



"Towards redesigning the plant commons : a critical assessment of the multilateral system of access and benefit-sharing of the international treaty on plant genetic resources for food and agriculture"

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ABSTRACT

The overall goals of the International Treaty on Plant Genetic Resources for Food and Agriculture are food security and sustainable agriculture. The Treaty entered into force in 2004 and regulates the conservation, sustainable use, and access and benefit-sharing of seeds for food and agriculture. Due to the "special nature" of plant genetic resource for food and agriculture, Contracting Parties to the Treaty consider seed management as a "common concern of all countries", which necessitates a multilateral regime approach. To this end, they created the multilateral system of access and benefit-sharing of the Treaty. This dissertation analyses the common management system of seeds within the Treaty in order to evaluate if and how the Treaty reaches its set objectives. The research methodology is transdisciplinary, and contains three steps. First, a historical and contextual analysis of the international seed management rules is carried out. Second, the Treaty is studied in detail following two methods: a legal and a stakeholder analysis of the Treaty and of its implementation instruments. This second step leads to the identification of specific conceptual constraints preventing the effective implementation of the Treaty to reach its objectives. Third, following this double reading of the Treaty, the research results are analyzed in light of the theory of the commons, with the aim to assess if and how the literature on the commons can contribute to helping the Treaty reach its overall goals: food security and sustainable agriculture, by improving what was qualified a...

CITE THIS VERSION

Frison, Christine. *Towards redesigning the plant commons : a critical assessment of the multilateral system of access and benefit-sharing of the international treaty on plant genetic resources for food and agriculture*. Prom. : Dedeurwaerdere, Tom ; De Schutter, Olivier ; Van Overwalle, Geertrui <http://hdl.handle.net/2078.1/177606>

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TOWARDS REDESIGNING THE PLANT COMMONS

A CRITICAL ASSESSMENT OF THE MULTILATERAL SYSTEM OF ACCESS AND BENEFIT-SHARING OF THE INTERNATIONAL TREATY ON PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE

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Dissertation presented in partial fulfillment of the requirements for the degree of Doctor in Law

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September 2016

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*To my sons,
Théodore and Charlie*

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List of Acronyms and Abbreviations

3PB	Third Party Beneficiary (Plant Treaty)
ABS	Access and Benefit-sharing
ACFS	<i>Ad Hoc</i> Advisory Committee on the Funding Strategy (Plant Treaty)
ACSU	<i>Ad Hoc</i> Technical Committee on Sustainable Use of Plant Genetic Resources for Food and Agriculture (Plant Treaty)
AEGIS	A European Genebank Integrated System
BSF	Benefit-sharing Fund (Plant Treaty)
CBD	Convention on Biological Diversity
CAPRI	System Wide Program on Property Rights and Collective Action (CGIAR)
CePaCT	Centre for Pacific Crops and Trees
CFS	Committee on World Food Security (UN, FAO)
CG Centres	or CGIAR
CGIAR	Consultative Group for International Agricultural Research
CGRFA	Commission on Genetic Resources for Food and Agriculture (FAO)
COP	Conference of the parties (CBD)
CPR	Common Pool Resource (<i>theory of the commons</i>)
CPGR	Commission on Plant Genetic Resources (then CGRFA, FAO)
DNA	Desoxyribonucleic Acid
DUS	Distinct Uniform and Stable criteria (UPOV)
EMBRAPA	Brazilian Agricultural Research Corporation, Ministry of Agriculture, Livestock, and Food Supply
EPC	European Patent Convention
EPO	European Patent Office
ESA	European Seed Association
ETC Group	Action Group on Erosion, Technology and Concentration (formerly RAFI)
EU	European Union
FRs	Farmers' Right (Plant Treaty)
FAO	Food and Agriculture Organization (UN)
G-77	Group 77 - Loose coalition of developing nations in UN fora
GATT	General Agreement on Tariffs and Trade (WTO)
GCDT	Global Crop Diversity Trust
GEF	Division of Global Environment Facility Coordination – UNEP
GFAR	Global Forum on Agricultural Research
GMO	Genetically Modified Organism
GPA	Global Plan of Action (voluntary instrument in PGRFA, FAO)
GRULAC	Latin American and Caribbean Group (FAO)
GURT	Genetic Use Restriction Technology
IAARD	Indonesian Agency for Agricultural Research and Development
IAASTD	International Assessment of Agricultural Science and Technology for Development (under sponsorship of the UN and the World Bank)
IARC	International Agricultural Research Centres (supported by CGIAR)
IBPGR	International Board for Plant genetic Resources (then IPGRI, then Bioversity International)
IBP	International Biological Programme
IDLO	International Development Law Organization

List of Acronyms and abbreviation

IFAD	International Fund for Agricultural Development (UN agency)
IGC	Inter-governmental Committee on Intellectual Property, Genetic Resources, Traditional Knowledge and Folklore (WIPO)
INGO	International Non Governmental Organizations
INRA	Institut National de Recherche Agronomique (France)
IP	Intellectual Property
IPGRI	International Plant Genetic Research Institute (the Bioversity International, CGIAR)
IPC	International Planning Committee for Food Sovereignty (alliance of small scale producers)
IPES-Food	International Panel of Experts on Sustainable Food
IPR	Intellectual Property Right
IR	International Relations
ISF	International Seed Federation (formerly ASSINSEL)
ITPGRFA or the Treaty	International Treaty on Plant Genetic Resources for Food and Agriculture (or the Plant Treaty)
IU	International Undertaking on Plant Genetic Resources (FAO)
IUCN	International Union for Conservation of Nature
MDGs	Millennium Development Goals
MLS	Multilateral System of access and benefit-sharing (Plant Treaty)
MTA	Material Transfer Agreement
Nagoya Protocol	Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the CBD
NSSL	National Seed Storage Laboratory (Genebanks)
OECD	Organisation for Economic Co-operation and Development
PBR	Plant Breeders' Right
PGR	Plant Genetic Resource
PGRFA	Plant Genetic Resources for Food and Agriculture
PUD	Product Under Development (Plant Treaty)
PVP (A)	Plant Variety Protection (Act)
R&D	Research & Development
SEARICE	Southeast Asia Regional Initiatives for Community Empowerment
SPC	Pacific Community (scientific and technical organisation in the Pacific region 26 countries and territories)
SDGs	Sustainable Development Goals
SMTA	Standard Material Transfer Agreement (Plant Treaty)
SPC-Community	South Pacific Community
TK	Traditional Knowledge
TRIPS	Trade related Aspects of Intellectual Property Rights (Agreement, WTO)
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UPOV	International Union for the Protection of New Varieties of Plant
USDA	United States Department of Agriculture
WG-MLS	Ad Hoc Open ended Working Group on the Multilateral System
WIPO	World Intellectual Property Organization
WTO	World Trade Organization

Acknowledgements

This work has been supported financially by many different funding sources, the main ones being the 6th Framework Programme of the EU, the UCLouvain FSR funding, the Belgian Federal Public Service – Health, Food Chain Safety and Environment, DG Environment, and unexpectedly the Mutualité Chrétienne, without which I would simply not have been able to finalize this work.

The list of persons and institutions I would like to thank is quite long. Indeed, I have conducted my doctoral research in a collaborative manner in two different research centers and in partnership with other institutions. I came across many people, who participated in my research and rendered the achievement of this dissertation a less lonely process.

First, this thesis was jointly conducted in two Belgian universities: the Center for Philosophy of Law (CPDR) at the UCLouvain and the Center for IT & IP Law (CiTiP) at the KU Leuven. I wish to thank both of these institutions for providing me with the framework to conduct this research. I am grateful to Prof. Luc Wintgens, as a member of my supervision committee, in helping me clarify several technical and methodological issues. I thank Prof. Philippe Cullet, Prof. José Esquinas-Alcazar and Prof. Marie-Christine Janssens for accepting to join my jury.

