The International Treaty
ON PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Research Study 5

Experience involving technology transfer, capacity building, and information exchange for the International Treaty on Plant Genetic Resources for Agriculture

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Introduction

1. Technology transfer, capacity building, and information exchange are important contributors to the accomplishment of the aims of the International Treaty on Plant Genetic Resources for Agriculture (ITPGRA). These matters have been prioritized as approaches to non-monetary benefit sharing in the treaty itself as well as in subsequent decisions by the parties. This report examines practices and experiences among other multilateral treaties for technology transfer, capacity building, and information exchange to identify lessons and provide recommendations on how best to achieve these objectives for the ITPGRA. Effort has been made to identify empirically-grounded evidence of what has or has not worked for other treaties, rather than aiming for a comprehensive but merely general survey of treaties that engage in such activities. The lessons identified will be analyzed in light of the priorities and activities undertaken within the Treaty, particularly through the two rounds of funding under the Benefit Sharing Fund (BSF).

2. Despite the ubiquity of the practice, findings from a variety of fields support the view that capacity building and technology transfer activities in international development have often not succeeded.[1] Accordingly, much of the literature upon which this report draws has this conclusion as a background concern. Many of the lessons drawn by these other reports explicitly or implicitly respond to such concerns and seek to overcome them.

3. The mandate for technology transfer, capacity building, and information exchange derives from Article 13.2 of the ITPGRA. It is also reflected in the Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture and the ITPGRA Funding Strategy. Following these mandates, under the Funding Strategy, technology transfer, capacity building, and information exchange together constitute one of the three criteria upon which project funding can be provided. Hence, the mandate and priority of technology transfer, capacity building, and information exchange are well grounded within the treaty.

4. While the ITPGRA reflects a specific understanding of technology transfer, there are a variety of definitions used in other contexts, which are useful to understanding the broader phenomenon. One definition provides that it is "the intentional 'passing-on' of technology or know-how from one party to another, commonly by purchase, investment, or agreements for cooperation."[2] Similarly, the Intergovernmental Panel on Climate

[1] OECD, Donor Support for Institutional Capacity Development in Environment: Lessons Learned (2000), p. 10, ("Institutional capacity development in ODA programmes has been, at best, partially successful.")

[2] Stephen O. Andersen, K. Madhava Sarma, and Kristen N. Taddonio, *Technology Transfer for the Ozone Layer: Lessons for Climate Change* (Earthscan, 2007), p. 5.

Change (IPCC) defined it as the transfer of technical knowledge and its utilization, dissemination, and diffusion.[3] The transfer of such technical knowledge can occur both between countries and within a single country. Although the term's meaning within the ITPGRA is more specific, these other definitions provide background for the other examples considered in this paper.

5. Capacity development, while used in a variety of different contexts, has gained a more settled definition, particularly in the United Nations. UNDP refers to capacity development as the "the process through which individuals, organizations and societies obtain, strengthen and maintain the capabilities to set and achieve their own development objectives over time".[4] Documents from the United Nations speak of capacity development "as intended to develop the future ability of national partners to do things for themselves, or do things better, without the United Nations having to play the same role again".[5] The OECD defines the "capacity" as "the ability of people, organisations and society as a whole to manage their affairs successfully" and "capacity development" as "the process whereby people, organisations and society as a whole unleash, strengthen, create, adapt and maintain capacity over time".[6]
6. Turning back to the concept of technology transfer cited earlier, one can also speak of capacity for technology transfer. In this sense, capacity for technology transfer pertains to the ability of actors to use new technologies in their work, broadly conceived. It entails both the ability to understand the intricacies and complexities of new technologies and possess the wherewithal to apply technology in specific institutional, production, and operational processes and engage in one's own technology transfer efforts.
7. The exchange of information referenced in Article 13.2(a), has no specific technical meaning identified in other contexts. This paper will thus survey practices from other treaties and development actors relevant to the provisions of the ITPGRA.
8. The next section will examine specific experience with a number of multilateral treaties in relation to technology transfer, capacity building, and information exchange. Following this overview, the report will analyze the implications of the findings for the ITPGRA.

