery versus invention distinction, and to some extent the conditions of industrial applicability, that played that role (Brahy, 2008). Since the late 1980s, first in the United States, and then to a lesser extent in Europe, there has been a loosening of these protection requirements, considering that upstream inventions (basic research), still far away from commercialization, can nevertheless be patented.[3] These legal changes have been facilitated by technological changes and the blurring of the border between basic and applied research, particularly in the biotechnology sector.

Fourthly, academics are now invited to patent their research results. Until the 1980s, few universities cared for moving science from their laboratories to commercialization by firms. Governments have decided to overcome this situation and to encourage technology transfer between universities and firms. Since the 1980s in the United States and since the late 1990s in Europe, the ownership of public funded research results has been transferred to universities. Universities and scientists are encouraged to look for patents and collaborations with firms ready to invest in the development of their inventions. One effect of these legal changes is that part of the research results that were freely available before are now subject to patent restrictions. Another effect is that they contribute to creating a spirit of appropriation that goes beyond patenting: contracts concerning access (often exclusive) to the genetic material collections that are upstream of any research and the material transfer agreements (MTAs) that are now a general practice in exchanges between firms and universities and even between universities (Merges, 1996 and OECD, 2000).

A last step in the appropriation of genetic resources lies in the geographical extension of intellectual property law, especially the protection in developing countries of inventions made in developed countries. Until 1994, all States were free to adopt the level of protection they wished. In fact, many countries, especially less developed and developing countries, offer a low level of protection and little help in the enforcement of property rights obtained in another country. In addition, these countries often exclude several subject matters from protection, most notably medicines and living organisms. Since the adoption of the TRIPS Agreement in 1994, developing countries must now protect plant varieties and biotechnological innovations. Not only do they have to protect their own inventions, but above all they must provide protection within their territory for inventions made abroad.

Upstream

Legal changes did not only occur downstream of the innovation chain, but also upstream, changing the conditions of access to research input. First, "wild" genetic resources or genetic resources present in traditional plant varieties are no longer open access. Since the Convention on Biological Diversity entered into force, they are now subject to the national sovereignty of

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the initial variety in the expression of the essential characteristics that result from the genotype or combination of genotypes of the initial variety.

[3] However, the USPTO seems to have taken a step backwards; in 2001, it published new guidelines on the interpretation of the usefulness requirement that seem to increase the utility standards. See US Patent and Trademark Office, "Utility Examination Guidelines", 66. Fed. Reg. 1092 (January 5, 2001).

the State in which they are located or from which they originated.[4] About 50 States have adopted, or are considering adopting, national legislation regulating access to genetic resources and benefit sharing. In addition, scientists must henceforth take into account community rights to traditional knowledge: indigenous and local communities are increasingly aware of the use of their traditional knowledge by outsiders and its consequences. They vehemently denounce the use and appropriation of their knowledge by private firms. They also criticize the documentation and publication of their knowledge by scientists and they reject the notion of public domain and research exceptions as being contrary to their customary law. They demand recognition of their rights to their knowledge, and several national and international fora are discussing the recognition/creation of rights to traditional knowledge.

In conclusion, while scientists used to act with great freedom and without the need for direct contact/negotiation with national authorities, TK holders and private corporations, they are now at the center of a web of negotiations concerning the use of resources and they are even required to be the transmitters of obligations along the innovation chain.

Institutional solutions set up by scientists

Before examining how scientific organizations attempt to take into account their role as intermediaries in a changing institutional environment, it is useful to remember that scientists and traditional communities share some common characteristics: (1) both are innovation systems ruled by social norms or customs; (2) the effectiveness of these norms has been affected by increasing contacts with private firms and changes in the institutional environment (a proliferation of property rights); (3) both try to preserve their norms and link them with the institutional environment. As a result, scientists should be in a good position to understand the demands of TK holders. In this section, we examine situations in which scientists attempt to adapt their practices to take into account the norms and customs of TK holders and the way in which they attempt to transfer that concern to firms throughout the innovation chain.

In addition, we should not forget that it was the ethnobotanists themselves, with the Belem declaration in 1988, who inspired and pushed for the inclusion in the Convention on Biological Diversity of article 8J, which calls for the respect, preservation and maintenance of traditional innovations and practices. Since then, a number of research organizations have tried to respond to their changing environment.