At the CPDR, I wish to thank former and current directors Prof. Jacques Lenoble and Prof. Marc Maesschalck for their continuous encouragement and trust in my capacity to overcome the many challenges that paved my PhD road. I thank my supervisors: Prof. Tom Dedeurwaerdere for believing in my research project since the beginning, for his insightful and always positive comments and for helping me find the financial support to carry out my work; as well as Prof. Olivier De Schutter for his guidance in helping me clarify and further develop my reasoning, our discussions have been instrumental for my research. I am grateful to my friends and research colleagues - past and current members of the CPDR - for their engaging presence and innumerable discussions, which fed my research progress. A particular word of appreciation goes for Matthias, Bernard, Elise, Juan-Pablo and Priscilla: their restless encouragement, stimulating discussions and positive suggestions every other day squeezed into my office around special teas and sweet nuts and cookies have transformed me into a real interdisciplinary researcher. Another special thank you goes to my young female fellows, Elisabeth, Sixtine, and Charlotte who have acted as cheerleaders, careful readers, ever present ears over the last two years. I heartily thank Charlotte and her parents for lending me their wonderful country house when I needed silence, time and concentration to write the following chapters. Finally, I warmly thank the administrative team. At UCLouvain, I also thank Prof. Charles-Hubert Born for his overall support.

Acknowledgements

At CiTiP, I thank Prof. Frank Gotzen, Prof. Willy Geysen, and Prof. Marie-Christine Janssens for their kind encouragement. I wholeheartedly thank my supervisor Prof. Geertrui Van Overwalle, who has demonstrated a great flexibility to adapt to my specific situation, with empathy, unlimited availability, and unconditional intellectual, moral and personal support. Her timely and careful reading of each and every line of my work may have been somewhat challenging, but she has been extremely supportive in helping me structure my work and implement my research methodology in a rigorous manner. I would not have finished this work without her generous supervision over the last couple of years: hartelijk bedankt Geert! I also thank past research members Birgit Verbeure and Esther van Zimmeren for their continuous support, their friendship and reassurance throughout my work, as well as Linda Mees. I wish to offer an additional thank you to Esther van Zimmeren, for reviewing most of my work, for her ability to understand my reasoning and to clarify the intentions behind my words, for encouraging me when I was despaired, for acting as a benevolent colleague and a supportive friend. Finally, I thank all past and current CiTiP members and project collaborators. At KU Leuven, I also thank Prof. Geert De Baere, Prof. Sophie Styns, and Prof. Jeroen Maesschalck for their support.

Furthermore, I am indebted to all the “Treaty people” for facilitating my work by collaborating on the stakeholder analysis book and for helping me entering their fascinating world. First and foremost, I heartily thank Pepe Esquinas for believing in my project and for sharing his relations and political experience in FAO negotiations. I also thank all the Treaty Secretariat people, especially Shakeel Bhatti, Álvaro Toledo, Daniele Manzella, Ruairidh Sackville Hamilton, Kent Nnadozie, Paola Franceschelli, and Fabrice Mongin, for their help and support in FAO premises. A special thank you to Francisco López for collaborating on the edition of the stakeholder analysis book; Michael Halewood and all the Bioversity International and CGIAR folks I know, in particular Gerald Moore, who participated in my PhD supervision committee during the first years; Cary Fowler, for his kind and encouraging words; Clive Stannard for intense discussions on the functioning of the Treaty and insightful remarks; and of course all the participating authors to the stakeholder analysis book. I also thank people from the FAO Commission on Genetic Resources for Food and Agriculture.

Additionally, I would like to acknowledge the Centre for International Sustainable Development Law (CISDL, Montréal, Canada) and its members for the fruitful research meetings, projects and publications, which contributed to launch my research career. In particular, I thank Prof. Markus Gehring, Prof. Sumudu Atapattu, Prof. Jorge Cabrera, Dr. Maya Prabhu, Prof. Konstantia Koutouki, Prof. Bradnee Chambers, Dr. Catherine-Zoi Varfis, Frederic Perron-Welch, Christine Toczeck, Kishan Khoday, Emily Wheeler, and a special word for Prof. Pia Rodriguez, who encouraged me to apply as legal research fellow at the CISDL. I owe a very special acknowledgement to CISDL Director Prof. Marie-Claire Cordonier-Segger, who was the first person believing in my skills as a researcher when she integrated me in the Biodiversity

Acknowledgements

Law team of the CISDL right after my master thesis. Her impressive expertise and ability in jointly conducting many challenging projects has inspired my tenacity and ambitions.

At the Secretariat of the Convention on Biological Diversity, I thank Charles Gbedemah, David Cooper, Worku Damena Yifru, Valérie Normand, Olivier Rukundo, and in particular my friend Kathryn Garforth for many interesting discussions on international biodiversity law and its relation to the FAO Treaty.

Last, but certainly not least, I am grateful to my friends and family who have supported me in various manners. First and foremost, I thank my parents, my primary supporters. My father, who was my very first reader and patiently reviewed every line written; my mother, who supported me in many different ways, and especially by taking care of my children, and who flew from Italy every time I needed her (and that was very often)! I thank my brother and sisters for their encouragements and advices, in particular Séverine, carrying out a PhD in London at the same time as I, and with whom I could share all the great and difficult steps of a doctoral research during long Skype calls. I thank my husband for taking care of our children when I was not available and for offering me the laptop on which these lines were written, as well as my family in law, for helping out with our children and for their interested questions on my work. I thank the long list of babysitters and friends who replaced me to take care of our children when I could not leave my desk. I thank my good friends for their everlasting encouragement and support: Caro, Emilie, Carine, Dominique, Delphine, Lucie, Thi-Thu, Fando, Oli, Karl, and Sebastian. I thank my late grandmother Moeke and my late grandmother of adoption Simone, two women farmers who transmitted me their strength and courage, two feet steadily sunk into the nourishing ground. I thank my dear sons, Théodore and Charlie, for their incommensurable love.

Chapter 1 Introduction – Harvesting the Benefits of the Commons to Grow a Food Secure World

“Le premier qui, ayant enclos un terrain, s'avisait de dire : Ceci est à moi, et trouva des gens assez simples pour le croire, fut le vrai fondateur de la société civile. Que de crimes, de guerres, de meurtres, que de misères et d'horreurs n'eût point épargnés au genre humain celui qui, arrachant les pieux ou comblant le fossé, eût crié à ses semblables: Gardez-vous d'écouter cet imposteur; vous êtes perdus, si vous oubliez que les fruits sont à tous, et que la terre n'est à personne.”

Jean-Jacques Rousseau (1755), “Discours sur l'origine et les fondements de l'inégalité parmi les hommes”¹

On 25 March 2015, the Enlarged Board of Appeal of the European Patent Office (EPO) ruled² that plants or seeds obtained through conventional breeding methods are patentable; thereby widening the extent of patent claims over plants and plant varieties.³ This loose interpretation of the European Patent Convention (EPC) Article 53 (b)⁴ widens breeders' rights to protect plants under a patent,⁵ whereas up to then in Europe, such intellectual protection was mainly possible under Plant Breeders' Rights (PBRs).⁶ This decision extends further the

¹ J.-J. ROUSSEAU, 1755, *“Discours Sur L'origine Et Les Fondements De L'inégalité Parmi Les Hommes”*, Amsterdam, Marc Michel Rey. Republié en 2012 sur Presses Électroniques de France, Second partie, at p. 68.

² *Enlarged Board of Appeal*, decisions taken on 25 March 2015, case number G 0002/12 (relating to the so called Tomatoes II case) and G 0002/13 (relating to the Broccoli II case), which state that plant products such as fruits, seeds and parts of plants are patentable in principle under the European Patent Convention even if they are obtained through essentially biological breeding methods involving crossing and selection. This decision goes counter to a *European Parliament Resolution*, (which is not binding) adopted on 10 May 2012 on the patenting of essential biological processes (2012/2623(RSP)).

³ In 1995 the Board of Appeal of the European Patent Office had rejected such patent claims: “a product claim which embraces within its subject-matter *plant varieties* (...) is not patentable”. *Plant Cells/Plant Genetic Systems*, T 356/93, paragraph 24.

⁴ Article 53(b) “*Exceptions to patentability*” of the *European Patent Convention* states that: “European patents shall not be granted in respect of: (b) plant or animal varieties or essentially biological processes for the production of plants or animals.”

⁵ This was already the case in the USA under the *Plant Patent Act* of 1930 (enacted on 17 June 1930, codified as title 35 United States Code) Section 161 which states: “Whoever invents or discovers and asexually reproduces any distinct and new variety of plant, including cultivated sports, mutants, hybrids, and newly found seedlings, other than a tuber propagated plant or a plant found in an uncultivated state, may obtain a patent therefor, subject to the conditions and requirements of title (Amended September 3, 1954, 68 Stat. 1190).”