Technology transfer

9. While the basic definition of technology transfer referenced above is clear, to properly understand the concept, it is necessary to further unpack it. Rather than an ultimate goal, technology transfer should be understood as entailing a series of steps. At a first level, the transfer of technology is the simple transmission of the knowledge from one party to another, which encompasses also the absorption of that knowledge by the recipient. Beyond this transactional consideration, instance, is the broader process of technology diffusion. Technology diffusion relates to the application by individuals or firms within a

[3] IPCC, Methodological and Technical Issues in Technology Transfer, 2001, available at: http://www.ipcc.ch/ipccreports/sres/tectran/index.php?idp=0
[4] UNDP, *Supporting Capacity Development: The UNDP Approach*, p.4, available at: http://www.undp.org/content/dam/aplaws/publication/en/publications/capacity-development/support-capacity-development-the-undp-approach/CDG_Brochure_2009.pdf
[5] See for more: *Evaluation of UNDP Contribution to Strengthening National Capacities*, UNDP, Evaluation Office, December, 2010, p.9, available at: http://web.undp.org/evaluation/thematic/nc.shtml
[6] *The Challenge of Capacity Development, Working Towards Good Practice*, DAC Guidelines Reference Series, OECD/DAC, 2006, available at: http://www.oecd.org/dac/governanceanddevelopment/36326495.pdf

country of technology that has been transferred.[7] A further stage involves technology commercialization, where technology moves from the research and development stage to become a product or service that is the subject of market exchange.

10. A further point of clarification is that although the concept of technology transfer conveys a unitary sense, it encompasses at least three distinctive activities. The first involves physical assets such as machinery or equipment.[8] The second involves information--both technical and commercial--pertaining to know-how, the choice of technology, engineering design and facility construction, organizational and operating methods, quality control, and market characteristics.[9] A final category includes human skills, in such areas as science, engineering, or other professional fields. This latter category embodies capacity of actors to use technology, while the other two categories enable the acquisition or exercise of such capacity. Framed in another way, a distinction can be drawn between "hard technology transfer" and "soft technology transfer". The former encompasses the first two categories of physical assets and engineering, while the latter concerns the third category, that is, such matters as information exchange, networking, institutional strengthening, capacity building and training. In connection with the Montreal Protocol of the Vienna Convention (Montreal Protocol), for instance, UNDP, the World Bank, and UNIDO provided the hard technology transfer while soft technology transfer was the responsibility of UNEP.[10] The distinction between these different categories has implications for how technology transfer is approached and how priorities are set.

11. Understanding the different types of technologies that can be transferred also helps clarify the nature of the activity and challenges it presents. While certain types of technology can be considered "plug-and-play"—in other words requiring only minor tailoring to local circumstances or conditions—much of it involves more complex processes of adaptation. Taking the case of the effort to protect the ozone layer through the Montreal Protocol, the shift from ozone depleting chemicals to alternatives did not merely involve discrete actions to substitute machinery but instead involved wholesale reconfiguration of production processes and end products. Technology transfer involving manufacturing and environmental technologies generally requires significant amount of learning by the technology users.[11]

12. A variety of actors can carry out technology transfer activities. The vast majority of technology transfer occurs within the private sector between commercial firms.[12] Governments can play a role in facilitating technology transfer by designing domestic regulatory systems conducive to the practice and funding research, dissemination of information and know-how, and commercialization. Other efforts may involve non-market actions involving such practices as reverse engineering, library or internet research, or imitation. Community based organizations and clusters of firms located in particular geographic areas can also drive technology transfer.

13. In the context of multilateral treaties, an important consideration the foregoing suggests is that the peculiarities of different treaties' requirements significantly affects the nature of

[7] Andersen, *Technology Transfer*, p.7.
[8] *Id.*, p.6.
[9] *Id.*
[10] IPCC, "Methodological and Technical Issues in Technology Transfer".
[11] Andersen, *Technology Transfer*, p.6.
[12] IPCC, "Methodological and Technical Issues in Technology Transfer.

their technology transfer activities. In other words, the substance of what a treaty regulates matters. Moreover, within a given treaty regime, technologies are transferred to support a wide range of different practices, which themselves may be heterogeneous between industries and countries involved. Nevertheless, the following discussion will identify some lessons that may support analysis of the specific challenges involved in technology transfer under the ITPGRA.

14. For the purposes of this paper, attention will be given to three treaties, which have involved substantial technology transfer activities. It examines experience with the Montreal Protocol, which is widely viewed as one of the most successful multilateral environmental agreements, in large part due to successful technology transfer efforts. Next, it considers experience to date with the Framework Convention on Climate Change (FCCC) and efforts to modify its technology transfer and related capacity building efforts in recent years. Finally, outside of the environmental field, the paper examines the role of technology sharing within the Anti-personnel Mines Convention (APM Convention), which is enabling significant mine action activities in furtherance of the treaty in many countries[13]. This discussion will provide a basis for further analysis in the subsequent section of the paper.

