

# Governing the management and use of pooled microbial genetic resources: lessons from the global crop commons

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## Abstract

The paper highlights lessons learned over the last thirty years establishing a governance structure for the global crop commons that are of relevance to current champions of the microbial commons. It argues that the political, legal and biophysical situation in which microbial genetic resources (and their users) are located today are similar to the situation of plant genetic resources in the mid-1990s, before the International Treaty on Plant Genetic Resources was negotiated. Consequently, the paper suggests that it may be useful to look to the model of global network of ex situ plant genetic resources collections as a precedent to follow – even if only loosely – in developing an intergovernmentally endorsed legal substructure and governance framework for the microbial commons.

## 1. Introduction

One of the most appealing aspects of recent commons scholarship is its determination to transcend the oversimplified dichotomy of exclusively private versus exclusively public forms of control over pooled resources -- a dichotomy that has predominated earlier literature in the field (National Research Council 2002; Hess and Ostrom 2007). This article argues that governance of a global microbial genetic resources commons is indeed one of those ‘commons cases’ that involves a complex variety of rules derived from: ‘customary’ practices of communities of users; new, voluntarily followed protocols and contractual agreements adopted by the same users; private, public (and in some cases, an absence of clearly articulated) property rights; and national and international public laws. In addition -- and this is likely the biggest departure from other papers in this volume -- this article argues that some form of recognition by an intergovernmental organization of the global microbial commons *per se* is an indispensable element of the overall governance of the microbial commons.

Champions of a microbial commons are in a privileged position, having the recently ‘perfected’ global crop commons to look to for inspiration and lessons learned. In sections 2 and 3 of this article, I engage in such an exercise, highlighting some of the most relevant lessons learned during the last twenty years from experiences creating the global crop commons and drawing conclusions from them for the governance of the microbial commons. I will work backwards chronologically, first reviewing the current, generally positive state of affairs, with the recent coming into force of the International Treaty on Plant Genetic Resources for Food and

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Agriculture (the Treaty).<sup>2</sup> This treaty provides a solid legal and administrative framework for the crop commons. I will then delve further into the past to a period of considerable political and legal uncertainty concerning the management and use of plant genetic resources on a global scale. In this context, I will highlight an interim solution that was felt to be necessary at the time in order to preserve the commons characteristics of critically important *ex situ* collections of crops and forages hosted by the International Agricultural Research Centres of the Consultative Group on International Agricultural Research (CGIAR Centres). Ultimately, it is this interim solution that may be most interesting for champions of the global microbial commons, since it arose out of a combined set of political, legal, and biophysical circumstances that share significant similarities to the circumstances in which microbial genetic resources (and their users) find themselves today.

In section 4, I compare the commons characteristics of plant genetic resources for food and agriculture and microbial genetic resources. I consider the similarities and differences between these two groups of resources and their various policy implications. In this context, I consider the possibility of subdividing the scope of the microbial commons with a focus on agricultural microbial genetic resources in particular. I also consider which intergovernmental body would be the most appropriate to attempt to engage in considering, recognizing and ultimately, providing policy guidance for microbial commons.

## 2. The current state of affairs: the crop commons secured through the International Treaty

### *2.1. The multilateral system of access and benefit sharing*

The Treaty creates a framework that addresses the collection, management, conservation, and use of all plant genetic resources for food and agriculture (PGRFA). It goes a long way to resolving decades of political and legal uncertainty concerning access to PGRFA and benefits associated with their use. In this section, I set out the most significant aspects of the scope, content, and functioning of the multilateral system of access and benefit sharing created by the Treaty, highlighting the manner in which it responds to, and is supportive of, the commons characteristics of PGRFA. I will address the political and legal conditions that created the need for the Treaty in the following sections.

In 2001, the Food and Agricultural Organization's (FAO) conference adopted the text of the Treaty. It came into force in 2004, and, at the time of writing, 120 countries and the European Community have ratified it. The Treaty creates the multilateral system of access and benefit sharing (multilateral system). One of the objectives of the multilateral system is to facilitate rapid, regular, and low-cost exchanges of plant genetic materials for use in training, research, and breeding for food and agriculture. To minimize transaction costs, all contracting parties to the Treaty adopted, in 2006, the standard material transfer agreement (SMTA), which sets out the legal conditions that govern all transfers of materials in the multilateral system.<sup>3</sup> The SMTA is a private contract between the providers and recipients of

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<sup>2</sup> International Treaty on Plant Genetic Resources for Food and Agriculture, Report on the Conference of the Food and Agriculture Organization, Thirty-first session, Rome, 2–13 November, 2001, c. 2001/REP, Appendix D

<sup>3</sup> The full texts of the standard material transfer agreement in all six official United Nations languages are posted on the Treaty's website at <[http://www.planttreaty.org/smta\\_en.htm](http://www.planttreaty.org/smta_en.htm)>.

materials in the multilateral system. On principle, the SMTA does not leave room for any additional negotiations. All of the legal issues that needed to be, and could be, addressed were agreed to by the contracting parties in the Governing Body when they adopted the SMTA. The only exception is for 'PGRFA under Development', a term that refers to materials derived from materials accessed from the multilateral system that are still under development. Providers may request additional terms to those included in the SMTA for PGRFA under Development, as long as those terms are consistent with the Treaty and the SMTA.

Another objective of the multilateral system is to ensure the sharing of benefits that are derived from the commercialization of new products that incorporate multilateral system material. According to the SMTA, recipients who develop and commercialize new products that incorporate material accessed from the multilateral system must pay 1.1 percent of gross sales to the multilateral system if they simultaneously prohibit others, through legal or technical means, from using the product for research or breeding.<sup>4</sup> Not surprisingly, the conditions for mandatory financial benefit sharing were the most hotly debated issues during the negotiations of the Treaty and, later, the SMTA (the negotiations of the SMTA took four years to complete, starting in 2002, and ending in 2006 (Lim 2008))<sup>5</sup>. There was disagreement about what physical conditions should trigger benefit sharing. Some felt that there should be no mandatory benefit sharing if the final commercialized product contained less than 25 percent, by pedigree, of materials accessed from the multilateral system. Others argued that instead of minimum percentage thresholds, the 'trigger' should be whether the commercialized product contained traits of value (for example, drought tolerance, higher micronutrient production) obtained from multilateral system materials. Ultimately, it was agreed that there should be no minimum threshold, and that any incorporation of material accessed from the material system would trigger payments, as long as the other conditions were met. (SGRP 2006b). There also was disagreement about whether commercialization alone should trigger benefit sharing or whether it should be triggered by commercialization in combination with legal or technical restrictions on further use for research and breeding. Ultimately, the latter formulation prevailed. Part of the justification for this decision was that it complemented the form of intellectual property protection already established in the 1978 and 1991 versions of the International Convention for the Protection of New Varieties of Plants (UPOV Convention), which includes exemptions for the unrestricted use of protected plant varieties for the purposes of research and breeding.<sup>6</sup> In this way, the benefit-sharing formulation of the SMTA underscored the importance of always keeping materials available for research and breeding. The adopted formula penalizes companies that seek stronger forms of protection, such as patents or some form of genetic use restriction technology, which prohibit the use of products for downstream research and breeding. Multinational life science companies who rely proportionately more on patents than smaller seed companies (that still exploit protections based on national laws implementing the UPOV Conventions) would prefer to have the benefit-sharing provisions triggered by any commercialization (Halewood and Nnadozie 2008). In this matter, the multinational life science companies and civil society groups, which are usually antagonists in matters

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<sup>4</sup> [provide details of the alternative benefit sharing scheme under Art 6.11]

<sup>5</sup> [explanation of how the four years was calculated]

<sup>6</sup> International Convention for the Protection of New Varieties of Plants, 23 October 1978 (revised 10 November 1972, and 23 October 1978, and entered into force 8 November 1981) U.K.T.S. 11 (1984) [this is the citation for UPOV 1978. Still need it for UPOV 1991]

concerning genetic resources policy making, find themselves making very similar criticisms, though for different reasons. The high threshold for mandatory benefit sharing established in the SMTA negotiations has also been strongly criticized by legal academics. (Reichman et al. 2008).