⁶ *International Convention for the Protection of New Varieties of Plants (UPOV Convention)* of December 2, 1961, as revised at Geneva on November 10, 1972, on October 23, 1978, and on March 19, 1991. Text available at <http://www.upov.int/upovlex/en/conventions/1991/content.html> /; see also *Council Regulation 2100/94/CE on Community Plant Variety Rights*. For an extensive description of these matters see C. CHIAROLLA, 2006, “Commodifying Agriculture Biodiversity and Development-Related Issues”, *Journal of world intellectual property*, Vol. 9, (1) pp. 31-42. For a comparison of European and American approaches to patent protection of plants before the widening of protection scope, see G. VAN OVERWALLE, 1998, “Patent Protection for Plants: A Comparison of American and European Approaches”, *Idea*, Vol. 39. See also G. VAN OVERWALLE, 1996, “Octrooierbaarheid Van Plantenbiotechnologische Uitvindingen. Een Rechtsvergelijkend Onderzoek Naar Een Rechtvaardiging Van Een Uitbreiding Van Het Octrooirecht Tot Planten.-Patentability of Plant

appropriation and enclosure of plants and seeds which accelerated at the end of the twentieth century,⁷ and shrinks even more the rights of farmers to save, grow and sell their seeds.⁸ This first trend strengthens the increasing domination of food and agriculture markets by a few corporate multinational companies.⁹

As a reaction, farmers,¹⁰ researchers,¹¹ breeders¹² and citizens¹³ are acting collectively worldwide to promote the free conservation, use, and exchange patterns¹⁴ for so called “non-

Biotechnological Inventions. A Comparative Study Towards a Justification of Extending Patent Law to Plants " (KU Leuven, 1996).

⁷ Sabrina Safrin names this trend “hyperownership”; see S. SAFRIN, 2004, “Hyperownership in a Time of Biotechnological Promise: The International Conflict to Control the Building Blocks of Life”, *The American Journal of International Law*, Vol. 98, (4). The upsurge of intellectual property rights over plants progressed over time. For an exhaustive analysis of the rise and expansion of these rights see L. R. HELFER, “International Property Rights in Plant Varieties: International Legal Regimes and Policy Options for National Governments”, 2004 ; see also C. CHIAROLLA, 2006 *op.cit.* and O. DE SCHUTTER, “Seed Policies and the Right to Food: Enhancing Agrobiodiversity and Encouraging Innovation”, 2009 .

⁸ This right had already been reduced to nothingness with the revision of the *UPOV Convention* in its 1991 Act, where Articles 14(1), 14(5), 15(1)(iii), and 15(2) define the scope and exceptions of Breeders’ Rights. Previously, under the 1978 Act, the UPOV Convention allowed a farmer to replant seeds from the crop produced by protected seeds for his own subsequent use (save seeds); to exchange seeds with other farmers without paying additional royalties to the breeder; and to use a protected variety to create new varieties without prior authorization of the original breeder. The 1991 Act suppressed the right to freely exchange seeds and imposed limitations on their replanting. As for the right to use seeds for further breeding, the 1991 Act limits it to new varieties that are not “essentially derived” from protected varieties. The overall result of the amendment has narrowed the exemption and expanded the rights of first-generation breeders (see HELFER, *op. cit.* at p. 20-32).

⁹ A. MORLEY, J. MCENTEE, AND T. MARSDEN, “Food Futures - Framing the Crisis”, in T. MARSDEN AND A. MORLEY (eds), *Sustainable Food Systems - Building a New Paradigm*, Oxon, Routledge, 2014 at p. 47. See also O. DE SCHUTTER, “Agribusiness and the Right to Food”, 2009 at pp. 4-5; and M. A. ALTIERI AND C. I. NICHOLLS, “Agroecology Scaling up for Food Sovereignty and Resiliency”, 2012 at pp. 6-7; FORESIGHT, 2011, “The Future of Food and Farming: Challenges and Choices for Global sustainability”, The Government Office for Science (GO-Science), at pp. 99-100; and finally see J. CLAPP AND D. A. FUCHS, 2009, “*Corporate Power in Global Agrifood Governance*”, Cambridge, Mass., MIT Press; N. LOUWAARS *et al.*, “Breeding Business. The Future of Plant Breeding in the Light of Developments in Patent Rights and Plant Breeder’s Rights”, 2009 at p. 27-38 and p. 60; see also O. DE SCHUTTER, “Addressing Concentration in Food Supply Chains - the Role of Competition Law in Tackling the Abuse of Buyer Power,” (United Nations Report of the Special Rapporteur on the right to food, 2010).

¹⁰ *La Via Campesina* is the most active and widespread farmers’ association worldwide. It was born in 1993 and defends small-scale sustainable agriculture as a way to promote social justice and dignity. It strongly opposes corporate driven agriculture and transnational companies that are destroying people and nature. It comprises about 164 local and national organizations in 73 countries from Africa, Asia, Europe and the Americas. Altogether, it represents about 200 million farmers. It is an autonomous, pluralist and multicultural movement, independent from any political, economic or other type of affiliation. See <http://viacampesina.org/fr/>

¹¹ The *Open Source Seed Initiative*, promoted by Prof. Jack Kloppenburg at the University Wisconsin-Madison campus, is inspired “by the free and open source software movement that has provided alternatives to proprietary software, OSSSI was created to free the seed - to make sure that the genes in at least some seed can never be locked away from use by intellectual property rights. Through our Pledge, OSSSI asks breeders and stewards of crop varieties to pledge to make their seeds available without restrictions on use, and to ask recipients of those seeds to make the same commitment. OSSSI is working to create a pool of open source varieties, to connect farmers and gardeners to suppliers of open source seed, and to inform and educate citizens about seed issues.” Available at <http://osseeds.org/>

¹² To cite only the most popular: *Association Kokopelli* (see <https://kokopelli-semences.fr/>), or the *Garden Organic* UK based association and its *Heritage Seed Library* aims to conserve and make available to its members, through an annual catalogue, vegetable varieties, mainly of European varieties, that are not widely available (see <http://www.gardenorganic.org.uk/>).

¹³ “Graines de Troc” is one example out of many of a participatory platform for the exchange of seeds and related knowledge. It is a non-commercial association where members exchange their seeds and related knowledge for free, and which objective is to protect biodiversity against standardization of varieties by sharing old varieties. See <http://www.grainesdetroc.fr/>

¹⁴ An example in France: *Réseau Semences Paysannes* functions as a network of local and national associations of farmers, citizens, NGOs and other actors involved in organic agriculture production and conservation (see <http://www.semencespaysannes.org/>).

industrial varieties”.¹⁵ This second trend represents an alternative path to produce local, diverse, sustainable and healthy food.¹⁶

In between these two trends, emerges the global challenge of feeding a growing world population in the face of increasing social, economic and environmental vulnerabilities,¹⁷ and the more specific issue of access to seeds¹⁸ for food security and sustainable agriculture.¹⁹

Since the middle of the twentieth century, policies (through the green revolution)²⁰ have promoted the large scale production of uniform, high yielding monocultures of a few staple crops as the solution to feed a growing population.²¹ The focus was on increasing yields through the development of new breeding technologies, thereby quickly replacing local and diverse varieties with uniform crops worldwide,²² and shifting the qualification of seeds from

¹⁵ I call “non-industrial seeds” seeds that are not registered in official plant variety catalogs, thereby seeds that do not fulfil one or several of the criteria for certification of seed i.e. distinctness; uniformity; stability; and value for cultivation and use - for agricultural crops. This notion covers “non-conventional seeds, “old / ancient / forgotten varieties”, etc.; see C. HECQUET, “Comment Faire Circuler Les Semences? Enjeux Et Perspectives Pour Les Alternatives,” (2015), unpublished.

¹⁶ M. A. ALTIERI AND C. I. NICHOLLS, 2012. See also the very recent report produced by the International Panel of Experts on Sustainable Food Systems (IPES-Food) which recognizes that “[t]he key is to establish *political* priorities, namely, to support the emergence of alternative systems which are based around fundamentally different logics, and which, over time, generate different and more equitable power relations. Incremental change must not be allowed to divert political attention and political capital away from the more fundamental shift that is urgently needed, and can now be delivered, through a paradigm shift from industrial agriculture to diversified agroecological systems.” See their first report IPES-Food, “From Uniformity to Diversity: A Paradigm Shift from Industrial Agriculture to Diversified Agroecological Systems”, 2016 at p. 7. IPES-Food brings together expert voices representing different disciplines and different types of knowledge, to inform the policy debate on how to reform food systems across the world. and their website <http://www.ipes-food.org/>

¹⁷ F. BURCH, J. FANZO, AND E. FRISON, 2011, “The Role of Food and Nutrition System Approaches in Tackling Hidden Hunger”, *International Journal of Environmental Research and Public Health*, Vol. 8 ; Burch et al contend that “one of the World’s greatest challenges is to secure sufficient and healthy food for all, and to do so in an environmentally sustainable manner.” They promote an integrated system approach to reduce hidden hunger and explore the interrelationships of food, health, and environment, and their role in addressing chronic micronutrient deficiencies, affecting over two billion people worldwide.