Montreal Protocol

15. Technology has played an important role in enabling the Montreal Protocol to bring about significant reductions in the use of ozone depleting substances (ODS). Indeed, it is widely seen as the most significant successful example of technology transfer among multilateral treaties. The activities involved were quite broad, covering a variety of sectors (240 in total), industries, products, and processes. Many of these activities occurred in developing countries. While the details of these processes cannot be examined in depth, the following will provide an overview of some of the considerations.

16. The dominant technological imperative for the Montreal Protocol was the identification of alternative and substitute chemicals in place of ODSs. Once such alternatives were developed, the technological challenge became commercializing the products to enable their distribution at scale, designing products and manufacturing equipment to use the new chemicals, and learning to operate such products and equipment. Numerous programs of financing and multilateral, and bilateral technical assistance were adopted to facilitate the adoption of these technologies.

17. Despite the importance of official assistance through governments, IGOs, and financing facilities such as the Global Environmental Facility (GEF), restrictions on ODSs through the Montreal Protocol were the result of a wide range of supporting activities and initiatives. A significant factor was the need to overcome legal, regulatory, and industry barriers to using the new technologies. Governments, insurers, and technical standards organizations had prescribed the use of specific types of CFCs in different contexts.[14] Hence, fire safety standards for aircraft, weapons systems, ships, racing cars, and other

[13] Mine action is defined as "activities which aim to reduce the social, economic and environmental impact of mines and UXO [unexploded ordinances]". UN, International Mine Action Standard, 4.10, Second Edition, 1 January 2003, Incorporating amendment number(s) 1 & 2, Definition 3.147.
[14] Andersen, *Technology Transfer*, p.55.

flammable or explosive risks specified the use of halon fire protection technologies.[15] Military and telecommunication organizations mandated the use of CFC-113 as a cleaning device. Methyl bromide was mandated for use in preventing pests and certain products.[16] One way of addressing these issues was through government-industry partnerships that led to picking winners, that is, agreeing on particular technologies as alternatives to ODSs that were best.

18. Likewise, governments' imposition of regulatory measures to restrict or impede the use of ODSs also played a significant role in encouraging the development and use of new technology. Examples included bans on the production or import of ODS products, which effectively shut down export markets for firms failing to adopt new ODS alternative technologies. Governments also widely used tax incentives to encourage the adoption of alternatives. As a response to these and other government regulatory measures, voluntary actions by industry—both to preempt regulatory action and act upon corporate social responsibility values—to reduce ODS emissions or phase out their use, further addressed the concerns. Both industry and governments applied product labeling schemes to identify products failing to apply ODS alternatives, as a way of encouraging firms to adopt the new technologies. Together these diverse actions contributed to the development and uptake of the alternatives to ODSs and reduced overall ODS emissions.

19. Another important factor that facilitated the application of ODSs was the relative lack of intellectual property impediments. A primary reason was that there were multiple suppliers of the best available technologies.[17] A further reason was that the products were generally cooperatively developed and available in the public domain for unrestricted global use.[18] Moreover, for reasons described in the prior paragraph, a variety of firms and industry associations either voluntarily agreed not to enforce patents or distributed their technology in the public domain.[19]

Framework Convention on Climate Change

20. In contrast to experience with the Montreal Protocol, much of the activity of the FCCC in relation to technology transfer reflects the parties' efforts to address notable weaknesses identified in this aspect of the Convention's operations.

21. Technology transfer was a raison d'être of the FCCC. The original concept was that developed countries would shift away from carbon use, while transferring technology to developing countries to enable them to improve carbon efficiency.[20] Preventing carbon leakage, or the shifting of polluting, carbon inefficient industries from developed countries to developing countries was seen as a risk, which technology transfer could help avoid. It was further understood that if developing countries could successfully put new technologies in place during the first commitment period, during the second commitment

[15] *Id.*
[16] *Id.*
[17] *Id.*
[18] *Id.*
[19] *Id.*
[20] *See* Intellectual Property Quarterly Update, 4th Quarter 2008, South Center and CIEL, p.1 [hereinafter "IP Update"].

period they too could undertake emission reduction commitments.[21]

22. Accordingly, the FCCC provides that developed countries and Annex II parties will take "practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to other Parties, particular developing country parties, to enable them to implement the provisions of the Convention".[22] Indeed, the FCCC recognizes that "the extent to which developing country parties will effectively implement their commitments under the Convention" depends upon the developed countries meeting their obligations of financial assistance and technology transfer.[23]

23. Despite this guidance, experience has shown that the transfer of technology has proceeded slowly and failed to live up to expectations.[24] Among the findings of the SSBTA was that although spending on research and development for mitigation of emissions had increased in recent years, it was still below levels of the 1970s, and that energy-related research and development was skewed towards that which would have a limited role in actual mitigation.