It is important to underscore the fact that the monetary benefits do not go back to individual suppliers or countries of origin of the material. Instead, they go back to the multilateral system to be spent on helping farmers, particularly those in developing countries, who conserve and sustainably use PGRFA, following guidelines developed by the Governing Body. One issue that arose during the negotiations of the SMTA was that, since the financial benefits flow back to the system as a whole, there would not be incentives for suppliers to expend resources to enforce recipients' compliance. To address this situation, negotiators agreed to include a provision in the SMTA for a legal entity representing the third party beneficiary interests of the Multilateral System as a whole. This entity is able to initiate dispute settlement procedures against recipients who fail to comply with the benefit-sharing provisions (Moore 2008; CGRFA 2006). FAO has been requested to perform the role of the Third Party Beneficiary. The Governing Body recently decided upon the procedures that the third-party beneficiary representative should follow to initiate legal actions, and the kinds of information that suppliers need to be make available concerning transactions using the SMTA to facilitate the third-party beneficiary's work.

The scope of the multilateral system extends to sixty-four crop and forage genera, which are listed in Annex 1 of the Treaty. All contracting parties agree to 'pool' the reproductive materials of the Annex 1 crops and forages that are 'under the management and control of the Contracting Parties and in the public domain.'<sup>7</sup> As long as the materials satisfy these conditions, it does not matter if they are in *ex situ* collections in gene banks or in *in situ* conditions (for example, in fields and protected areas<sup>8</sup>) in the country concerned. The content of the Annex 1 list was one of the last things the Treaty's negotiators struggled over. In the lead up to the adoption of the text, countries made last minute deals about the inclusion of some species and unilaterally withdrew their consent concerning the inclusion of others. Over the course of the negotiations, the potential scope of the list expanded and contracted dramatically, from possibly including all agricultural plants to a narrow list of just twelve species or genera (Lim and Halewood 2008). Conspicuously absent from the current list of sixty-four crops and forages are soybean, groundnut, fonio, okra, and a wide range of tropical forages. Of course, it is open to the Governing Body to decide whether to increase or decrease the species/genera included in the list: any changes to the list require the consensus of all Contracting Parties.

The Treaty also encourages voluntary inclusion of additional Annex 1 materials by contracting parties and legal individuals (including companies). The Treaty invites the CGIAR Centres to sign agreements with the Governing Body of the Treaty, to place the collections they host (both Annex 1 and non-Annex 1 materials) under the Treaty's framework, and to subject the management of those collections to the overall policy guidance of the Governing Body. In 2006, the eleven CGIAR Centres with plant genetic resources collections agreements with the Governing Body, formally placing approximately 700,000 unique accessions of crops and forages under

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<sup>7</sup> Treaty, *supra* note 1, Article 11.2.

<sup>8</sup> The country concerned may of course adopt national legislation setting out requirements to be fulfilled by collecting missions or other such conditions governing access to PGRFA found in *in situ* conditions, but any such legislation must be consistent with the other conditions of the Treaty and the SMTA.

the Treaty's framework.<sup>9</sup> During the first twenty months of operation under the Treaty, from January 1, 2007 to July 31, 2008, the centres distributed over 525,000 samples of PGRFA using the SMTA (SGRP 2009).

At its second meeting in 2007, the Governing Body decided that the CGIAR Centres should use the same SMTA when distributing the non-Annex 1 materials in their collections, with the addition of a series of explanatory footnotes (SGRP 2007a).

Contracting parties are free to use whatever MTAs they wish for the transfer of non-Annex 1 materials. In exercise of this freedom, some countries have decided to use the SMTA with explanatory footnotes also to distribute non-Annex 1 PGRFA (provided of course that those materials are not subject to other legal conditions that would preclude such use). The Netherlands' Centre for Genetic Resources was perhaps the first national organization to adopt such a policy. More recently, in the context of developing the European Genebank Integrated System, European countries have decided in principle that they would also make selected non-Annex 1 materials (categorized as European Accessions) available under the SMTA with explanatory footnotes (EC/PGR 2008). While these materials are not included within the multilateral system created by the Treaty, in fact, they will be distributed using the SMTA, creating the same nexus of legal rights and obligations that applies to Annex 1 materials. Of course, since the decision to use the SMTA for non-Annex 1 materials lies outside the Treaty and within the sovereign rights of the individual States, it will be open for the Netherlands and AEGIS to decide, on their own, to reverse their policies to use the SMTA for non-Annex 1 materials without seeking any guidance from the Governing Body.

As more countries start implementing the Treaty, the overall proportion of transfers within the multilateral system from countries (as providers) will increase. The Secretariat of the Treaty sent a letter to state parties in mid-2008, asking them to confirm which of their collections would be included in the multilateral system. A number of countries have responded positively, and the collections they identify are posted on the Treaty website.<sup>10</sup> In this context, it is important to note, as far as contracting parties are concerned, Annex 1 materials within their borders that satisfy the standards mentioned earlier -- that is, under the management and control of contracting parties and in the public domain -- are already in the multilateral system. It is not formally necessary for countries to make lists of included material (and they cannot exclude materials that otherwise fit those conditions simply by not listing them). However, for the multilateral system to actually work, potential recipients have to know what is available in the pool, and the only way for them to know is for suppliers to publish lists of what they have.

Indeed, the drafters of the Treaty fully appreciated the importance of a global information system to make the multilateral system functional. It is for this reason that Article 17 of the Treaty, which is entitled 'The Global Information System on Plant Genetic Resources for Food and Agriculture,' states that contracting parties will cooperate to develop just such a system. Here again, the Governing Body still has decisions to make about the best way to harmonize existing information systems. There is a strong contingent of participants in the multilateral system who would like one day to see a globally accessible 'one-stop shop,' which would list all of the

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<sup>9</sup> The full text of agreements made under Article 15 of the Treaty, *supra* note 1, between international organizations and the governing body of the treaty are posted on the Treaty's website at <[http://www.planttreaty.org/art15\\_en.htm](http://www.planttreaty.org/art15_en.htm)>.

<sup>10</sup> See 'Information on Collections in the Multilateral System', at <[http://www.planttreaty.org/inclus\\_en.htm](http://www.planttreaty.org/inclus_en.htm)>

accessions available through the multilateral system (no matter where they are housed) and provide all non-confidential information about those accessions, including passport, characterization, and evaluation data; links to all published articles; and information on where such accessions have been transferred within the multilateral system. Whether or not it will ever be possible to actually construct such a one-stop shop remains to be seen.

The Governing Body also needs to decide upon the minimum level of information that should be publicly available concerning recipients of germplasm from the multilateral system through such a system. The SMTA states that providers shall make period reports to the Governing Body ‘according to a schedule to be established by the Governing Body’ (Article 5(e)). There are currently divergent practices between the CGIAR gene banks on one hand, which make information about what materials they send to what recipients publicly available, and, on the other hand, most national gene banks and private companies, who make little or no such information publicly available. The outstanding question is focused more on minimum levels of disclosure and how information can be kept confidential. Presumably, no organization or country would be prohibited from making additional information about exchanges publicly available if they wanted to do so (as long as it was clearly stated to would-be recipients that such information would be made available by the organization concerned).

As I shall highlight in the subsequent section, the Treaty did not invent the notion of globally pooled PGRFA. PGRFA have been pooled and exploited by farmers, breeders, researchers, and conservationists on international bases for a very long time. However, the Treaty is extremely significant because it effectively puts to rest so many of the struggles of the preceding twenty years about how the PGRFA commons should be managed.

## *2.2. Outside the multilateral system, what rules apply?*

Of course, the Treaty’s multilateral system does not exhaust all of the issues related to the use and governance of all plant genetic resources. As pointed out earlier, a number of crops and forages are not currently included in Annex 1, and therefore, apart from wild relatives of crop plants, the Treaty does not extend to any other groups of plants. Furthermore, the multilateral system does not extend in scope to ‘chemical, pharmaceutical and/or other non-food/feed industrial uses’ of even Annex 1 materials. All other crops, and all other uses beyond those specified in the Treaty and the SMTA, are outside the multilateral system.