¹⁸ In the present work, the words ‘seed’, ‘plant’, ‘PGRFA’, ‘material’ or ‘genetic resource’ are used interchangeably to talk about the ‘plant genetic resources for food and agriculture’ (PGRFA) as defined under Article 2 of the Plant Treaty. In simple terms, PGRFA are crops and forages used as nutriment for humans and animals.

¹⁹ On 25 September 2015, the United Nations Sustainable Development Summit adopted 17 Sustainable Development Goals, of which “Goal 2 Zero Hunger”, provides in target 2.5 that “[b]y 2020, [States should] maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed. Available at <https://sustainabledevelopment.un.org/sdgs>. See also, P. CULLET, 2004, “Intellectual Property Rights and Food Security in the South”, *The Journal of World Intellectual Property*, Vol. 7, (3); P. CULLET, 2004, “Food Security and Intellectual Property Rights in Developing Countries”, RIBios (Réseau interdisciplinaire biosécurité): Institut universitaire d’études du développement (IUED); P. CULLET, 2005, “Seeds Regulation, Food Security and Sustainable Development”, *Economic and Political Weekly*, Vol.

²⁰ R. E. EVENSON AND D. GOLLIN, 2003, “Assessing the Impact of the Green Revolution, 1960 to 2000”, *Science*, Vol. 300, (5620); L. TANGLEY, 1987, “Beyond the Green Revolution”, *BioScience*, Vol. 37, (3); see also S. B. BRUSH, 2001, “Genetically Modified Organisms in Peasant Farming: Social Impact and Equity”, *Indiana Journal of Global Legal Studies*, Vol. 9, (1).

²¹ R. E. EVENSON AND D. GOLLIN, 2003 *op.cit.*

²² FAO’s *The State of the World’s Plant Genetic Resources for Food and Agriculture* first report shows that one of the most important reasons for genetic erosion is the replacement of traditional varieties with modern, high yielding, and genetically uniform ones. See FAO, “The State of the World’s Plant Genetic Resources for Food and Agriculture”, 1998 at p. 33.

public goods to highly privatized goods.²³ Today, numerous studies show that this approach has had various serious consequences: first, a rapid diversity loss resulting from the widespread intensive monocultures;²⁴ second, despite the significant yield increases, the objectives of eradicating hunger and malnutrition were not achieved;²⁵ third, the domination of a few multinational corporations over the entire agriculture input sector;²⁶ fourth, the hyper-ownership and enclosure of seeds through legal and technological means,²⁷ leading to the increasing brittleness of traditional informal seed systems²⁸ and movements worldwide;²⁹ fifth, the continuing reduction in numbers of small-scale farms on which most of developing countries' population rely for their food production;³⁰ etc.

While agro-chemical companies have systematically used the argument of reducing hunger and malnutrition to promote policies³¹ that strengthen their dominant position worldwide³² and expand the commodification process,³³ it is undeniable that these strategies

²³ See L. R. HELFER, 2004; see also C. CHIAROLLA, 2006 *op.cit.*

²⁴ Ibid. See also J. ESQUINAS-ALCAZAR, 2005, "Protecting Crop Genetic Diversity for Food Security: Political, Ethical and Technical Challenges", *Nature Reviews Genetics*, Vol. 6, (12) at pp. 946-953.

²⁵ A. MORLEY, J. MCENTEE, AND T. MARSDEN, *op. cit.* at pp. 37-42 and 47-48 referring to several FAOSTAT data.

²⁶ See O. DE SCHUTTER, "Agribusiness and the Right to Food", 2009 At pp. 4-5; see also the failed tentative US\$46.5B takeover bid of Monsanto over Syngenta, available at http://www.nytimes.com/2015/08/27/business/dealbook/monsanto-abandons-47-billion-takeover-bid-for-syngenta.html?_r=0. With Monsanto being the world leader in seeds and genetically engineered traits and Syngenta in insecticides, fungicides and herbicides, the merger would have created an agricultural behemoth with the largest market share in the world in both seeds and agricultural chemicals.

²⁷ *Op. cit.* all references under note 9; see also A. MORLEY, J. MCENTEE, AND T. MARSDEN, *op. cit.* at p. 49.

²⁸ Louwaars defines 'informal seed systems' as "covering methods of local seed selection, production and diffusion." They are also called 'traditional', 'local' or 'farmers' seed systems' since "they operate mainly at farmer and community levels both in terms of production and exchange mechanisms." Louwaars prefers referring to 'farmers' seed systems' as "being the most neutral term and one that made clear that the ones operating this system are the farmers themselves." Informal seed systems are opposed to 'formal seed systems', i.e. commercial seed systems which developed in industrialised countries in the second half of the nineteenth century. "The development of a commercial breeding and seed sector in the USA was especially enhanced by the discovery of the phenomenon of heterosis and the subsequent introduction of hybrid varieties of maize. This trend separated crop improvement and seed production from other regular farm operations, creating different specialised actors, including breeders, seed producers and seed conditioners." N. LOUWAARS, 2008, "Seeds of Confusion. The Impact of Policies on Seed Systems" (Wageningen Universiteit, 2008) at p. 32.

²⁹ O. DE SCHUTTER, "Seed Policies and the Right to Food: Enhancing Agrobiodiversity and Encouraging Innovation", 2009 at p. 4 § 7. See also N. LOUWAARS, "Seeds of Confusion. The Impact of Policies on Seed Systems," At p. 29. Louwaars points to the problematic coexistence between farmers' seed systems (i.e. informal networks between farmers operating at local or community levels) and commercial seed systems (including the fact that the commercial seed systems aims at reducing further and further the informal networks).

³⁰ M. A. ALTIERI AND C. I. NICHOLLS, 2012 at pp. 6-7.

³¹ R. B. SHAPIRO, "Growth through Global Sustainability: An Interview with Monsanto's Ceo, Robert B. Shapiro," ed. J. MAGRETTA (Harvard Business Review, 1997); R. B. SHAPIRO, "Open Letter from Monsanto Ceo Robert B. Shapiro to Rockefeller Foundation President Gordon Conway and Others", Monsanto Company; see also E. SIMANIS, "The Monsanto Company: Quest for Sustainability," ed. S. HART (Kenan-Flagler Business School: Sustainable Enterprise Program of the World Resources Institute, 2001).

³² See for example Monsanto's website <http://www.monsanto.com/pages/default.aspx>, Syngenta's website <http://www.syngenta.com/global/corporate/en/Pages/home.aspx>, or Bayer CropScience's website, available at <http://www.cropscience.bayer.com/>.

³³ C. CHIAROLLA, 2006 *op.cit.* at pp. 25-26 & 42. Chiarolla "considers the extent to which the patent system needs to be modified in order to prevent agricultural exemptions, enjoyed by plant breeders and farmers under sui generis plant variety protection, from being overridden by patent claims that extend to plants and plant varieties. It is suggested that sui generis

have not reached the “official objective” of eliminating hunger and malnutrition.³⁴ Indeed, although the number of hungry people has diminished,³⁵ the first Millennium Development Goal (MDG) to eradicate poverty and hunger and the “Zero Hunger” 2015 Sustainable Development Goal (SDG) are far from being achieved.³⁶

The problem is therefore not so much about our capacity of producing enough food (indeed studies have shown that within our limited world resources, we are able to feed our population),³⁷ but rather about managing and facilitating the access to food and the seeds needed for its production in a fair and equitable manner.³⁸

PVP regimes should respond to broad societal objectives and promote sustainable agriculture.” For an earlier similar proposal, see P. CULLET, 1999, “Revision of the Trips Agreement Concerning the Protection of Plant Varieties”, *The Journal of World Intellectual Property*, Vol. 2, (4).

³⁴ SUSTAINABLE AGRICULTURE AND FOOD SYSTEMS THEMATIC GROUP, “Solutions for Sustainable Agriculture and Food Systems”, 2013 U.N.S.D.S. NETWORK at p. 1; see also O. DE SCHUTTER AND G. VANLOQUEREN, 2011, “The New Green Revolution: How Twenty-First-Century Science Can Feed the World”, *Solutions Journal*, Vol. 2, (4); and A. DORWARD *et al.*, 2004, “A Policy Agenda for Pro-Poor Agricultural Growth”, *World Development*, Vol. 32, (1).