24. At least two reasons are behind the situation. On the one hand, the developed countries have not shown great political will to effectuate technology transfer, while on the other hand, developing countries—at least prior to the Poznan Committee of Parties in 2008—have not expressed clear and concrete technology transfer needs for either climate change mitigation or adaptation.[25] The lack of progress on this element of the FCCC has led some observers to ask "how could one of the central pillars of addressing climate change also have been one of the most neglected and least implemented?"[26]

25. A key impediment to technology transfer in the early years of the FCCC was due to the lack of funding for technology needs assessments. Another impediment was the view of developed countries that the lack of enabling environments in developing countries.[27] Applying a market oriented perspective, they argued that poor legal and regulatory environments inhibited the creation of private sector demand for new technologies and that countries needed to put in place proper protection and enforcement for intellectual property.

26. Hence, an important aspect of the FCCC parties' efforts to improve technology transfer under the treaty was the decision to create a dedicated committee to the subject. At COP 1/CP16 the parties established an Expert Group on Technology Transfer under the auspices of the Subsidiary Body for Scientific and Technological Advice. In Decision 5/CP.7 of the FCCC, the parties set forth the desired focus of technology transfer activities, namely technology needs assessments (TNAs), technology information, capacity development for technology transfer, and support for the enabling environment. In contrast to the Montreal Protocol, in accordance with this decision, investment capital for technology transfer is not to be provided.

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[21] *Id.*, at p2.
[22] Article 4.5, FCCC.
[23] Article 4.7, FCCC.
[24] Joyeeta Gupta and Nicolien van Der Grip, *Mainstreaming Climate Change in Development Cooperation: Theory, Practice, and Implications for the European Union* (CUP, 2010).
[25] IP update, p2.
[26] IP update, p2.
[27] IP update, p6.

27. As a result of a lack of funding from developed countries for technology transfer, at FCCC COP 14, the members launched a new policy initiative on development and transfer of technology. Pursuant to Decision 2/CP.14, the parties set forth standards for the Development and Transfer of Technologies. In response, the GEF created the Poznan Strategic Program on Technology Transfer. The program includes three funding windows related to technology needs assessments (TNAs), piloting technology projects related to the assessments, and disseminating GEF experience and successfully demonstrating environmentally sound technologies. The program was funded with a $15 million contribution from the Special Climate Change Fund (SCCF) and $35 million from the GEF Trust Fund. The focus of the technology transfer window is on capacity development for technology transfer, the enabling environments, implementation of the results from TNAs, and technology information. A 2012 evaluation of the four projects funded under the dedicated SCCF window for technology transfer (SCCF-B) found that although relevant to the guidance of the FCCC COP on capacity development for technology transfer, funding for the program was limited at $15 million and thus did not generate significant scale to make conclusive judgments.[28] It was also seen as too early to form conclusive judgments.

28. Recent reports of the Expert Group on Technology Transfer have distinguished between three different types of technology transfer in the context of collaborative research and development for technologies relevant to climate change adaptation and mitigation. First, is the adaptation of existing technologies and products to local conditions, what the Expert Group considered a short term measure. The second approach involves the development of technology specific to developing countries, which it considered a medium-term effort. A third approach consists of pure research and development activities, which represents a long-term proposition. This analysis illustrates that the choices involved in technology transfer are not binary. In other words, different approaches can generate different payoffs and priorities can be calibrated to resources available.

29. In evaluating the different options for technology transfer, the SSBTA recommended prioritizing adaptation and modification of existing or mature technology to meet local conditions and needs.[29] The Committee's findings were based on the limited technological base of developing countries to conduct these activities on their own. A second level of effort they recommended was technology research and development to address specific local needs in developing countries. Both were seen as more short term measures. At the same time, it also called for developing medium and longer term measures. Within this context, it referred to the development of advanced breeding and crop production technologies as long term measures. While it noted that spending on agricultural research and development had increased, most of it was concentrated in non-LDCs.