The status and rules governing access and benefit sharing for plant genetic resources outside the multilateral system are subject to some controversy. Some argue that rules for access and benefit sharing for non-Annex 1 PGRFA should be decided by the Governing Body of the Treaty, since the Treaty in general covers all PGRFA and there is no other intergovernmental body with equal specialization to address the issue. This argument is further supported by the fact that the Treaty formally extends its competence to regulate access and benefit sharing to the non-Annex 1 materials hosted by the CGIAR Centres as well as other organizations that sign similar agreements with the Governing Body (SGRP 2007b).

Others argue that access and benefit-sharing rules developed under the Convention on Biological Diversity (CBD) should apply to all plant genetic resources

that are not explicitly listed in Annex 1.<sup>11</sup> Even if the Treaty has the competence to develop rules for access and benefit sharing for non-Annex 1 materials, since it has not done so (with the exception of international organizations that have made agreements with the governing body) the CBD should apply by default. Furthermore, the CBD clearly applies to all plants that are not associated with food and agriculture.

The difficulty with the application of the CBD, as far as the governance of a commons is concerned, is that most countries tend to implement the CBD by putting in place relatively rigid, process-heavy access and benefit-sharing regulations; systems that require a case-by-case consideration of each application for access; and novel contracts between providers and recipients in each case. They also frequently require permission to be obtained from a competent authority in the government of the country concerned for each new agreement (SGRP 2006b; Moore and Tymowski 2005). These processes can lead to significant delays or total frustration of research, conservation, and economic development programs (Correa 2005; UNEP 2006; Halewood and Sood, 2009). It is beyond the scope of this article to review evidence of this phenomenon. However, the problem was very clearly identified in a report written by approximately 200 scientists from across Latin America brought together by the Brazilian government in preparation for the eighth Conference of the Parties to the CBD in 2006. The report states that '[b]asic biological research is seriously hampered by many of the current national ABS regimes,' and '[d]istrust, rather than trust, is presently dominating the situation in many countries, hampering biological research. This holds for national as well as international research.' The participants recommended that '[a]ll countries are encouraged to review their processes for permits on research, collection, import, and export of specimens to rationalize and streamline the ABS process. In addition, rules and regulations need to be practicable' (UNEP 2006).

Such procedurally related problems are antithetical to the spirit and functioning of a commons. The international community developed the Treaty's multilateral system of access and benefit sharing as the antidote to these kinds of procedural problems (SGRP 2006a). Plant-related agricultural research and plant breeding depend on regular, low-cost, and rapid access to the 'genetic pools' of plant species and genera. Without such access, research and breeding efforts that are of critical importance to food security would be threatened (Raymond and Fowler 2001). The multilateral system, if it operates as planned, will insulate research, breeding, and training for food agriculture from the risks of being frustrated by uncertainties related to access and benefit sharing.

It is not obvious, based on the text of the CBD why countries have felt the CBD needs to be implemented in this restrictive, bilaterally-oriented way. It is true that Article 15 of the Treaty affirms that it is the sovereign right of countries to regulate access to genetic resources within their borders and that such access can only be granted subject to prior informed consent and on mutually agreed terms.<sup>12</sup> However, as the Treaty proves, countries can exercise their sovereignty to develop multilateral systems of access and benefit sharing in which consent is both prior and informed and pursuant to terms that are mutually agreed 'up front' in the form of standard material transfer agreements. That said, quite understandably, in the absence of internationally coordinated efforts to support the exploration of multilateral approaches, countries tend to fall back on more protectionist themes, seeking to

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<sup>11</sup> Convention on Biological Diversity, 5 June 1992, 31 I.L.M. 818 (1992).

<sup>12</sup> CBD, *supra* note 7, Article 15.

defend or fence off resources under their control. The Bonn Guidelines on Access and Benefit Sharing, which were adopted in 2002 by the sixth Conference of the Parties to the CBD, further entrenched the idea among contracting parties that the way to implement the CBD was to put in place strong procedural filters on access applications on a case-by-case basis.<sup>13</sup>

### 3. Uncertainties prior to the Treaty about the governance of the crop commons and the 1994 FAO-CGIAR in-trust agreements

#### 3.1. *The lead up to, and signing of, the in-trust agreements*

In this section, I look back to the period before the Treaty was in place. I further elaborate on the political climate and legal uncertainties of the times and how they affected the management of *ex situ* collections hosted by the CGIAR Centres in particular. I also focus on the solution that was eventually adopted by the centres, whereby agreements with the FAO were signed, formally placing the collections they held in trust for the global community and submitting the management of these collections to the high-level policy oversight of the Commission on Genetic Resources for Food and Agriculture (CGRFA).

Throughout this section, I highlight three interrelated themes: (1) the degree to which intergovernmental oversight was necessary to provide the requisite political, legal, and administrative ‘cover’ for the centres to continue operating as primary ‘pumps’ in global systems of conservation and use of PGRFA; (2) the degree to which the centres proactively engaged with the CGRFA (and its working groups) and the FAO to forge these agreements; and (3) the positive impact of the agreements on the longer term negotiations of the Treaty and the multilateral system of access and benefit sharing in particular. I also highlight the way the designers of the in-trust agreements took into consideration how the CBD affects the legal status of genetic resources. I include this additional focus on the CBD as a response to the fact that so much of the writing about the microbial commons appears to ‘gloss over,’ or ignore, the impact of the CBD on international genetic resources pooling. Reading through this section, champions of the global microbial commons will no doubt recognize some similarities, and some differences, between the situation of the microbial commons today and the PGRFA commons in this period before the Treaty.

Most accounts of efforts to formalize the existence of PGRFA as internationally pooled resources start in 1983, with the FAO Conference’s adoption of the non-binding International Undertaking on Plant Genetic Resources for Food and Agriculture (IU),<sup>14</sup> and the creation of the CGRFA. One of the Commission’s responsibilities was to oversee the implementation of the IU. The IU called for the creation of an ‘internationally coordinated network of national, regional and international centres including the international network of base collections in gene banks, under the auspices or the jurisdiction of FAO, that have assumed the responsibility to hold, for the benefit of the international community and on the principle of unrestricted exchange, base or active collections of PGR’ (Article 7)

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<sup>13</sup> Bonn Guidelines on Access and Benefit Sharing, <<http://www.cbd.int/doc/publications/cbd-bonn-gdls-en.pdf>>.

<sup>14</sup> International Undertaking on Plant Genetic Resources for Food and Agriculture, UN Food and Agriculture Organization, 22nd Sess., Conf. Res. 8/83 (1983) at article 1 [hereinafter *International Undertaking*].

The IU also proclaimed ‘the universally accepted principle that plant genetic resources are a heritage of mankind and consequently should be available without restriction.’ (Article 7) However, this important principle was not actually universally accepted; eight countries abstained from adopting the IU on the basis that, among other things, it did not recognize the primacy of plant breeders’ rights over the need to provide unrestricted availability. (Mekouar, 2002) Efforts to accommodate the abstaining countries, and to mollify those who did not like the compromises necessary to do so, lead to the adoption, in 1989, of one resolution allowing for the recognition of plant breeders rights within the IU framework, and another resolution recognizing the concept for farmers’ rights. Most significantly, as far as norms affecting the pooling of PGRFA is concerned, in 1991, the Commission adopted a third resolution which recognized the sovereign rights of countries to regulate access to PGRFA within their borders. This resolution is hard to reconcile with the ‘universally accepted principle’ of ‘availability without restriction’. The friction between these two principles never really got to be ‘played out’ as events at the Commission concerning the IU were overtaken, in 1992, by the adoption of the Convention on Biological Diversity.