³⁵ *Ibid.* See the *Millennium Development Goals* (MDG) and in particular Target 1.C to halve, between 1990 and 2015, the proportion of people who suffer from hunger. See <http://www.un.org/millenniumgoals/>. The 2015 MDG report states that “Current estimates suggest that about 795 million people are undernourished globally. This means that nearly one in nine individuals do not have enough to eat. The vast majority of them (780 million people) live in the developing regions. However, projections indicate a drop of almost half in the proportion of undernourished people in the developing regions, from 23.3 per cent in 1990–1992 to 12.9 per cent in 2014–2016. This is very close to the MDG hunger target. Rapid progress during the 1990s was followed by a slower decline in hunger in the first five years of the new millennium and then a rebound starting around 2008. The projections for the most recent period mark a new phase of slower progress.” UNITED NATIONS, “Millennium Development Goals Report 2015”, 2015 at p. 20.

³⁶ *Ibid.* MDG Goal 1 Eradicate extreme poverty and hunger. “Although the MDG targets of halving the proportion of people living in extreme poverty and hunger have been met or almost met, the world is still far from reaching the MDG goal of eradicating extreme poverty and hunger. In 2015, an estimated 825 million people still live in extreme poverty and 800 million still suffer from hunger.” Eradicating poverty and hunger remains at the core of the post-2015 development agenda. at p.23. FAO, “The State of Food Insecurity in the World 2014 - Strengthening the Enabling Environment for Food Security and Nutrition”, 2014 ; see also O. DE SCHUTTER, “Building Resilience: A Human Rights Framework for World Food and Nutrition Security”, 2008 at pp. 4-6; finally see A. P. KAMERI-MBOTE AND P. CULLET, 1999, “Agro-Biodiversity and International Law-a Conceptual Framework”, *Journal of Environmental Law*, Vol. 11, (2).

³⁷ M. A. ALTIERI AND C. I. NICHOLLS, 2012 at pp. 4-5, Altieri states that “seventy eight percent of all malnourished children under five who live in the Third World are in countries with food surpluses”. Although the UN Food and Agriculture Organization claims that to feed nine billion people in 2050, and as people become more affluent, global agricultural production will need to increase by 70 per cent, various critics including Altieri dispute this claim. See also the Background Document Prepared by the UN Special Rapporteur on the Right to Food Olivier De Schutter on his Mission to the World Trade Organization (WTO), Presented to the Human Rights Council in March 2009 where he shows that poverty is one of the major cause for people to be undernourished, and that the majority of the world’s undernourished people are small farmers in developing countries who are net buyers of food. These farmers’ income is often too low to enable them to purchase the food available on the market. See Background Study to UN Doc. A/HRC/10/005/Add.2.

³⁸ F. M. LAPPE, J. COLLINS, AND P. ROSSET, 1998, “*World Hunger; Twelve Myths*”, New York, A Grove Press Book; see also O. DE SCHUTTER, “Building Resilience: A Human Rights Framework for World Food and Nutrition Security”, 2008 at p. 6 § 6; see also A. MORLEY, J. McENTEE, AND T. MARSDEN, *op. cit.* at p. 56. See also Pautasso *et al.* who stresses that “The conservation and management of agrobiodiversity is a key issue in the struggle to achieve food security for a growing world population in the face of global change”, in M. PAUTASSO *et al.*, 2013, “Seed Exchange Networks for Agrobiodiversity Conservation. A Review”, *Agronomy for Sustainable Development*, Vol. 33, (1), at p. 153; see also A. SEN, 1981, “*Poverty and Famines: An Essay on Entitlement and Deprivation*”, Oxford university press.

A growing number of studies show that a different type of agriculture could better address the above mentioned needs,³⁹ taking into account the social, economic and environmental hazards.⁴⁰ In December 2010, Special rapporteur on the Right to Food Olivier De Schutter was pointing out that “States can and must achieve a reorientation of their agricultural systems towards modes of production that are highly productive, highly sustainable and that contribute to the progressive realization of the human right to adequate food.”⁴¹ Drawing on an extensive review of the scientific literature published in the last five years,⁴² the Special Rapporteur identifies agroecology⁴³ as a mode of agricultural development to be promoted. Ecological agriculture⁴⁴ demonstrates that yields can be

³⁹ See above note 16 on the first report of IPES-FOOD, 2016. See also the Sustainable Agriculture and Food Systems Thematic Group, which foresees that regions are likely to suffer moderate to high costs in the Business-As-Usual scenario of unsustainable agricultural development. “In the absence of change towards a new, shared global framework for sustainable development of agriculture and food systems, a Business-As-Usual trajectory would have severe implications for food and nutritional security, economic and social development, public health as well as environmental sustainability”. SUSTAINABLE AGRICULTURE AND FOOD SYSTEMS THEMATIC GROUP, 2013 at pp. 10-12. See also the results of a 30 years research comparing organic and conventional farming by the Rodale Institute (a non-profit organization dedicated to pioneering organic farming through research and outreach). RODALE INSTITUTE, “The Rodale Institute’s 30-Year Farming Systems Trial Report”, 2011 . Their landmark Farming Systems Trial® is the longest- running side-by-side comparison of organic and conventional agriculture. For over sixty years, the Institute has been researching the best practices of organic farming and sharing findings with farmers and scientists throughout the world, advocating for policies that support farmers, and educating consumers about how going organic is the healthiest option for people and the planet.

⁴⁰ Numerous studies exist for different plants. Here are few examples. For wheat: S. S. JONES, 2004, “Breeding Resistance to Special Interests”, *Organic Farming Research Foundation Information Bulletin*, Vol. Fall 2004, (14); for sown grasslands: I. PRIETO *et al.*, 2015, “Complementary Effects of Species and Genetic Diversity on Productivity and Stability of Sown Grasslands”, *Nature Plants*, Vol. 1; for fungi see P. STAMETS, 2005, “*Mycelium Running : How Mushrooms Can Help Save the World*”, Berkeley, Ten Speed Press. Paul Stamets obtained a patent for his invention ‘application Ser. No. 09/678,141 for MYCOPESTICIDES, filed Oct. 3, 2000, now U.S. Pat. No. 6,660,290’; and for a general overview see J. CAPLAT, 2014, “*Changeons D’agriculture-Réussir La Transition*”, Paris, Actes Sud; for an example in El Salvador see M. LAPLACE, “Le Salvador Bannit Le Roundup De Monsanto Et Connait Des Récoltes Records”, *L’info Ecologique au Quotidien*, 27 April 2015 (accessed on 14 September 2015).

⁴¹O. DE SCHUTTER, “Agroecology and the Right to Food”, 2010 at p. 1. See also O. DE SCHUTTER AND G. VANLOQUEREN, 2011 *op.cit.*. See also M. PAUTASSO *et al.*, 2013 *op.cit.* at p. 153; O. DE SCHUTTER, “Towards More Equitable Value Chains: Alternative Business Models in Support of the Right to Food”, 2011 .

⁴² Miguel Altieri, Professor of Agroecology at the University of California, Berkeley in the Department of Environmental Science, Policy and Management, is one of the most eminent experts in the field. He published extensively on topic, *inter alia* M. A. ALTIERI *et al.*, “Agroecology: The Scientific Basis of Alternative Agriculture”, 1987 ; M. A. ALTIERI AND L. MERRICK, 1987, “In Situ Conservation of Crop Genetic Resources through Maintenance of Traditional Farming Systems”, *Economic Botany*, Vol. 41, (1); M. A. ALTIERI, 1999, “The Ecological Role of Biodiversity in Agroecosystems”, *Agriculture, Ecosystems & Environment*, Vol. 74, (1); M. A. ALTIERI, 2002, “Agroecology: The Science of Natural Resource Management for Poor Farmers in Marginal Environments”, *Agriculture, ecosystems & environment*, Vol. 93, (1).