30. The model emerging within the FCCC favors collaborative research and development. A significant reason for this approach stems from the often limited technological capabilities within developing countries. Collaborative research and development between developed and developing countries can help developing countries gain complementary skills and supplement their capacity, while providing developed countries with better understanding

[28] Evaluation cite.
[29] SSBTA, p.10.

of local needs and product opportunities to meet those needs.[30]

31. A key finding of the report was the need to emphasize adaptive and incremental technology transfer. Such activities, the Committee found, are "likely to be of more relevance to developing countries than an emphasis on early stage research and development or radical breakthroughs." Moreover, it found that technological innovation typically takes place on an incremental basis. The report emphasized that substantial evidence suggests that too much emphasis has been given to early stage research and development rather than capacity of developing countries to undertake wide-scale technological change.[31]

Anti-personnel Mine Convention

32. In a completely different context, the APM Convention illustrates how technology has been disseminated to facilitate mine action activities as part of the implementation of that convention. Technology is used to survey, detect, and map mined areas, manage information on mine contamination, and enable the gathering and disposal of mines among other things. Although the work is not typically referred to as technology transfer, *per se,* practically speaking it involves many of the same considerations.

33. The Geneva International Centre for Humanitarian Demining (GICHD), which hosts the Implementation Support Unit of the APM Convention and international organizations such as the UN Mine Action Service (UNMAS) play leading roles in facilitating the transfer of technology. Relevant technologies are developed by a range of actors including humanitarian organizations, universities, NGOs, and private firms. To facilitate the dissemination of this technology and standards, the GICHD and UNMAS conduct extensive capacity development, technical assistance, and information exchange among the various stakeholders involved.

34. A good illustration of their approach can be seen in relation to the information technology platform developed for mine action (INSMA). The GICHD developed the platform for use by national actors in mapping and cataloguing mine action data through mobile devices and computer terminals. To facilitate the use of INSMA, the GICHD conducts extensive training around the world.

35. Similar work is performed in relation to survey techniques and technologies. Here too, the GICHD plays a central role in researching and identifying best practices in survey. It then communicates that information to national mine action authorities through training, outreach, and technical assistance. It also develops training materials and operational manuals that it distributes to relevant stakeholders.

36. These types of efforts have the effect of creating communities of practice focused on the various technical aspects of implementing the treaty. While there may be overlaps between the actors in the different communities, they are broken down into specific areas of interest. To illustrate this approach, the GICHD maintains a web page that provides background information, technical guidance, and lists of relevant organizations and individuals for specific technological aspects of mine action (e.g. manual demining or

[30] SSBTA, p. 12.
[31] SSBTA, p.17.

radar detection devices). These communities of practice include private firms, national mine authorities, NGOs, and international organizations. GICHD and UNMAS cultivate these communities to share technical knowledge and know-how on mine action techniques, products and equipment, contribute to publications and technical manuals, and participate in workshops, conferences, and training.

37. The experience with the APM Convention illustrates a combined approach to technology transfer, capacity building, and information exchange. Among the lessons of technology transfer under the treaty is that treaty secretariats can play an important role in facilitating technology transfer involving a dispersed group of diverse actors from different sectors. In addition, rather than approaching mine action technology as a single category, it is evident that there are numerous specific purposes for which technology can be used and within those categories, specific technologies applied. Overall, the life-and-death consequences of effectively carrying out mine action suggests that the efforts are intended to meet specific standards of rigor, which alone may provide more general insights.

Capacity building

38. Capacity building initiatives are a central feature of practice of multilateral treaty body and international organization efforts to facilitate state treaty implementation. This section begins by considering reviews on capacity building undertaken by international organizations in relation to development programming and follows with analysis of capacity building derived from specific treaty regimes. It should be noted that research specifically on the results of capacity building in relation to multilateral treaties is limited. More research exists on capacity building generally for development purposes. While the research from contexts outside of treaties is useful, there are some common characteristics of treaties as legal obligations, which suggest distinctive challenges of capacity building for them. Based on these diverse sources, a main theme that has emerged in relation to capacity building formultilateral treaty obligations is that it must be understood in a broader sense than merely the technical requirements any individual treaty imposes.

39. The OECD/DAC Guidelines on Capacity Building illustrate the significant challenges involved in capacity building efforts and provides a basis for possible improvements. The study drew on experience and evaluation reports and reflects inputs from the DAC members, the World Bank, and the UNDP.