Since 1989, the negotiations of the Convention on Biological Diversity had been under way under the aegis of the United Nations Environment Programme. In 1992, the text of the Convention was adopted, ‘[r]ecognizing the sovereign rights of States over their natural resources, the authority to determine access to genetic resources rests with the national governments and is subject to national legislation.’<sup>15</sup> Between the 1991 resolution by the Commission, and the CBD, the concept of an international legal framework designed to support international pooling of PGRFA was almost entirely eradicated. However, in the very last moments of the Conference for the Adoption of the Agreed Text of the Convention on Biological Diversity in 1992, a resolution was also adopted, which served to preserve the possibility of formalizing such a structure in the future. Nairobi Final Act, Resolution 3, entitled ‘The Interrelationship between the Convention on Biological Diversity and the Promotion of Sustainable Agriculture’ stated that contracting parties needed to ‘seek solutions to outstanding matters concerning plant genetic resources within the Global System, in particular access to *ex situ* collections not acquired in accordance with the CBD, and farmers’ rights.’<sup>16</sup>

Resolution 3 was a very positive development in as much as it preserved the possibility of developing a more appropriate system of pooled access and benefit sharing for PGRFA -- one that would build upon what Charlotte Hess and Elinor Ostrom refer to as the biophysical-technical characteristics of the resource in question, the attributes of the communities of users, and the existing rules in use (Hess and Ostrom 2007). This opportunity was seized upon very quickly in 1993 by the FAO Conference, which requested the FAO to provide the CGRFA with the intergovernmental negotiations to: revise the IU in harmony with the CBD; consider the issue of access to plant genetic resources, including *ex situ* collections that are not addressed by the CBD; and look at the issue of farmers’ rights. These negotiations took longer than anyone imagined they would. After seven long years, they led to the adoption of the text of the Treaty.

On the other hand, not everyone was enamored with the Resolution 3 at the time. For example, one civil society organization, GRAIN, opined that the CBD was

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<sup>15</sup> CBD, *supra* note 7, Article 15.1.

<sup>16</sup> Nairobi Final Act, [citation and pinpoint reference for quotation].

‘disturbingly limited’ by virtue of the fact that it did not extend to *ex situ* collections held by the CGIAR Centres. (GRAIN 1992).

Resolution 3 was also somewhat disconcerting in as much as it suggested, in an attention-attracting way during a period of high political tension concerning genetic resources generally, that the enormous *ex situ* collections of crop and forage materials held by the CGIAR Centres were in an international legal vacuum. Some organizations that were not content with Resolution 3, picked-up on, and amplified this uncertainty. For example, GRAIN published a statement that, ‘[a]ccording to the CGIAR, these seeds were collected in the name of the international community and are being held "in trust" for humanity. Yet there is no legal footing to back these polite assurances.’ (GRAIN 1992). The fact is, however, the legal footing for the collections was not as insecure as some commentary at the time suggested. The centres had acquired the materials in their collections over many years, through international collecting missions coordinated, usually, by the International Board on Plant Genetic Resources, with the agreement of the countries concerned (Esquinas-Alcázar and Hilmi 2008). The collections were maintained by the CGIAR Centres with the express intent of making the materials globally, publicly available. To underscore this point, and to help ease tensions that were permeating the international community and the meetings of the CGRFA, the CGIAR Centres published in 1989 a statement confirming that they considered themselves to be holding the materials in trust for the global community. There was nothing in international law to prevent the centres from holding the collections for this purpose, and there were no legal suits from countries asserting that the materials had been obtained without compliance with their own national laws. The fact that actual no one’s legal ownership of the materials was clearly established is not, in itself, a problem. Indeed, currently, under the Treaty’s framework, no ‘owners’ of the materials hosted by the CGIAR Centers are identified. The Treaty refers to materials ‘held in trust’ by the Centres; as shown below, pursuant to the the 1994 In Trust Agreements, the Centres were not the owners of those materials, despite the fact that they held them in trust for the international community. Nevertheless there was a good deal of discussion in the context of the CGRFA highlighting the legal uncertainties concerning the exact legal status of the CGIAR collections.

As a combination of the rising profile of the CGIAR Centres’ *ex situ* collections by the Nairobi Final Act, the discussions in the CGRFA and the fact that the revision of the IU was clearly going to take a long time, political tensions continued to rise. There was always the possibility – in the minds of critics outside the CGIAR Centres -- that the centres could simply change their policies and cut off, or restrict, access to ‘their’ collections. This line of critique was embedded in a longer-running, more general criticism -- which was most frequently made by civil society organizations and a few developing countries -- that the CGIAR Centres were too autonomous in their activities and that they should be subjected to more participatory forms of governance (ETC 2009, Fowler and Mooney 1990). In addition, there were fears and rumours that forces from outside the CGIAR Centres -- for example, the World Bank or countries hosting the Centres holding the collections -- could try to take over the collections and convert them to private or national uses. There was also concern that some countries would make demands for the return of the materials that were originally acquired from them, that were being held by the Centres.

Worries about the World Bank, for example, reached a fever pitch in 2004, as reflected in an article in the *Financial Times* (UK) entitled ‘World Bank Accused of Attempting Raid on Gene Reserves,’ which recounted accusations by ‘major

environmental and development NGOs' accusing 'the World Bank of attempting a coup to take over control of the 500,000 samples held in the genebanks of the [CG Centres]' (Tansey 1994) The second session of the Intergovernmental Committee on the Convention on Biological Diversity, in June 2004, was dramatically overtaken by this issue as numerous delegates and observers made interventions about the dangers of privatization of the collections, World Bank control, and the necessity of developing standards on benefit sharing with countries of origin for the Centres to require when distributing materials from the collections they held (UNEP 1994; GRAIN 1994).<sup>17</sup>

These events had significance beyond the question of how the CGIAR Centre-hosted collections would eventually be managed. These events also contributed to an atmosphere of distrust during the negotiations for the revision of the IU, which were encountering more challenges than anyone had previously imagined. They may also have contributed to the declining rates of acquisition of materials by the CGIAR gene banks, as countries became concerned that they could not be certain where the material would eventually end up and how it would be managed (Halewood and Sood 2009).

It was in this context, that the CGIAR Centres accelerated their efforts to develop agreements with the FAO to provide a secure legal status for the collections while preserving the ability of the centres to manage and distribute them globally, without restriction.<sup>18</sup> As part of its work in support of the creation of an 'internationally coordinated network of national, regional and international centres ... that have assumed the responsibility to hold, for the benefit of the international community ... collections of PGR,' the CGRFA had developed a four alternative draft agreements to be signed between the FAO and national public, private, and international organizations participating in the network. Pursuant to one model (model B), the organization or government concerned would transfer 'unconditionally to FAO the designated germplasm' and 'renounces the right to subject the designated germplasm to national legislation. FAO would then 'determine all policies in respect of activities related to the designated germplasm.' Not surprisingly, this model enjoyed very little support. Pursuant to other models (C and D), the organization or country concerned undertook to place 'designated germplasm' 'under the auspices of FAO within the international network of base collections ...' The country or organization would 'retain ownership of the resources of the designated germplasm', and would make it 'available when necessary for the purpose of scientific research, plant breeding or genetic resource conservation, without restriction, either directly to users or through FAO, either on mutually agreed terms or free of cost' (CPGR 1991). As of 1991, thirty-two countries indicated to the Commission that they would be willing to sign variants of models C and D. (CPGR 1991) That said, the Commission noted that the draft agreements were only meant to serve as the basis of negotiations. Clearly considerable additional work would be necessary for countries and or organizations to decide out how they would practically implement such vague and arguably inconsistent standards as 'without restriction, either on mutually agreed terms or free of cost'.

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<sup>17</sup> Calls were also made by delegates and civil society organizations (CSO) organizations for some form of benefit-sharing arrangements to be made, inspired by the CBD, with respect to the collections assembled by the CGIAR Centres before the CBD (UNEP 1994). This is, of course, what the renegotiations of the IU, in conformity with the CBD, were meant to achieve.

<sup>18</sup> It was understood that such agreements would be time-limited, based on the assumption that they would not be necessary once the negotiations for the revision of the IU were completed.