⁴³Altieri defines agroecology as an application of ecological science to the study, design and management of sustainable agro-eco systems. This is applied at the farm-level, but also across the global network of food production, distribution and consumption (i.e. including food production systems, processing and marketing, the role of the consumer, and the policy level). Agroecology uses knowledge from many disciplines, *inter alia* agricultural and ecological science and traditional knowledge systems. It questions conventional approaches which are centered on the use of science to promote economic growth. See M. A. ALTIERI AND M. D. FAMINOW, 1996, “Agroecology: The Science of Sustainable Agriculture”, *Canadian Journal of Agricultural Economics*, Vol. 44, (2). De Schutter further specifies that agroecology seeks ways to enhance farming systems by mimicking natural processes, using biological interactions and synergies to support production, O. DE SCHUTTER, “Agroecology and the Right to Food”, 2010. See also D. SÁNCHEZ CARPIO AND S. BECHEVA, “Agro-Ecology: Building a New Food System for Europe”, ed. F.O.T.E. EUROPE (2014)

⁴⁴ “Agroecology-based production systems are biodiverse, resilient, energetically efficient, socially just, and comprise the basis of an energy, productive and food sovereignty strategy. (...) Agroecological systems are deeply rooted in the ecological rationale

doubled within ten years' time;⁴⁵ and that favouring diversity increases productivity while facing environmental challenges.⁴⁶ Steve Wratten, Professor of Ecology at Lincoln University, confirms these observations.⁴⁷ He says we “have the protocols or recipes” to do this, “but getting governments to adopt it has a major barrier: international corporations.”⁴⁸ Wratten points here to a crucial issue: the necessity for political will to cooperate and promote collectively a fair and equitable access regime to food and seeds (i.e. against the agro-chemical giants).

This observation highlights the imperative need for all stakeholders in the world food chain – and especially States – to cooperate in order to operate a transition towards a sustainable agriculture and food system. As mentioned above, of access to seeds for producing food and reaching food security worldwide is of vital importance.⁴⁹ Indeed, States are highly interdependent with regard to the provision of food and agriculture plant varieties.⁵⁰ Countries' interdependence justifies a “compulsory” cooperation between States in establishing and protecting a fair and equitable access to seeds. This international

of traditional small-scale agriculture, representing long established examples of successful agricultural systems characterized by a tremendous diversity of domesticated crop and animal species maintained and enhanced by ingenious soil, water, and biodiversity management regimes, nourished by complex traditional knowledge systems. Such systems have fed much of the region's population for centuries and continue to feed people in many parts of the planet.” In M. A. ALTIERI, F. R. FUNES-MONZOTE, AND P. PETERSEN, 2012, "Agroecologically Efficient Agricultural Systems for Smallholder Farmers: Contributions to Food Sovereignty", *Agronomy for Sustainable Development*, Vol. 32, (1) at p. 2.

⁴⁵ Steve Wratten, Professor of Ecology at Lincoln University http://www.nzherald.co.nz/element-magazine/news/article.cfm?c_id=1503340&objectid=11489292. See also the results of the 30 years comparative research project between organic and conventional agriculture conducted by the Rodale Institute, *op cit.* RODALE INSTITUTE, 2011.

⁴⁶ Altieri states that “the global south has the agroecological potential to produce enough food on a global per capita basis to sustain the current human population, and potentially an even larger population, without increasing the agricultural land base. The reason why the potential resides in the South and not in the North, is because in developing countries still resides a large peasant-indigenous population, with a rich traditional agricultural knowledge and a broad genetic diversity which conforms the basis of resilient diversified agroecosystems.” M. A. ALTIERI AND C. I. NICHOLLS, 2012 at p. 25. See also M. ALTIERI, F. FUNES-MONZOTE, AND P. PETERSEN, 2012, "Agroecologically Efficient Agricultural Systems for Smallholder Farmers: Contributions to Food Sovereignty", *Agronomy for Sustainable Development*, Vol. 32, (1).

⁴⁷ Although a recent study from the Metaforum thinktank of the KU Leuven University doubts that agroecology can really feed the world, pointing to the vague definition of the concept, to the fact that agroecology cannot replace conventional agriculture and questioning whether it is judicious to replace a performant system with an agricultural system, which objectives and producing techniques are not sufficiently clear. See METAFORUM KU LEUVEN, "Voedselproductie En Voedselzekerheid: De Onvolmaakte Waarheid", 2015, in particular at pp.30-33. However, this report is easily contestable on these points when looking at the very limited number of studies and references referred to on agroecology and when keeping in mind that “the funding available for organic research is again negligible, remaining at about 2% of the total investment into agricultural research in Flanders” (showing that conventional agriculture strongly remains the dominant position). For this last argument, see P. BARET *et al.*, "Research and Organic Farming in Europe", 2015 at p. 8.

⁴⁸ M. A. ALTIERI AND C. I. NICHOLLS, 2012.

⁴⁹ E. A. FRISON, J. CHERFAS, AND T. HODGKIN, 2011, "Agricultural Biodiversity Is Essential for a Sustainable Improvement in Food and Nutrition Security", *Sustainability*, Vol. 3.

⁵⁰ C. KHOURY *et al.*, "Estimation of Countries' Interdependence in Plant Genetic Resources Provisioning National Food Supplies and Production Systems", 2015; FAO, 1998 at pp. 20-23. See also C. FOWLER AND T. HODGKIN, 2004, "Plant Genetic Resources for Food and Agriculture: Assessing Global Availability", *Annual Review of Environment & Resources*, Vol. 29, (1) at p. 147; and J. ESQUINAS-ALCAZAR, 2005 *op.cit.* at pp. 949-950.

cooperation challenge can be addressed by setting up (global) institutional arrangements.⁵¹ This is precisely why the International Treaty on Plant Genetic Resources for Food and Agriculture⁵² (hereafter the Treaty or Plant Treaty) was shaped and adopted in 2001. Steered by sustainable development principles, the Plant Treaty designs several tools to help countries reach their food security and sustainable agriculture overall goals.⁵³ Two major provisions – the Multilateral System of access and benefit-sharing (MLS)⁵⁴ and the recognition of Farmers' Rights (FRs)⁵⁵ – are designed as incentives for Contracting Parties to provide a facilitated access to seeds to all food and agriculture stakeholders, including smallholder farmers. The MLS is viewed as a global commons system,⁵⁶ where stakeholders manage together the access to seeds, their conservation and sustainable use. Both tools – the Multilateral System and Farmers' Rights – aim at proposing an alternative path to the current food and agriculture system blocked in the middle of a private/public good dilemma. However, little thorough research has been conducted on analysing whether these tools adequately respond to the need for reaching food security and sustainable agriculture through collective management of plant genetic resources for food and agriculture (PGRFA, or seeds).⁵⁷

The present research explores the consideration of seeds and the MLS as a global commons system to facilitate the provision of seeds worldwide for food security and sustainable agriculture. The aim is to (Part I) set the contextual field in which the Plant Treaty has its origins and identify the general challenges related to PGRFA management; (Part II) understand why seed exchanges remain problematic notwithstanding the implementation of

⁵¹ R. O. KEOHANE AND E. OSTROM, "Introduction", in R.O. KEOHANE AND E. OSTROM (eds), *Local Commons and Global Interdependence: Heterogeneity and Cooperation in Two Domains*, London, Sage Publications, 1995, at p. 13. See also S. JUNG CURT, 2007, "Institutional Interplay in International Environmental Governance: Policy Interdependence and Strategic Interaction in the Regime Complex on Plant Genetic Resources for Food and Agriculture" (Humboldt Universität, 2007) at p. 33. Jungcurt states that "analyses of international interdependence start from the observation that in many areas of public policy issues that were once considered purely national concerns now spill across borders and are global in reach and impact. A key problem in such cases is how to induce contributions from a sufficiently large number of states to provide an adequate level of benefits. When there are many beneficiaries, each of whose contribution is small relative to the cost of provision, the good will not be provided in optimal quantity, unless institutional arrangements exist that induce incentives to provide it."

⁵² International Treaty on Plant Genetic Resources for Food and Agriculture, FAO Res. 3/2001, 3 November 2001 (entered into force 29 June 2004); 2400 UNTS 379. Throughout the present research, the words 'Treaty', 'Plant Treaty', and 'ITPGRFA' are used interchangeably. The Treaty can be found in Annex 1 to this book.

⁵³ C. FRISON, 2006, "The Principles of Sustainable Development in the Context of the International Treaty on Plant Genetic Resources in Food and Agriculture", *McGill International Journal of Sustainable Development Law & Policy*, Vol. 2, (2).

⁵⁴ Plant Treaty, Articles 11-13.

⁵⁵ Plant Treaty, Article 9.