40. A central finding of the report is that that capacity development involves much more than enhancing knowledge and skills of individuals but rather depends on the quality of organizations in which they work and the enabling environment that influences the operations of particular organizations. The report frames capacity building as encompassing three dimensions: individuals, organizations, and enabling environments. On the basis of these conclusions, it suggests that capacity development requires actors to think through systematically what might work in particular circumstances by giving due attention to all three dimensions. It advocates a flexible approach to thinking about these three dimensions, which together constitute a systematic approach to capacity building.

41. Initiatives for better capacity development have also been adopted in the UN system.

Capacity development is considered as a central goal of the organization's development cooperation.[32] Multiple General Assembly resolutions have been adopted on the matter[33] and the UN agencies, such as the UNDP, have extensive mandate and experience of capacity building. The UNDP's approach to capacity development has evolved through a series of policy guidance documents issued 1994, 1998 and 2008.[34] As with the OECD documents, these documents have emphasized the need to approach capacity at multiple levels and the importance of taking a "systems approach", rather than *ad hoc* project based approaches. Overall, the focus of UNDP capacity development efforts is on furthering national ownership by enabling actors to be make informed choices relevant to setting national priorities, strategies, and plans.[35]

42. These findings have emerged alongside the development of the aid effectiveness agenda and move to national development strategies as the chief vehicle for undertaking development programming, including for treaty implementation. Within the treaty context, capacity development has increasingly focused on mainstreaming capacity development within broader national development efforts. Examples of this can be seen in the prioritization of national adaptation and mitigation strategies for implementation of the FCCC and the current approach to national strategies for PGRFA to facilitate achievement of the Second Global Plan of Action and implementation of the ITPGRA.

43. These developments have changed expectations and approaches to capacity development away from implementing discrete technical aspects of treaties towards the broader institutional context relevant to national strategic planning and execution. Experience with the APM Convention illustrates this phenomenon. A meta-evaluation of a series of project evaluations for mine action suggests that the focus of capacity building tended to be on the technical aspects of the work—particularly clearing mines—while neglecting the broader institutional measures needed to sustain mine action efforts.[36] Rather than focus capacity building on narrow tasks, the evaluators called for broader efforts that could support "national ownership" over a country's mine action strategy.[37] Accordingly, the evaluation found that successful implementation of treaty obligations required capacity to plan and integrate mine action activities within broader economic development programming as well as monitor and evaluate the results of those programs.

44. Overall, the advent of new development practices whereby all development activities—treaty-specific and general socio-economic development efforts—should be owned by the countries' concerned, that is, reflect national priorities and plans. Taking this view seriously means that capacity development activities must be broadened to enable the exercise of the capabilities to direct and manage such activities in a comprehensive sense, rather than as a function of narrowly defined measures to implement treaties' legal provisions.

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[32] *Evaluation of UNDP Contribution to Strengthening National Capacities*, UNDP, p.1, *supra* note 3
[33] *Id.* p.9
[34] UNDP, 'Capacity Development: Lessons of Experience and Guiding Principles', December 1994; UNDP, 'Capacity Assessment and Development in a Systems and Strategic Management Context': Technical Advisory Paper No. 3., Management Development and Governance Division, Bureau for Development Policy, January 1998; UNDP, 'Practice Note—Capacity Development', New York: UNDP Capacity Development Group, October 2008.
[35] UNDP, Capacity Development, p.3.
[36] IOD PARC, Meta-evaluation of Mine Action and Development, 31 July 2012, p.28.
[37] *Id.*

45. The interplay of technology transfer and capacity building suggests that the "soft" aspects of technology transfer are as important as the infrastructure and hardware.[38] Indeed, among developing countries that were generally not large producers of ODS or products using ODS, these capacity building and informational resources for implementing the Montreal Protocol were among the most important elements of the technology transfer agenda.

46. Overall experience with capacity building in different concepts and the emergence of national development strategies as the key focus of development in countries, points to the need to concentrate multilateral treaty capacity development efforts on institutional capabilities rather than narrow technical skills. Evidence suggests that capacity development focused on narrow technological applications rather than institutional capabilities to advance treaty goals conceived as part of a broader development framework will be unsustainable and achieve limited impact.

Information exchange

47. As suggested in the discussion involving technology transfer and the APM Convention, information exchange experience shows that making information and other resources available to separate treaty regimes and IGOs is important in its own right and also as a means of furthering in capacity building and technology transfer efforts related to treaty implementation, particularly in the context of national development strategies. While Articles 13.2 and 17 of the ITPGRA emphasize information exchange in relation to technical aspects of plant genetic resources for agriculture, in other treaties information exchange can encompass a wide range of activities.