For a variety of reasons, none of these agreements was ever signed by a country. One reason, as stated above, was that considerable ‘heavy lifting’ was still necessary to work through some of the more controversial terms. Another reason may be that countries were not motivated to sign such agreements when it was not clear what immediate benefits would flow back to them. At least in the early and mid 1980s, germplasm was still moving relatively easily around the world. And countries would not have had the same sense of urgency that was pressing the CGIAR Centres to address (real or perceived) uncertainties concerning the legal status of their collections. Finally, as time progressed, it was clear that what got included in the agreements would ultimately be affected by the ongoing negotiations of the CBD and the revised IU. So it made sense to wait until those negotiations were completed before finalizing the agreements. As one Commission meeting report from 1997 stated, continued work developing draft agreements with countries was, “to some extent on hold, pending the outcome of the negotiations for the revision of the International Undertaking,” as they would “have a bearing on the final form and content of future agreements”. (CGRFA 1997)

Despite the fact that these agreements had never been signed, they nonetheless provided a very useful basis upon which the Centres could build the In Trust Agreements (CPGR 1993).

Representatives for the CGIAR Centres worked with FAO and the Secretariat of the CGRFA to develop a first draft of an agreement, based most directly on model C, but introducing the concepts of both holding the collections ‘in trust’ for the international community, but without asserting ownership of them. This draft was submitted for consideration to the eighth session of the Working Group on Genetic Resources, which reported to the fifth session of the CGRFA in April 1993. The commission ‘welcomed the offer made by the CGIAR Centres to place their base and active collections under the auspices of FAO’ and accepted the proposed draft agreement as a basis for negotiations between the FAO and the CGIAR Centres. The CGRFA also decided that ‘as the only permanent intergovernmental forum dealing with plant genetic resources for food and agriculture, it should play a role in the development of the policy related to the collections’ (CPGR 1993).

Thereafter, the CGIAR Centres ran into some highly publicized, short-term, uncertainties in terms of getting the agreements informally endorsed within the CGIAR hierarchy. At an annual meeting of the CGIAR, the chair of the CGIAR and vice-president of the World Bank stated decisions concerning the In Trust Agreements should be postponed for further consultations concerning intellectual property and trade related issues. When challenged on his position by the a civil society organization, he wrote in a letter to the head of a civil society organization, that ‘it would be foolhardy to lock’ the centres’ collections into such agreements. (GRAIN 1994). The Bank appears not to have held this position very firmly; a few weeks later, at the meeting of the Intergovernmental Committee Meeting on the CBD mentioned above, the Director General of IPGRI affirmed his expectation that the agreements would be signed within a few months. He also reasserted the centres’ preferred position saying: ‘The international community has long recognised the need to establish a legal and political identity for the ex-situ collections managed by the CGIAR by placing them under the auspices of an intergovernmental authority’. (GRAIN 1994). Numerous delegates at that meeting expressed deep concern about ongoing uncertainties and called upon the FAO and the CGIAR Centres to finalize the agreements. These recommendations were echoed by the Crucible Group, an international think tank comprised of high-level stakeholder representatives,

participating in their personal capacity. The Crucible Group recommended that the CGIAR Centres ‘conclude an agreement with the member nations of FAO placing the *ex situ* germplasm collections they hold in trust under the auspices of that intergovernmental body’ (Crucible Group 1994).

In March 1994, at a meeting of the Centre Directors Committee, the Director Generals of the twelve affected Centres confirmed that they were content with the text of the generic Agreements between the CGIAR Centres and the FAO of the United Nations Placing Collections of Plant Germplasm under the Auspices of the FAO (In-Trust Agreements).<sup>19</sup> They also decided to send a letter to FAO outlining their interpretation of some of the clauses of the agreement.

Meanwhile additional changes were introduced into the draft agreement to meet the concerns expressed by the Commission, and the revised draft was submitted for approval by the Ninth Session of the Working Group on Genetic Resources. The Working Group approved the changes and the proposal that the FAO Secretariat and the CGIAR would issue a joint statement indicating their understanding of certain provisions of the in trust agreements.

Thereafter, each centre’s Board of Trustees approved the agreements for their particular centre. Finally, in October 1994, the Chair of the CGIAR signed agreements on behalf of the twelve CGIAR Centres with *ex situ* collections.

The signature of the agreements was reported to the First Extraordinary Session of the CGRFA in November 1994, which warmly congratulated FAO and IPGRI. (CPGR 1994).

Pursuant to the In-Trust Agreements, the CGIAR Centres were to place ‘designated germplasm’ under the auspices of the FAO in an international network of *ex situ* collections. At the time of signing, the CGIAR Centres reported including 450,000 accessions under the In-Trust Agreements. They provided updated reports on designated materials every two years to the CGRFA. By 2006, this number had increased to 650,000 accessions. The In-Trust Agreements stated that the CGIAR Centres held the material ‘in trust for the benefit of the international community’ and that the centres would make them available ‘without restriction’ for ‘scientific research, plant breeding, or genetic resources conservation’ along with any other available ‘related information.’ The CGIAR Centres would not claim ownership over the germplasm; nor would they seek intellectual property rights on designated germplasm or related information. The centres would pass on these same obligations to recipients. Furthermore, the centres recognized the authority of the CGRFA to set policies for the international network. The centres could designate materials that were included in their collections before the CBD came into force and any materials that they obtained thereafter with the consent of the country of origin or other providers who obtained the materials in accordance with the CBD (SGRP 2003).

Pursuant to the agreements, materials were designated at the discretion of the CGIAR Centres. In 1998, the centres published their own Guidelines for Designation of Accessions under the FAO Agreements (SGRP 2003). According to these guidelines, the centres would only designate materials for which they had a long-term conservation commitment and for which they could distribute without restriction. Concerning accessions acquired by the centres after the coming into force of the CBD, the guidelines stated that they

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<sup>19</sup> The full text of the agreements is available at <http://www.bioversityinternational.org/fileadmin/bioversity/publications/pdfs/1178.pdf>.

can and ordinarily should be designated under the Agreements with FAO provided they have been acquired with the understanding that they will remain in the 'public domain' and that the Centre will conserve them and make them available without restriction as called for in the FAO Agreements ... It is understood that acquisition of materials should be based on the express written permission of the relevant government authority. Centres should seek to determine which institute or agency has this legal authority. If materials are acquired with restrictions on their access or use, then it follows that they cannot be designated. Materials held with such restrictions cannot be considered as being kept by the Centre 'in trust for benefit of the international community' (SGRP 2003).

At the time of signing, the FAO and the CGIAR Centres issued a joint interpretive statement indicating, among the things, that the centres could use a material transfer agreement (MTA) when distributing designated materials. It took almost four years to develop the MTA. Interim drafts developed by the CGIAR Centres and Secretariat of the Commission were presented to the CGRFA as they were being developed (CPGR 1995a). In 1998, the centres adopted a simple, one-page material transfer agreement to be used whenever distributing designated germplasm (CGRFA 1999). Like the designation guidelines, the material transfer agreement explicitly stated the status of the designated material *vis-à-vis* the CBD:

[Centre] is making the material described in the attached list available as part of its policy of maximizing the utilization of genetic material for research. The material was either developed by [Centre]; or was acquired prior to the entry into force of the Convention on Biological Diversity; or if it was acquired after the entering into force of the Convention on Biological Diversity, it was obtained with the understanding that it could be made freely available for any agricultural research or breeding purposes (SGRP 2001).

Between 1994 and 2006 when the centres signed the agreements with the Governing Body of the Treaty, the CGIAR Centres distributed [number] samples of [number] accessions under the framework of the In-Trust Agreements (SINGER 2009).