In this section, we examine institutional responses through three illustrations:

- the link between science and traditional knowledge using the example of the policy shift of the CGIAR policy in the 1980s;
- the integration of the value chain through a minimum set of contracts and intellectual property standards, using the example of the National Institutes of Health (NIH);
- the publication policy and the way to alleviate the legal disconnection it causes in the value chain.

In comparing these three responses, we first examine the innovation chain and the nature of the links between actors intervening at different stages of the chain. Second, we observe the degree of consideration for traditional innovation: whether researchers take into account the

[4] With the exception of genetic resources in the CGIAR/ IPGRI collections that are open access and genetic resources subject to the International Treaty on Plant Genetic Resources.

content/results of traditional knowledge, whether scientists involve traditional innovators in their research process and whether scientists consider norms of behavior, customary rights and the governance of traditional innovation. We also look at whether we face a response by an individual committed organization, a professional community or even a larger community, and we examine the type of instruments used: unilateral commitment, contract, organizational policy, code of conduct for professional communities, or a change in the institutional environment.

Science and traditional knowledge: the learning process in the CGIAR system

The Consultative Group on International Agricultural Research (CGIAR) and its network of 15 research centers (IARCs) were created in 1971 with the aim of developing and widely circulating high-yielding crop varieties. They have been one of the main mechanisms in what is known as the Green Revolution.

Birnebaum (2000) notes that they have been able to "play this role thanks in part to a global network of transfers among institutions active in agricultural research and development of data, genetic resources, technologies, and human capital. These transfers were unimpeded by intellectual property obstacles".

But during the mid-1980s, the CGIAR was forced to review its work practices in order to respond effectively to changes in its technological and legal environment, i.e. the development of modern biotechnologies and information and communication technologies, a renewal of the conservation paradigm and the related extension of (intellectual) property claims.

This renewal of the IARCs' work practices has focused on the re-examination of two debates:

- the link between *in situ* and *ex situ* conservation related to the way *ex situ* conservation is carried out by the IARC and *in situ* conservation that could be carried out by farmers;
- the linkage between plant breeders' rights and farmers' rights related to the broader issue of the CGIAR IP strategy.

Both issues are linked to a better inclusion of landraces and traditional knowledge held by smallholder farmers in the formal innovation system.

This has been made possible through:

- a change in their conservation practices: a clear move towards collaboration with local actors (farmers, TK holders, etc.) for on-farm conservation and an informal ('traditional') system of seed exchange and breeding purposes is taking place;
- a change in their institutional organization to support this new orientation.

The innovation chain and the nature of the links between its different stages

Although scientific and formal political discussions have always tended to acknowledge the complementarities of *in situ* and *ex situ* conservation and the fact that they should be implemented side by side, this observation has seldom been specifically implemented (Pistorius, 1997). As mentioned earlier, the CGIAR was set up as a collector and supplier of genetic resources for the sake of professional breeders. For this purpose, the IARCs house some of the largest and best documented *ex situ* collections of genetic resources in the world. By comparison, Pistorius notes that "*there are very few field studies which could provide technical , sociological, ethnobiological and anthropological knowledge to support* in situ *conservation which focus on on-farm conservation (and use) of landraces and farmer's varieties*."

In this context, it is not surprising that the innovation chain before the end of the 1980s was a linear and unilateral one.

The 1980s were dedicated to building capacity internally for *in situ* conservation[5]. A task force was put in place in 1985 to make some recommendations on how the CGIAR's organizational structure and IARC researchers' practices should evolve to take this issue into account. This task force has led to the creation of an *in situ*/eco-geographical program.
But the real turning point was the Keystone Dialogues[6], in which the CGIAR took a leading role. These multi-stakeholder working groups were the opportunity for a real confrontation of viewpoints between the different interests at stake.
For the working group, the problem of the complementarities between the two conservation schemes could be solved by a twofold strategy:

- the recognition and a better understanding of the contribution of farmers;
- a stronger involvement of intermediary players and in the first place local NGOs and scientists.

A strategic document published by the IPGRI (one of the 15 IARCs dedicated specifically to PGR management) states that "ex situ *conservation makes resources available to a wide variety of users concerned with agricultural improvement (particularly crop and forestry breeders).* In situ *conservation of PGR can make a much more direct contribution to the well being of farmers and communities by ensuring that adapted plant types remain directly available to them for their own continuing use. It provides an essential part of development strategies based on sustainable use and equitable benefit sharing… IPGRI can play an essential part in the international collaborative effort required by supporting the scientific research, training, planning and implementation of* in situ *conservation, by collaborating with national programmes to build the capacity to support* in situ *conservation and by helping to tackle some major constraints*".
While the existence of a strong commitment is undoubtedly necessary for the development of an effective integration of both approaches, the critical factors remain the institutional set-up that supports this system and the cohesion between the overall developmental objectives and the real practices of the researchers in the different IARCs.