⁵⁶ M. HALEWOOD, 2013, "What Kind of Goods Are Plant Genetic Resources for Food and Agriculture? Towards the Identification and Development of a New Global Commons", *International Journal of the Commons*, Vol. 7, (2). See also J. SANTILLI, 2011, "Agrobiodiversity and the Law: Regulating Genetic Resources, Food Security and Cultural Diversity", New York, NY, Earthscan.

⁵⁷ The terms "seed" is used in lay term to designate PGRFA. This use is not in conformity with the actual definition of PGRFA or seeds. It is done so for simplicity of writing.

the Plant Treaty; and (Part III) overcome the deficit of Contracting Parties' obligations in reaching their food security and sustainable agriculture overall goals by elaborating on the *Theory of the Commons*⁵⁸ (in particular regarding States' recognition of FRs, their conservation and sustainable use responsibilities, as well as their access and benefit-sharing obligations). The present chapter is divided into seven sections. Section 1 describes the research approach; section 2 outlines the research map; section 3 explains the theoretical framework, i.e. the theory of the Commons; section 4 clarifies research motivations; section 5 sketches complementary research methods, i.e. the contextual analysis; section 6 delineates the scope of the work; and section 7 ends by identifying how the present work contributes to the state of the art.

Section 1. Research approach

The Treaty creates a facilitated access to the world's major crops and forages, with a provision for benefit-sharing. The facilitated access mechanism of the Treaty constitutes a shift in the concepts pertaining to PGRFA management and thereby is an important first step towards food security and sustainable agriculture.⁵⁹ However, preliminary findings reveal that the Treaty only partially answers the actors' need for an easy access to seeds.⁶⁰ Understanding why current PGRFA exchanges are problematic and how conservation, sustainable use, access and benefit-sharing provisions under the Treaty can be promoted for food security and sustainable agriculture purposes, requires taking a rather interdisciplinary research approach (§1). Furthermore, while different research methodologies are possible, an inductive research approach has been chosen to carry out the work (§2).

⁵⁸ The theory of the commons developed following Hardin's paper on the "Tragedy of the Commons". It was then widely addressed by Elinor Ostrom, whose seminal book "Governing the Commons" revolutionized the field. The theory is explained below under Section 3 and is detailed in Chapter 6.

⁵⁹ O. DE SCHUTTER, "The Role of the Right to Food in Achieving Sustainable Global Food Security", 2009 UNITED NATIONS.

⁶⁰ C. FRISON, T. DEDEURWAERDERE, AND M. HALEWOOD, 2010, "Intellectual Property and Facilitated Access to Genetic Resources under the International Treaty on Plant Genetic Resources for Food and Agriculture", *European Intellectual Property Review*, Vol. 32, (1). This article was published as a response to the paper published by C. LAWSON, 2009, "Intellectual Property and the Material Transfer Agreement under the International Treaty on Plant Genetic Resources for Food and Agriculture", *ibid.* Vol. 31, (5).

§ 1 Underlying interdisciplinarity for a sustainable development perspective

A researcher trained in law who is studying an international Treaty will generally produce a purely legal piece of work, which necessarily applies classic legal research methods. Notwithstanding the fact that the present work is rooted in legal methods, it is also profoundly inspired by interdisciplinary approaches (including economic, social and above all political sciences) and even more a transdisciplinary approach.⁶¹ Like any sustainable development topic, fully understanding the international seed regulatory system requires taking a 360° view of the problems related to seed conservation, use and exchange. Therefore, following the direction that major scholars have paved promoting interdisciplinary research,⁶² I widened my spectrum and stepped out of the strict legal field by enriching my analysis with concepts (sustainable development principles), theories (governance) and research methods (sociology and anthropology tools) from other disciplines. Indeed, combining methods, theories and concepts from other scientific fields have fed my analysis and recommendations with proposals that better reflect stakeholders' diversity of interests at stake. Notwithstanding this transdisciplinary-inspired research, I do not claim that my research is one hundred percent transdisciplinary. Undeniably, only collaboration between several researchers with different background and trainings, as encouraged by Ostrom, can achieve a truly inter- and transdisciplinary work.⁶³ My hope is that looking at my work with other additional lenses has enriched my legal research with "an interdisciplinary bundle of methods",⁶⁴ apt to respond to the complex requirements of any sustainable development discipline.

§ 2 Inductive research approach

The purpose of the thesis is to bring a theoretical insight to the Treaty, using the theory of the commons, in order to understand how the Treaty is (dys-)functioning and to make

⁶¹ Transdisciplinarity goes further than interdisciplinarity. As stated by Klein *et al.* "[t]he core idea of transdisciplinarity is different academic disciplines working jointly with practitioners to solve real-world problem." J. T. KLEIN *et al.*, 2012, "Transdisciplinarity: Joint Problem Solving among Science, Technology, and Society: An Effective Way for Managing Complexity", Birkhäuser at p. 4; see also A. WIEK AND A. I. WALTER, 2009, "A Transdisciplinary Approach for Formalized Integrated Planning and Decision-Making in Complex Systems", *European Journal of Operational Research*, Vol. 197, (1); G. H. HADORN *et al.*, 2006, "Implications of Transdisciplinarity for Sustainability Research", *Ecological Economics*, Vol. 60, (1).

⁶² A. R. POTEETE, M. A. JANSSEN, AND E. OSTROM, 2010, "Working Together: Collective Action, the Commons, and Multiple Methods in Practice", Princeton University Press, at pp. 255-257; see also L. A. FENNELL, 2011, "Ostrom's Law: Property Rights in the Commons", *International Journal of the Commons*, Vol. 5, (1), at pp. 22-23.

⁶³ A. R. POTEETE, M. A. JANSSEN, AND E. OSTROM, *cit.*, at pp. 255-257.

⁶⁴ E. VAN ZIMMEREN, 2011, "Towards a New Patent Paradigm in the Biomedical Sector? Facilitating Access, Open Innovation and Social Responsibility in Patent Law in the Us, Europe and Japan" (KU Leuven, 2011) at p. 24.

normative proposals so as to improve its implementation. Different approaches can reach this purpose: a deductive approach (starting from the theoretical framework of the commons and moving down towards the case-study of the Treaty); or a more inductive approach (starting from the field and moving up towards the theory). Depending on what approach is taken, the theoretical framework will be used at a different moment in the research process. In a deductive approach, the theoretical framework will come early in the thesis structure. This approach allows reaching a high abstract theoretical level of reasoning.⁶⁵ On the contrary, when taking a more inductive approach,⁶⁶ the theoretical framework is mobilized later, only after the analysis of the case-study, i.e. the Treaty. Indeed, it is the very results of the Treaty analysis that leads to choosing the theory of the commons as theoretical framework.

Coming from the experts' field of the Plant Treaty, it was more natural for me to begin my research with a bottom-up, inductive approach. Therefore, Part I starts by analyzing the context and history from which the Treaty is born. This first step in the inductive research is important as it sketches the tensions and problems in the international management of PGRFA. Based on this contextual identification, Part II moves on to assess the Treaty by carrying out a legal and a stakeholder analyses. Guided by the identified tensions in Part I, this second step in the inductive research allows to draft a list of problems in the implementation of the Treaty. Finally, from the results of this Treaty assessment, Part III makes the link with the theory of the commons, and reaches the final step of the inductive approach: build on the theory of the commons to provide normative proposals in order to improve the Treaty functioning and implementation.

Section 2. Research map

As said above, the present thesis is divided into three main Parts, each of which covers a time period. (§1) Part I is descriptive and looks at the past (i.e. what existed before the Plant

⁶⁵ While I fully understand and agree with the fact that a deductive approach is common for a PhD research and that it allows reaching strong theoretical arguments that enrich the state of the art of the said theory, it is not the path I have chosen to follow.

⁶⁶ The inductive approach is less common in legal research. However, some authors advocate that implementing such approach in legal research enriches the research field. See for example R. FOQUÉ, 2012, "Grondslagen En Methoden Van Juridisch Onderwijs", *Law and Method*, Vol. 2, (2) at pp. 17-18. See also H. R. BERNARD, 2012, "Social Research Methods: Qualitative and Quantitative Approaches", Sage; and W. L. NEWMAN, 1991, "Social Research Methods: Qualitative and Quantitative Approaches", Allyn and Bacon.

Treaty?); (§2) Part II is evaluative and analyses the present (i.e. how does the Treaty function?); and (§3) Part III is normative and envisages the future (i.e. how should the Treaty be implemented to effectively reach its objectives?). Each Part is composed of one or two chapters and is outlined below following an identical internal structure: first research objectives are framed, then research hypothesis and question(s) are posed, and finally methodologies used are explained.