### *3.2 What did the 1994 In-Trust Agreements achieve?*

It is difficult to say with certainty what effect the 1994 In-Trust Agreements achieved. Perhaps the best 'yardstick' for their success is what did not happen. The CGIAR Centres' collections were not nationalized, privatized, or subjected to fee-for-service charges that might have put them out of reach of poorer recipients. If any of these things had occurred, it would be reasonable to expect that they would have contributed to significant, if not total, disruption of the distribution of materials from the CGIAR Centres. In fact, under the In-Trust Agreements, the centres' rates of distribution stayed more or less constant from the period prior to 1994 and thereafter.<sup>20</sup> Thus, the In-Trust Agreements provide continued legal and

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<sup>20</sup> The numbers of samples distributed per year dipped slightly after 1994, up to 10 percent in some years, but this can be accounted for by other factors, such as better information about the materials in the collection, which allows the gene bank to better 'target' what materials to send and they therefore

administrative security for the CGIAR Centres to continue in their role as the ‘pumps’ in a relatively open, global system of innovation and conservation. Elisabetta Gotor (2009) points out that around 1989, and leading up to the establishment of the In Trust Agreements, a large number of requests for restoration of germplasm back to countries of origin and a reduction in acquisitions was recorded by the International Rice Research Institute genebank database. As a result the number of accessions held by IRRI reached a low point around 1994. The number of accessions might not have been built back up without the establishment of the stable policy environment that was provided by the In Trust Agreements.

Furthermore, the signing of the In-Trust Agreements sent a positive signal to the ongoing negotiations for the revision of the IU. The twelve In-Trust Agreements with the CGIAR Centres were the first agreements to formally place material in the network of *ex situ* collections. Given that those collections were among the largest and most diverse in the world, it was extremely important to have them ‘in’. The In Trust Agreements were had important symbolic importance to those who were critical of the centres’ autonomy. Voluntarily submitting to the policy guidance of an intergovernmental body acted as a salve on political tensions. As such, at the time, the In-Trust Agreements represented a high water mark for the development of the global system. Once the controversy of the CGIAR Centres’ collections were resolved through the mechanism of the agreements with the FAO it became easier for countries to imagine themselves as being part of a system following similar rules. The CGRFA explicitly recognized these facts when it was informed of the signature of the In-Trust Agreements:

The Commission warmly congratulated FAO and IPGRI, as well as the other CGIAR Centres, for taking this important step, *that will strengthen the Global System*, in line with recommendations of Agenda 21. It was also considered to be an important contribution to the process of revising the International Undertaking. This represented the beginning of a new era of cooperation between FAO, the CGIAR Centres and national institutions. It was also recommended that FAO redouble its efforts to have countries put their national collections of plant genetic resources for food and agriculture into the International Network. [emphasis added] (CPGR 1994).

Ultimately, no countries signed agreements to put their collection in the international network. Instead, they ratified the Treaty, which automatically included both *in situ* and *ex situ* PGRFA that are under their management and control and in the public domain.

#### 4. A comparison of the commons characteristics of microbial genetic resources and PGRFA

##### 4.1 Commons characteristics of PGRFA

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can send fewer samples per request. Better informed requesters/recipients also contribute to the same phenomenon.

Perhaps the two most important common characteristics of PGRFA are that countries are interdependent upon them and they are crucial to global food security. PGRFA are critical to food security because they are the basic building blocks of crop research, and by extension, agricultural production. They are the source of traits needed to overcome biotic and abiotic stresses. They are used by farmers and breeders in all forms of plant variety improvement and breeding. Interdependence refers to the fact that all countries rely on PGRFA that originated from other countries. This interdependence is a function of the history of crop domestication and the global movement of crops and associated agricultural technologies around the globe as a result of exploration, colonialism, free trade, economic development, and the associated 'globalization' of a number of foods. It is estimated that today, 60% of calories consumed by humans worldwide come from just four crops: rice, wheat, maize and sugar (Palacios 1997). Interdependence on PGRFA can be seen in the pedigrees of modern varieties that are grown all over the world, with 'end point progenitors' from tens of different countries from two or more continents (Gollin 1998). Interdependence can also be seen in the high level of global movement of PGRFA. Each year, the CGIAR Centres alone distribute more than four hundred thousand PGRFA samples all around the world in support of plant breeding, research, and conservation. More than 90% goes to public sector organizations. 85% of the samples distributed went to developing countries. (SGRP 2009).

The fundamental importance of interdependence and food security is reflected in the fact that they are the two criteria for inclusion of materials in Annex 1 of the Treaty's multilateral system.<sup>21</sup>

Other common characteristics of PGRFA flow from these fundamental characteristics. For example, PGRFA have (with a few notable exceptions) traditionally been subject to open exchanges from farmers-to-farmers and from breeders-to-breeders as well as among conservationists on a local, national, and international basis. The users of internationally pooled PGRFA are globally dispersed and potentially limitless.

As a result of the way PGRFA have developed and been used, it is often difficult to determine their country of origin. The CBD defines 'country of origin' as "the country which possesses those genetic resources in *in situ* conditions." The CBD defines 'in situ conditions' as the "conditions where genetic resources exist within ecosystems and natural habitats and, in the case of domesticated or cultivated species, in the surrounding where they have developed their distinctive properties". Ultimately, as far as crops are concerned, the CBD "requires the identification of the country of origin of the distinctive properties of a crop". The international ancestry of most PGRFA makes it extremely difficult to know in which countries particular traits may have developed. (Frison & Halewood 2006)

There are extensive *ex situ* collections of PGRFA. It is estimated that currently more than 1,300 gene banks around the world hold 1.5 million unique accessions of PGRFA (Fowler and Hodgkin 2004). Most of those accessions were acquired prior to the coming into force of the CBD, which means that they are beyond the reach national sovereign rights of control. So even if it was possible to discern their country of origin, it would be legally irrelevant. A sizeable proportion of those accessions -- approximately 13% -- are hosted by the CGIAR Centres, which have historically provided facilitated open, global, access to them.

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<sup>21</sup> Treaty, *supra* note 1, Article 11.1.

Human intervention is a critical variable, along with environmental conditions and plant reproductive systems, in the selection of distinct traits within species and the generation of crop biological diversity. In the absence of human intervention, many of these traits and varieties will cease to exist (Darwin 1859). Put another way, human use is a prerequisite for the conservation of PGRFA, which is not at all the case for wild plants, for example.

The value of individual accessions, on their own, is estimated to be marginal, while the cumulative value of large internationally pooled collections as part of the infrastructure in support of agricultural and research to meet the challenges of food security and international development is calculated to be very high (Smale ?, Pardy ?)

#### *4.2. Commons characteristics of MiGR*

I start this subsection by noting that it is not entirely fair to compare *all* microbial genetic resources to the subset of plant genetic resources that are useful for food and agriculture. The PGRFA commons is defined by a discrete subset of plant genetic resources and a community (or communities) of users with similar enough interests/practices that it was possible, in the context of the International Treaty, to agree upon standard access and benefit-sharing conditions, dispute resolution, and so on. If the Treaty applied to *all* plant genetic resources, including wild endemic species with potential pharmaceutical, cosmetic, and other industrial purposes, it seems unlikely that the international community have been able to come to such an agreement. Likewise, it seems to be expecting ‘rather a lot’ that the same kind of cohesion and commonality of purpose that permitted the creation of the Treaty’s multilateral system could be found across the entire range of microbial genetic resources and their users.

On the other hand, as shall be reviewed below, there are already substantial efforts on the parts of a number of organizations to promote internationally-harmonized quality management and access and benefit sharing policies across culture collections. So one should not dismiss the possibility of the development of a unified set of rules for a microbial genetic resources commons that includes all sectoral uses of microbial genetic resources. To that end, it is worthwhile to start with consideration of the commons characteristics of all microbial genetic resources, and only afterwards, focus in on microbial genetic resources of relevance to agriculture (i.e., the counterpart of plant genetic resources used for food and agriculture).

Dedeurwaerdere et al (2009) conclude that countries are interdependent upon microbial genetic resources, based on evidence of a) the need to collect a wide range of geographically dispersed species and or strains in the service of a lot of microbial related research, and b) the actual high rate of international exchanges of microbial genetic resources in service of that research.