What degree of consideration for traditional innovation? Towards a co-management model?

Since the beginning of the 1990s, participatory plant breeding program efforts have been increasing and have been mainstreamed inside the CGIAR (the PRGA program has been implemented to achieve this task). Scientists in the CGIAR system began to value participatory technology development, using the traditional practices and indigenous knowledge of local populations as a starting point. As ecological concerns gained currency in the late 1980s, these approaches were extended to the management of natural resources, using participatory rural appraisals, conservation strategies and interdisciplinary collaborations that relied heavily on local knowledge.
However, as Susan Bragdon (2004) states, what exactly those programs entail still remains unclear and key aspects of legal and ethical issues still have to be explored. Even if these programs make it possible to go further into the co-management logic, they still stumble against the IP dimension precluding a real integration of the value chain covering the upstream and downstream dimension.

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[5] It should nevertheless be noted that the CGIAR was not starting from scratch. A first report was prepared by Robert and Catherine Prescott-Allen (once affiliated to IUCN) who, after having reiterated the need for *in situ* conservation, proposed a set of initiatives to achieve it in the context of the CGIAR.

[6] The first took place in 1988, the second in 1990 and the third and final in 1991.

As a matter of fact, a 1994 agreement between FAO and the IARC stipulates that Centers and their clients may not seek IP rights over so-called “designated” genetic resources held “in trust” in the Centers’ genebanks on behalf of humankind. This “in-trust agreement” thus aims to reassure countries that their contributed genetic resources will not be appropriated by anyone; such incentives may however not be sufficient to guarantee a continued smooth flow of genetic materials to the Centers (Binenbaum, 2003).
In 1996 the CGIAR adopted a set of guiding principles on intellectual property and genetic resources for its Centers. One of the main statements recaptures the spirit of the CGIAR-FAO agreement: “*The Centers will not claim legal ownership nor apply intellectual property protection to the germplasm they hold in trust, and will require recipients of the germplasm to observe the same conditions, in accordance with the agreements signed with FAO*”.
This policy is completed by another set of principles concerning IARC relationships with the private sector (“Principles Involving Center Interaction with the Private Sector and Others”).
In both guiding principles, the aim was to find a good balance between farmers’ rights and breeders’ rights by seeking to avoid a situation where IPR claims by the private sector interfere with the efforts of promoting participatory breeding (Lettington R., 2004). For this reason, instead of entering into the logic of traceability of the germplasm flows, the CGIAR has tried to recreate a free access rationale. Material Transfer Agreements constitute the main tool for imposing such “IP-free” obligations.

To conclude, it seems that due to external pressure, the CGIAR has profoundly modified its scientific positioning, which has led to a certain extent – mainly through the design of projects and the allocation of funds – to a change of research practices through their collaborative efforts with genetic resource professionals and with farming communities.
However, the role of the CGIAR regarding changes in its legal environment, i.e. the extension of IPRs to living material, property claims to their “raw material” (national sovereignty over GR, farmers’ and other TK holders' rights), has been much more limited. The CGIAR could have assumed its intermediary role by taking into account farmers' rights and transferring the obligation to downstream users (bio-industries). In doing so, they could have created a connection between farmers’ rights (upstream) and orthodox intellectual property rights (downstream). One possible way to assume this role would have been to develop traceability tools enabling TK and GR providers to follow their use along the innovation chain. This was not the option pursued by the CGIAR, probably because tracing the use of GR and TK remains very difficult. Instead, the CGIAR has decided to focus on extending the free access rationale, considering that any increase in property rights would create high transaction costs likely to reduce the use of GR and to prejudice the situation of those who are already the most vulnerable, namely smallholder farmers (Lettington, 2004).