48. Here too, the Montreal Protocol affords significant insights into how treaty implementation can be enabled. Awareness raising and information exchange both played important roles in the process of technology transfer and capacity development. UNEP drove much of this activity. Awareness raising was important to stimulate interest in ozone depletion and the need for ODS alternatives. Among these efforts was a regular "OzonAction Newsletter", sent to different stakeholders, which included sector-specific supplements.[39] Similarly, an information kit with videos, posters, radio clips, and a national awareness manual was provided to enable national focal points to conduct domestic campaigns.[40]

49. Information exchange activities focused on awareness of ODS alternatives, cost implications, and market preferences.[41] Among the purposes of information exchange was to inform countries of the requirements of technology transition to non-ODSs, and prepare technology transfer projects on an informed basis.[42] Among the publications UNEP developed were technical brochures on legislation, patent information, standards, and codes of practice.[43] Other resources included papers on emerging technologies, directories of different equipment, sourcebooks for technology suppliers, and

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[38] Andersen, *Technology Transfer*, p. 268.
[39] Andersen, *Technology Transfer*, p.275.
[40] *Id*.
[41] *Id*. at p.276.
[42] *Id*.
[43] *Id*.

compendiums of experts and consultants.[44] Through demonstration projects, efforts were made to show that technolgies were not only sound but viable economically.[45]

50. Similar levels of information exchange is evident in relation to the APM Convention. Among the activities of the GICHD and UNMAS has been the gathering and dissemination of information from multiple actors, which then form the basis of good practice guides and other resource materials for treaty parties. Indeed, a key element of the communities of practice described in relation to technology transfer is precisely the facilitated exchange of information between the various stakeholders.

Analysis

51. While the three priority areas of technology transfer, capacity building, and information exchange are each discrete priorities, a key lesson of the research reviewed for this report is that the interaction of the activities and positive synergies between them create opportunities for the ITPGRA. Capacity building may involve training programs but it may also occur through information exchange. Likewise, technology transfer can occur through soft mechanisms such as collaborative research or plant breeding, but it can also occur through sharing information, such as manuals or scientific publications, or creating and populating globally accessible PGRFA-related data bases. Moreover, the introduction of new technologies changes the capacity building needs of individuals and organizations.

52. These observations have a number of implications for the ITPGRA. At a basic level, the interconnections and mutually reinforcing nature of technology transfer, capacity development, and information exchange suggests that there are good reasons for approaching the three subjects in a unified fashion. At the same time, considerations of sustainability and the relative ineffectiveness of narrow project-based capacity building efforts underscore the importance of institutional capacity as a priority. In this regard, the approach to national strategies for PGRFA, provides the basis upon which technology transfer, capacity development, and information exchange can occur.

53. As the discussion above indicates, the alignment of national development strategies with national stategies related to treaty implementation represents an important change in the manner of carrying out such activities, bringing about potential improvements in the effectiveness of the activities. On this understanding, countries' technology transfer needs must be understood in connection with their national strategies for PGRFA. Likewise, capacity development initiatives should be geared to enabling the the implementation of national strategies for PGRFA, instead of focusing on building capacity for narrow short-term projects. Information exchange can also help guide the formation and implementation of national strategies for PGRFA. Conducting these activities in connection with national strategies for PGRFA that are linked to national development strategies may create opportunities for synergies and complementarities with activities being carried out in other sectors.

54. Support for the notion of that broad capabilities to devise and manage national strategies

[44] *Id.*
[45] *Id.*

for PGRFA should be prioritized is compatible with the nature of the challenge the ITPGRA faces. In contrast to other treaties such as the Montreal Protocol, the Plant Treaty requires sustained technology transfer efforts. The Montreal Protocol was intended to accomplish a discrete aim: the phase out and elimination of CFCs. Hence, there was a clear end goal. A similar understanding can be seen in the discussions among parties to the APM Convention regarding "completion" of the treaty's aims--in other words, global elimination of all land mine stockpiles and remediation of all land mines deployed. In contrast, the goals of plant genetic resources conservation and sustainable use, and equitable sharing of benefits derived from those uses represent long term and ongoing tasks. As a result, technology transfer, capacity building, and information exchange will likely also be ongoing processs, which can only be achieved through long term strategies and programs.

55. Achieving this kind of ongoing activity, as the examples of the Montreal Protocol and APM Convention show in particular, can be facilitated greatly through the development of vital communities of practice involving technical aspects of the treaties. Such communities may help facilitate the type of collaborative technology transfer that the SSBTA of the FCCC has been considering. These communities may be cultivated, convened, and supported by treaty secretariats, however, they also manifest significant levels of self-direction.