It is estimated that only approximately 5% of the worlds microbial diversity has been identified. Many of the species identified are internationally ubiquitous. At the species level at least, these microbes are already commonly pooled and available. (Of course, there are important exceptions, those extremeophiles associated with extreme environments, such as oceanic thermal vents and sub-zero temperatures. It is also the

case that there is considerable infraspecific diversity associated with particular environments.)

As in the case of PGRFA, the international character of microbial genetic resources has been promoted through human uses, including conservation practices. There are currently 553 culture collections, in 68 countries, holding over 1,420,000 microbials (WDCM 2009). Probably more than 50% of the strains held world-wide were acquired before the CBD came into force. So, like the pre-1993 crop collections, they are beyond national sovereignty-based claims for control rooted in the CBD, at least those strains that were transferred out countries of origin prior to their implementing article 15 of the CBD. Many of the culture collections – certainly the larger ones located in developing countries – have long-established traditions of providing facilitating open, global access to their collections. That tradition has apparently continued, even since the CBD has come into force. Dedeurwaerdere et al (2009) report that out of 19 genebanks studied around the world, on average, approximately 90% of new deposits in 1995, 1996 and 1997 were made without any restrictions on the collection's ability to further distribute that material.

It is estimated that the public culture collections alone distribute more than 500,000 single isolates annually (Dedeurwaerdere et al 2009). The vast majority of those transfers – 77% -- are to public sector recipients (Stromberg et al 2006). At least as much, and probably considerably more, is distributed through informal networks between researchers with 'working collections' (Dedeurwaerdere et al 2009).

In addition, individual strains are, on their own, of marginal value. As part of collected gene pools, subjected to high throughput analytical methods, however, their collective value as research tools is high. While microbial strains are generally not the subject of protracted and systematic breeding programs, as are crop varieties, they are highly dependent upon continued human intervention for their maintenance as pure strains and for their conservation as such.

[Finish later, addressing a) the reason for setting up culture collections in the first place compared to the creation of PGRFA collections, b) different ways in which genetic resources are used (and understood) in plant breeding and microbial research contexts, c) the fact that most of the WFCC listed collections are hosted by national public organizations, not international public organizations as in the case of PGRFA, d) the participants in the microbial commons are globally dispersed and potentially limitless, e) multiple uses of many microbes, f) fact that the culture collections are set up to serve many different sectors whereas crop and forage genebanks were set up to serve food and agriculture.]

#### *4.3 An agricultural microbial genetic resources commons?*

In this section, as anticipated above, I focus on the commons-characteristics of agricultural microbial genetic resources, that is, a subset of microbial genetic resources identified on the basis of their function assisting “in the production of plants or animals, either directly or indirectly, in agricultural settings” (CGRFA 2007a). The possibility of taking such an approach was highlighted in a submission by the Genetic Resources Policy Committee of the CGIAR – a committee established to provide

policy advice to the Chair of CGIAR Chair -- to the CGRFA in 2007. The paper submitted by the Genetic Resources Policy Committee to the CGRFA, written by John Howieson, considers that agricultural microbial genetic resources would include the following:

- plant microsymbionts;
- associative organisms (that is, eliciting or enhancing a positive reaction or effect when in intimate proximity to a plant or animal);
- rumen organisms;
- biocontrol agents (pathogens of weeds, fungi, insects, or nematodes);
- pathogens of plants or animals;
- agents for nutrient solubilization, bioremediation, or biodegradation;
- agents for production of biofuels; or
- agents facilitating DNA or gene transfer (CGRFA 2007a),

in as much as they are used to assist in the production of plants or animals either directly or indirectly in agricultural settings.

Of course, some of the same microorganisms could also be used for purposes in pharmaceutical, industrial, or cosmetics-related research or applications. The GRPC urged that such taxonomical uncertainties need not be problematic. They can be overcome through focusing on the function for which the organism in question is used.

The GRPC noted that the microbes used in agriculture ‘were extremely important for the sustainable improvement of productivity in developing countries.’ The committee also noted that agricultural microbial genetic resources are subject to ‘extremely fast rates of reproduction and variation’ and ‘historical patterns of use and distribution’, including being deployed in open fields without any containment, that render them difficult to subject to legal forms of control and appropriation (CGRFA 2007a).

Finally, as in the case of PGRFA, it is argued that considerable potential advantage can be gained through agricultural microbial research, and the direct deployment of microbial genetic resources in production systems is being lost due to political and legal uncertainties. To this end, the GRPC has suggested that

[o]ne possible way to increase the availability to, and use of AMiGRs by, developing countries would be to develop a ‘virtual’ core collection of screened materials currently held by public organizations around the world that wanted to participate. A critical aspect of this enterprise would be to agree upon harmonized terms and conditions for the distribution of those materials, in conformity with international law. The process for considering the establishment of such a base collection and the terms and conditions for its use would need to be highly participatory, with costs, legal status, partners, administrative responsibilities and other issues identified and exhaustively considered (CGRFA 2007a).

Perhaps most importantly, the GRPC noted that agricultural microbial genetic resources are critical to food security, i.e., the second of the two fundamental commons characteristics of PGRFA. This characteristic is important for two reasons: it embodies a common concern of people all around the world, and it is a compelling

justification for the intergovernmental community to expend energy developing norms to support the functioning of a global agricultural microbial genetic resources commons. It is hard to imagine mounting a campaign in support of similar efforts on behalf of microbials-based cosmetics research ... although, in fact, recently, there have been muted attempts to do so (Oliva 2009).

Interestingly, as it turns out, during its eleventh session in 2007, the CGRFA adopted a multi-year program of work, which includes consideration of access and benefit sharing for all genetic resources for food and agriculture, including microbial genetic resources. (CGRFA 2007b). In preparation for its twelfth session in late 2009, the commission's secretariat is coordinating the preparation of six sector-specific background papers -- concerning plant, animal, aquatic, forest, biocontrol, and microbial genetic resources respectively -- to assist the commission in its access and benefit-sharing related considerations. The upcoming meetings of the CGRFA, therefore, appear to be tailor-made for advanced, intergovernmental consideration of policy and institutional support for an agricultural (and possibly food) related microbial genetic resources commons.

Meanwhile, in the hope of jarring forward the stalled negotiations of an international regime on access and benefit sharing under the framework of the CBD, the ninth Conference of the Parties to the CBD, in 2008, decided to create an expert group on, among other things, sectoral approaches to access and benefit sharing. The group met in early December 2008. Certainly a strong case was made among the expert group participants for recognizing food and agriculture as a sector worth treating separately as far as access and benefit sharing is concerned. And within the discussion of food and agriculture by the expert group, what I have referred to as the commons-characteristics of agricultural microbial genetic resources were noted (UNEP 2008). On the other hand, there appears to be continued intransigence on the part of most delegations -- including those purportedly in favour of sectoral approaches -- to get into discussions about particular sectors and how they could possibly be treated differently.

It is still too early to be able to predict with any accuracy how these activities under the aegis of CGRFA and the CBD will influence one another and what their outcomes will be.

#### *4.4 An international network of agricultural microbial collections?*

If indeed the CGRFA concludes that there are sufficient grounds for investigating a set of access and benefit sharing norms to support the global pooling and management of microbial genetic resources used in food and agriculture, it will have a number of precedents to examine from its past work in support of the global crop commons. The positive correlation between the commons characteristics of agricultural microbial genetic resources and PGRFA cited earlier suggest that some of the lessons learned in formalizing and governing the crop commons are highly relevant. Perhaps the most obvious parallel (though not the easiest course of action) would be to consider negotiating a legally binding international convention, like the Treaty, with a carbon-copied multilateral system of access and benefit sharing for agricultural microbial genetic resources. Another, lighter-weight possibility would be to

investigate the possibility of a series of bilateral agreements between an appropriate intergovernmental body and the holders of collections, setting minimum quality standards and establishing harmonized terms for distribution from those collections. The agreements could also subject the management of the collection to high-level intergovernmental policy guidance. International and private organizations could make such agreements on their own, and public organizations could do so through their national governments or at least with their approval. To be effective, the network would not need all, or even most, of the collections of microbial genetic resources to be 'signed on.' What would be important is to ensure that, through those organizations that do 'sign on,' the most relevant strains for agricultural uses would be effectively conserved and made globally available. Flexibility could (indeed, would have to be) maintained to allow signatories not to include some materials, for example, those which they are convinced have high market value. In essence, this approach to developing an agricultural microbial commons would be similar to the global network of *ex situ* collections originally conceived of in the IU. If this approach to supporting an effective agricultural microbial commons proves to be effective, it would not be necessary to move into negotiations for a binding international convention.