When scientists perceive their role as brokers: the NCI example

Sometimes scientific organizations (or funding agencies) can choose to act explicitly as intermediaries between countries and communities providing genetic resources and traditional knowledge. This is the case of the US National Cancer Institute[7] that has a long history of collecting genetic resources for drug research. Since its inception, it has adopted a collaborative approach to drug development combining internal research programs with collaborative partnerships with both the private sector and other public research organizations. As a government agency, the NCI may participate in the drug development process through

[7] For a detailed analysis of the National Cancer Institute Policy, see Kerry Ten Kate and Adrian Wells, “The Access and Benefit Sharing Policies of the United States National Cancer Institute: A Comparative Account of the Discovery and Development of the Drugs Calanoide and Topotecan”, submission to the Executive Secretary of the Convention on Biological Diversity by the Royal Botanic Garden, Kew, available on the website of the Secretariat at http://www.biodiv.org/doc/case-studies/default.asp

preclinical and clinical studies, but its mandate does not allow it to engage in commercialization. It therefore has a long history of collaborating with the private sector for the commercialization process. If the NCI cannot find partners, it will provide its research results to the public free of charge. To collect genetic resources in a wide range of countries, the NCI has long collaborated with research organizations from source countries. As a result, the NCI is particularly well positioned to play the role of intermediary (and to carry out basic research) between TK holders and to supply countries on the one hand and private companies on the other hand.

<u>The innovation chain and the nature of the links between its different stages</u>

When looking at the role of the NCI in the innovation chain, it appears that the NCI has direct contact both upstream with countries and traditional communities providing genetic resources and possibly traditional knowledge, and downstream with private firms developing products from those resources (and basic research carried out by the NCI). In addition, the NCI will progressively require downstream actors to have direct links with upstream actors.

Indeed, since the 1980s, the NCI's approach to access and benefit-sharing has evolved in response to the changing demands and capacities of governments and organizations in the countries that have provided the NCI with samples for screening. It also develops its own policy to facilitate negotiations with provider countries and between provider countries and private companies. This started in 1988 with a *Letter of Intent*, which was the basis for negotiating bioprospecting contracts with provider countries. Regarding the ownership of research results, it provides that joint patent protection will be sought for all inventions developed collaboratively, and all licenses arising from the collaboration will refer to the agreement. As to benefit sharing, the NCI will negotiate with licensees on behalf of the provider country to make licensees share part of the benefits with the provider country.

Building on experience and long-term relationships with those countries, in 1992 it moved to a *Letter of Collection* and then in 1995 to a *Memorandum of Understanding*, sharing intellectual property and forcing private partners interested in research results to negotiate benefit sharing directly with the provider country concerned.

The NCI experience is an interesting example of an institution that perceives its role as an intermediary in the innovation chain.

<u>What degree of consideration for traditional innovation?</u>

NCI collaborations consist essentially in cooperation between a US and a foreign public research organization, rather than collaboration with traditional communities with different norms or customs. However, they may include limited consideration for traditional innovation. In the first cooperation policy, the involvement of the provider country was limited to the supply of genetic resources and there was little technology transfer. However, as the NCI moved in 1992 to its *Letter of Collection* and then in 1995 to its *Memorandum of Understanding*, it has looked more closely at traditional knowledge and has increased the involvement of provider countries in the research process. Last, an attempt can be seen in the NIC publication policy to take traditional norms (customary law) into account: if one researcher seeks to disclose traditional knowledge, permission of a traditional healer is sought prior to publication of any information he has contributed and his contribution is acknowledged.

<u>Conclusion</u>

This example is only valid for the limited number of institutions that work explicitly as brokers, developing contacts with all the links of the innovation chain. Most researchers do not have direct contact with all links.

Science and traditional knowledge: the publication issue

The NCI example was an illustration of a situation where scientists explicitly claim and assume their role as intermediaries in the innovation chain by contracting upstream with GR and TK providers and transferring some obligations along the innovation chain by contracting downstream with bio-industries. The issue of academic publication may be seen as an opposite example in the sense that scientists publishing an article do not interact with their readers, and even less transfer them obligations they would themselves have contracted with TK or GR providers.

<u>The innovation chain and the nature of the links between its different stages</u>.
Publication is central in academic life, but it has an ambiguous role in the transfer of knowledge in the sense that it could create a "legal disconnect" in the innovation chain. Even when they accept their role as intermediaries, researchers are rarely informed of how their publications are later used by firms.
Yet it has been recognized that publications make TK available to everyone and are the main way in which firms access TK: according to Ten Kate and Laird (1999), 80% of firms using TK access it through academic publications. In doing so, (1) it may reveal knowledge that should not be revealed; (2) it prevents TK holders from negotiating compensation and conditions for the commercial use of their knowledge.

<u>What degree of consideration for traditional innovation?</u>
Two questions need to be answered regarding scientists and publication relating to TK:

- can scientists consider the need of TK holders to strengthen their norms as legitimate?
- can scientists adapt their publication norms in order to take into account TK holders' norms?