56. A further reason to emphasize national strategies and programs as the basis for technology transfer is the ability to scale efforts. While research on technology transfer in multilateral treaties and international institutions clearly reflects that few technologies are "plug and play" and that effective technology transfer must be linked to clear needs and local conditions, the nature of the projects undertaken under the BSF thus far are even more narrowly drawn. On the positive side, these projects are consistent with observations that effective technology transfer must be relevant to local conditions. Yet, it is precisely this specificity that makes it difficult to achieve scale and contribute to long-term capacity to carry out the ITPGRFA's aims. The challenge will be to focus on specific institutional capacity needs relevant to national strategies for PGRFA that lead to sustained technology transfer activities.

57. Turning to the BSF, there might be economic means of encouraging countries to take approaches conducive to building national capacity favorable to technology transfer. In the context of the Montreal Protocol, to maximize the impact of the investments under the Multilateral Fund for the Montreal Protocol, an upper limit was established for the cost per kilogram of ODSs phased out, which varied by sector and sub sector.[46] In other words, funding was capped at specified levels, which meant that costs exceeding those amounts would have to be met by the relevant private sector firms. An analogous situation with the Plant Treaty might be to provide support to enable the technology transfer, capacity building, or information exchange needs enabling the implementation of national strategies for PGRFA. Such approach is attractive because it allows countries to design national strategies appropriate to their needs and priorities, and may help build capacity that will enable long term innovation in furtherance of the ITPGRA's aims. This approach is consistent with the reference in Annex 1 of the Funding Strategy to the effect that "building strong national programmes is essential for capacity building in developing

[46] Andersen, *Technology Transfer*, p117.

countries and furthering the implementation of the Treaty."[47]

58. In terms of the role of the private sector, while experience with the Montreal Protocol and the FCCC suggests that it may have a major role, the regulatory focus and approach of the ITPGRA differs. In both of those cases, the private sector is a primary target of the regulatory effort. Failure of the private sector to institute new production practices and market new products means the failure to achieve the basic purpose of the relevant instruments. In contrast, the private sector's role in the ITPGRA is potentially facilitative of aspects of the treaty's aims. Areas identified in the Funding Strategy (see Annex 2: "Priority areas") where private sector assistance could be of help for example, sharing improved lines for farmers to manage/improve/conserve on farm, tools and methods for characterization and evaluation of PGRFA in public or community collections, entering into participatory plant breeding, and evaluation programs with farmers, etc. Drawing on the experience with the Montreal Protocol, private sector support for these goals cannot be presumed and it may require additional action to encourage it.

[47] ITPGRA, Funding Strategy, Annex 1.

Conclusion

59. To summarize, the main conclusions of this report are that:

- Technology transfer, capacity building, and information exchange, while distinct concepts, spillover into each other and may give rise to positive synergies in their execution.

- Government action is a critical factor in the willingness of industry to deliver technology. Experience suggests that applying a combination of carrots and sticks can motivate industry to share technology. Good will and laissez faire policies are not likely to drive action by the private sector.

- The important role of the private sector in other treaties does not necessarily constitute precedent for the ITPGRA as the nature of the regulatory approach different treaties take may differ. At the same time, more analysis of the entire production chain relevant to PGRFA may help illustrate ways the private sector can support the treaty's aims.

- Capacity development must be understood as part of a broader process of institutional strengthening for the purpose of treaty implementation but in the context of broader supportive plans and policy processes.

- A key feature of treaties with active practices of technology transfer, capacity building, and information exchange is the emergence and cultivation by treaty bodies of interactive communities of practice involving various stakeholder groups. The ITPGRA may consider ways of opening space to encourage technology transfer, capacity building, and information exchange among the different stakeholder groups.

- Approaching capacity building through national development strategies may harmonize efforts related to treaty implementation with broader national needs, thereby achieving synergies between these activities.

- There may be distinct benefits for the ITPGRA of building national capacity for technological innovation, given the ongoing nature of the technology needs involved in the treaty's mandate.

- Given limited resources and time constraints, relatively greater emphasis should be placed on the capacity to adapt already existing technologies to local conditions than "blue sky" research oriented to achieving global breakthroughs.

- Financing is critical for all three areas—all research consulted for this report supports this view.

- Technology transfer tends to implicate the private sector relatively more than capacity building and information exchange, which tend to occur through governmental channels. At the same time, while the private sector may do more of the work, it may also require compensation to do it.

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