In this context, however, it is important to note at least one significant difference between the situation of agricultural microbial genetic resources and PGRFA. A much higher proportion of the world's *ex situ* collections of microbial genetic resources are held in nationally controlled collections than in the case of PGRFA. In the agricultural microbial genetic resources world, there are no international organizations that occupy the equivalent central role of the CGIAR Centres, with the same extensive range of *ex situ* collections and an established role as a global collector and supplier. One of the reasons the CGIAR Centres have attracted so much attention throughout the 1990s was that they were international organizations, coupled with the fact that there was dissatisfaction, in some camps, with the way the centres were governed. National organizations are seldom subject to the same level of international scrutiny or political pressures. Consequently, it is possible that no national collection holder would be as ready as the CGIAR Centres were in the 1990s to explore solutions such as signing the In-Trust Agreements with the FAO and surrendering some of their independence to intergovernmental oversight.

That said, it is worth noting in precisely this context that throughout the 1980s and up the mid 1990s, the CGRFA continued its work in developing draft agreements for countries to sign to bring their collections into the global network of *ex situ* collections and that at least 32 countries indicated willingness to sign such agreements (CPGR 1991, 1995b, 1995c).

While it is true that no country actually signed these agreements, it is also true that they eventually did ratify the Treaty and a significant proportion of both their *ex situ* and *in situ* materials will end up as part of the multilateral system. It is quite possible that what accounts for the difference was the lack of benefit-sharing provisions in the draft agreements. Now that benefit-sharing standards have been agreed to under the Treaty and the SMTA, countries appear to be more willing to agree to a formalized system for pooling resources for facilitated access. Perhaps now, with an internationally agreed precedent for benefit sharing under the Treaty (and SMTA), it will be easier for the international community to agree upon the kinds of benefit-sharing provisions that should be built into other kinds of agreements, including bilateral agreements to include microbial collections in a global network. One major incentive to enter into such agreements is the fact that most of the holders

of microbial genetic resources collections are looking for ways to facilitate the exchange of these genetic resources.<sup>22</sup>

#### 4.5 *Microbial commons beyond agriculture*

In the last two subsections, I have focused on comparing the situation of PGRFA to that of agricultural microbial genetic resources. Of course, this comparison is of little relevance (and possibly little interest) to users of microbial genetic resources outside agriculture. However, to move well beyond consideration of agricultural uses of microbes risks losing the advantage of gleaning what insights can be gained from comparing two similarly situated groups of resources and communities of users. That said, there are numerous potential ways to define communities of users and the related groups of organisms, and it would be a disservice to ignore them. One frequently sighted user community that potentially cuts across agricultural, pharmaceutical, cosmetic, and industrial sector divisions is up-stream, non-commercial researchers (Reichman et al 2008; UNEP 2008). Common practices among up-stream non-commercial researchers using microbial genetic resources could potentially justify treating them as a distinct community of users. On one hand, I have cited the importance of agricultural microbial genetic resources to food security as a justification for intergovernmental interest in, and support for, an agricultural microbial commons; again, it would be hard to make a similarly impassioned plea for researchers engaged in the cosmetics sector. On the other hand, there has already been an impressive amount of activity, lead by international umbrella organizations for culture collections, to develop common quality standards, management protocols and harmonized policies for access and benefit sharing, regardless of the ultimate use of microbial genetic resources concerned. [To be added: a description of some of these efforts.]

Another problem concerns intergovernmental forum shopping. The CGRFA would provide an appropriate forum for the consideration of policies and administrative structures in support of an agricultural microbial commons. It is hard to imagine what intergovernmental body has the capacity to entertain negotiations (and later, provide oversight) for the creation of a commons for all uses of *all* microbial genetic resources. Once one moves beyond the context of food and agriculture, there are very few examples of intergovernmental bodies considering models for pooling resources other than for creating new ways to control or appropriate them. The one striking exception that confirms this rule is the ongoing consideration, under the aegis of the World Health Organization, in the context of support for bird flu-related research (WHO 2009).

Ultimately, it may be that simultaneous efforts at different intergovernmental bodies dealing with agriculture, health, environment will be necessary, with culture collections and other microbials commons champions promoting consistent, harmonized norms to be developed by those bodies.

## 5. Conclusion

The evolution of the governance of the crop commons provides useful insights for those engaged in efforts to formalize the structure of the microbial commons. During the 1980s and 1990s, issues related to the international movement and use of all

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<sup>22</sup> [cite report of Microbial Commons workshop, Ghent, June 2008]

genetic resources became highly politicized and subject to rancorous international debate, polarized between developed and developing countries. Most developing countries were deeply resentful of the extension of intellectual property protections for foreign technologies to within their own borders, through the negotiations under the General Agreement on Tariffs and Trade and the World Trade Organization. The negotiations and coming into force of the CBD did little to resolve these tensions. In many ways, it exacerbated them by asserting that countries have the right to regulate access to genetic resources within their borders (which is fine in itself) but failed to provide any guidance as to how they should do so. The model that most countries have seized upon, in the absence of coordinated consideration of alternatives, is based on a reaction to the archetype 'bio-piracy' scenario of a compound, isolated from a wild plant with the help of traditional knowledge, that was accessed without permission from a developing country, leading to the development of a pharmaceutical worth millions in the global market. The regulatory 'solution' in such a case is to create processes for exhaustive screening of all applications for access to genetic resources in a country and require the consent of the government in each case. All but the most recent work of the Conference of the Parties of the CBD has tended to entrench this approach to implementing the CBD. Such regulations are appropriate to address some forms of exploitation of some genetic resources. However, it appears that, perhaps inadvertently, the baby has been thrown out with the bath water. The internationally encouraged preoccupation with sealing off unregulated access to any and all genetic resources has led to the mismanagement, disuse, and, in some cases, abandonment of valuable commons.

Volunteer efforts of individual (or groups of) organizations to maintain genetic resources commons are not powerful enough, on their own, to counter this trend. The CGIAR Centres' declaration in 1989 that they considered themselves to be holding their *ex situ* collections in trust for the global community did not create the necessary conditions for the secure management and use of those collections. Their good intentions did not insulate the collections from the (real, or equally damaging imagined) threats of being taken over by national host governments or the World Bank or from being disintegrated by demands for repatriation of accessions by countries of origin or subject to future changes of policy decided by the centres themselves. Ultimately, in order to secure the position of the collections as core resources for the global PGRFA commons, the CGIAR Centres had to sign agreements with the FAO, putting their collections in the global network of *ex situ* collections and subjecting them to being managed by the high level policy guidance of the CGRFA. The secure inclusion of nationally held material in the global crop commons was not achieved until governments' ratified the Treaty. In a more positive political environment, a similar outcome could have been achieved through those same governments -- or at least those with the most important *ex situ* collections of PGRFA -- signing agreements to include their collections in the international network of *ex situ* collections of PGRFA.

Many of the same challenges face the management and use of the microbial genetic resources commons. Under these circumstances, it is unlikely that individual collection holders -- individual, public, or private -- will be able to reverse the 'Balkanization' of the microbial commons through their own voluntary efforts. Intergovernmental recognition and support for the microbial commons will be necessary for their long-term maintenance and efficiency. As time passes, the proportion of microbial collections that are acquired after 1993 will have to increase. Without the buy-in, and approval of, the governments of the countries from which this

material is first accessed, it will be impossible to populate, and maintain, a global microbial commons. The best way of obtaining such support is to have the principles of the commons recognized, and supported, through an intergovernmental body.

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