Different attempts by the academic sector show that this has already been taken into account.

First, at a general level, a number of initiatives encourage scientists to consult with TK holders regarding their publication practices, to discuss the consequences of the publication and to obtain their **prior informed consent**. As an illustration, the UN Commission on Human Rights (1995) states that "*researchers must not publish information obtained from indigenous peoples or the results of research conducted on flora, fauna, microbes or materials discovered through the assistance of indigenous peoples without identifying the traditional owners and obtaining their consent to publication*". The (US) National Institutes of Health and its National Cancer Institutes impose this requirement in their grant policies.
Some initiatives, like the International Society of Ethnobiology Code of Conduct (1996, modified in 2006) [8] and the Pew Scholars Initiative Guidelines for Researchers and Local Communities (1996), go one step further, suggesting agreement on an acknowledgement protocol including **citation as a source, co-authorship**, or if preferred, respect of the desire for **anonymity** (Laird, Alexiades, Bannister, Posey, 2002).

In the same vein, a number of individual scientists (Cunningham, 1996; Alexiades, 1999; Sheppard, 2000) have developed ad hoc compromises between the academic norms of extensive publication and the wishes or norms of TK holders, which allow only **a partial disclosure of their knowledge.** For instance, Milliken (Milliken 1997, Milliken and Albert 1996) published the name and traditional uses of species that were already the object of numerous publications, while he only mentioned the genus and not the use of the species with uses restricted to the community he worked with (Laird, Alexiades, Bannister, Posey, 2002).

[8] The ISE code of ethics is available at: http://ise.arts.ubc.ca/documents/ISECodeofEthicsTEXT2006_000.pdf

For a long time, it was common practice to see communities sharing their knowledge and their time with visiting scholars without receiving the results of the research, at least not in an accessible format or language. Some communities and researchers have now developed a practice of **translating and sharing research results** with TK Holders.

Overall, one can observe a number of initiatives by individuals, individual organizations or professional associations that are aware of the role of publications in the circulation of traditional knowledge and its possible commercial use and therefore try to adapt their publication practices. However, these limited initiatives will not suffice and require more support from research institutions such as funding agencies and other research sponsors and journals policies. In this sense, the Eighth Asian Symposium on Medicinal Plants, Spices and Other Natural Products adopted a resolution called the "Melaka Accord" which recommends that journal editors, peer reviewers and professional societies should attempt, when reviewing manuscripts, grant applications or conference papers, to ensure that the host country's collaborators receive appropriate recognition of their contribution. This institutional support might not always be easy to obtain as it often conflicts with initiatives to adapt publication practices. For instance, funding agencies' and journals' expectations of the most complete disclosure of research results conflict with partial publication, and attribution rules may limit the possibility of co-authorship. In this context, it is worth mentioning that scientists have recently adapted their publication norms and practices in response to increased connections with the private sector. For instance, a publication could be delayed until a patent has been obtained. Likewise, data are not always entirely disclosed in order to keep certain information of potential commercial interest secret. Journals have also adapted their policies along the same lines. While they traditionally require the disclosure of data in such a way that readers can reproduce the results described in the publication, they have accepted more limited disclosure, taking into account the increasing role of IPRs and commercial development in academic life (Eisenberg, 1987). They may consider doing the same for TK holders.

Conclusion

Scientists are a vital link in the innovation chain and they act as intermediaries between TK holders and firms likely to develop commercial products derived from traditional knowledge and/or GR. Sovereignty over biological resources, the recognition of the relevance of traditional knowledge in managing biodiversity and of the rights of indigenous and local communities over their knowledge/genetic resources, the great emphasis put on the commercial use of biodiversity in a context of the patentability of life forms and the appearance of new issues related to the conservation, management and promotion of biodiversity are some events among others that have dramatically modified academic practices in the life sciences. New international norms and regulations relating to the access and benefit sharing debate are challenging the place of the academic sector, its role and its responsibility in achieving the third objective of the CDB, namely the equitable sharing of benefits arising from the use of genetic resources. Scientific skills linked to knowledge acquisition, inventories or biodiversity management are increasingly questioned – or even challenged – by new objectives set out by the international ABS policies. Scientists can no longer ignore the evolution of their institutional environment and the international negotiation process. They can either keep complaining that their practices are out of business and beg for exceptions, or they can try to play a leading role in the negotiation process and propose a range of institutional solutions that fit the specificity and diversity of their practices.

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