§ 1 (Thesis Part I) Plant genetic resources for food and agriculture management: digging the soil to assess fertility for collaboration

A. Objectives: understanding the past seed management system

Part I of this PhD aims at drawing a picture of the international seed regulatory system that developed during the twentieth century in order to understand on what basis the Plant Treaty was designed and set up. Throughout the analysis of all major international instruments related to seeds, the objective of Part I is to point out the shift from the consideration that seeds were public goods available to all, to the consideration that seeds are overly privatized goods, accessible to few following strict (legal, economic or technical) access conditions. Part I comprises two chapters. Chapter 2 describes the historical evolution of PGRFA management and the international instruments that have an impact on seed management. Chapter 3 analyses the tensions arising from this multifaceted international regime complex.

This descriptive first Part highlights major tensions resulting from the above-mentioned developments: i.e. the international regime complex for PGRFA and the hyper-ownership of seeds. These tensions express an imbalance of recognition in the rights pertaining to seeds: private hyper-ownership of seeds (through legal and technological tools) overpower collective rights over seeds (e.g. through (in-)effective Farmer's Rights). Part I demonstrates that the international community needed to design a new international convention to overcome these tensions: the International Treaty on Plant Genetic Resources for Food and Agriculture, which is investigated in Part II.

B. Hypothesis

The historical evolution of PGRFA management has shifted the consideration that seeds are public goods freely available to all to the consideration that seeds are overly privatized goods, accessible to few following strict (legal, economic and technical) access conditions. This evolution has crystallised an imbalance of rights pertaining to seeds and contributed to further limit access to and exchanges of seeds between all stakeholders, thereby endangering seed conservation and sustainable use.

C. Research questions

What is the historical evolution of the international seed management system before the Plant Treaty came into force? (Chapter 2)

What core tensions render the international seed management system so complex? (Chapter 3)

D. Methods

To answer these questions, three steps were taken simultaneously. First, a legal analysis of the international instruments relating to seed management has been carried out. The method applied for this analysis is the same as the one used to study the Plant Treaty (see Part II below).⁶⁷ Nevertheless, it has not been conducted in as much depth because, contrary to the Treaty, these conventions are not central to this work.

Second, a wide literature review on the PGRFA management history was undertaken at the international level – from the mid twentieth century to nowadays – both from scientific legal and non-legal literature. For the non-legal literature, there was a lot of literature on PGRFA management, from a very wide range of actors and from different perspectives and disciplines. As for legal scientific literature on the Plant Treaty, there was very little until recently.⁶⁸ Today, scholars have become interested in the issue and there is a growing body of

⁶⁷ Articles 31-33, Vienna Convention on the Law of Treaties, 23 May 1968, 8 I.L.M. 679. To avoid repetition, this method is detailed below.

⁶⁸ P. CULLET, "Food Security and Intellectual Property Rights in Developing Countries", *op. cit.* at pp. 12-21.

scientific literature on the topic, although still very limited compared to other fields of law.⁶⁹ This reading enabled me to grasp a fairly comprehensive picture of the international PGRFA management system.

Third, as explained below,⁷⁰ “law in books” and “law in practice” are two different things. While gathering information from publications, my concomitant experience as negotiator and observer in Treaty meetings also provided me with other useful knowledge. This knowledge is examined following a *modus operandi* described under Section 5 “Contextual Analysis” below. This contextual approach (inspired from socio-anthropological methodologies) is distinguished from the methods described here because it has been used throughout the research as a support tool to clarify the context and understand the law accordingly. There is no specific output from this method, apart from guiding the research all along. This has enabled, when necessary, to choose research directions and take decisions accordingly.

The literature review, legal study and supporting contextual analysis provide a thorough historical-legal description of the international instruments managing seeds between 1950 and 2001, which have highlighted specific tensions between stakeholders in the international management of PGRFA. These results allow to move towards the second step of the inductive research by evaluating the current International Treaty regulatory setting, covered in Part II of this thesis.

§ 2 (Thesis Part II) The plant genetic resources for food and agriculture regime: an assessment of the Plant Treaty

A. Objectives: analyzing the current international seed regime

The objective of Part II is to draw a precise portrait of the Plant Treaty functioning, of the constraints in the Treaty text and of the difficulties in its implementation, in order to understand why the Treaty does not reach its objectives. The analysis is twofold. First, a

⁶⁹ The Treaty is still a young instrument of international law: it was signed in 2001, it entered into force in 2004, but only started to be effectively ‘in function’ after the adoption of the Standard Material Transfer Agreement by the Governing Body in 2006. Several operationalizing tools have been adopted at later meetings (e.g. the compliance mechanism has only been finalized in 2013).

⁷⁰ See below section 4.

classical legal analysis of the Treaty is conducted (Chapter 4), to explain if and how it attempts to overcome the public/private good dichotomy for seed management. However, this legal study provides insufficient appreciation to fully understand the slow implementation of the Treaty and the difficulties in fulfilling its objectives. Therefore, as a complementary step, a stakeholder analysis is carried out (Chapter 5), where actors have identified limitations and constraints they face in their experience with the Treaty negotiation and implementation.

B. Hypothesis

By creating the MLS, Contracting Parties have attempted to strike an equitable balance between public and private interests in access to seeds, but countries face difficulties in implementing the Treaty. The *de facto* imbalance of rights pertaining to seeds needs to be re-balanced in order to implement efficiently the MLS and allow stakeholders to reach the Treaty's objectives.

C. Research questions

How do the Treaty and more specifically the MLS function? (Chapter 4)

What are the constraints identified by stakeholders that limit an efficient Treaty implementation? (Chapter 5)

D. Methods

Part II is the second step of the inductive approach and constitutes the core analysis of my work. For each chapter a different method is implemented. The legal study of an international Treaty requires applying classical legal research methods. Therefore, Chapter 4 performs a reading of the Treaty text following the international law rules on Treaty interpretation. Then, through a stakeholder analysis, Chapter 5 confirms and complements the results of the legal analysis by recognizing concrete limits and constraints in the Treaty implementation identified by stakeholders. Combining these results provides a comprehensive set of information which allows to assess the implementation of the Treaty by its Contracting Parties and to propose paths for a better congruence between the Treaty's implementation tools and the Treaty's objectives.

(1) The legal analysis

A classical legal analysis of the Treaty is conducted following the international law interpretation principles of the 1969 Vienna Convention on the Law of Treaties,⁷¹ to understand the legal rules established by the Treaty.⁷² The legal analysis is based on the text of the Treaty and other relevant international agreements; decisions taken by the Governing Body of the Treaty; reports of the negotiation meetings of the Treaty; etc. A caveat is made regarding the fact that access to some preliminary documents is not possible (e.g. audio records or verbatim proceedings of preparatory and negotiation meetings do not always exist and when they do, they are hardly accessible). This is an important note to make as this reduces the degree of transparency of the negotiations.⁷³ This is one of the reasons justifying the use of complementary methods of research. Furthermore, the findings from the legal analysis are cross-checked with data and statistics found mainly on the Treaty secretariat website.⁷⁴ This cross-check evaluation is necessary in the assessment of the Treaty implementation and was only possible after several years of functioning.⁷⁵

To facilitate the reading and understanding of this thorough legal analysis, Treaty Articles are clustered into eight topics. These topics are important themes within the Treaty, but they are also relevant and related to the theory of the commons. These topics are: 1) sustainable agriculture and food security; 2) scope of the Treaty; 3) Farmers' Rights; 4) facilitated access to PGRFA; 5) benefit-sharing and the Benefit-sharing Fund; 6) legal procedural aspects (Third Party Beneficiary); 7) information and knowledge; and 8) participation and governance. Each topic is presented in the following manner: first all relevant Treaty Articles are clustered; then a historical and legal explanation of the Articles is

⁷¹ Articles 31-33, Vienna Convention on the Law of Treaties, 23 May 1968, 8 I.L.M. 679.

⁷² Several methods are used to conduct this interpretative task, such as systematic interpretation, grammatical interpretation, technical interpretation or teleological interpretation. See Lina Kestemont (2015), « Methods for traditional legal research », in Reader 'Methods of Legal Research', (work in progress), at pp. 5-14.

⁷³ Several negotiators reported that this was desired by some member states and that important steps have occurred during informal discussions whether inside or outside the doors of the negotiating meeting room. Moreover, negotiators have reported that when verbatim proceedings were recorded, negotiators could still request to modify the text of the proceedings after the meeting was held. Notably, this has happened with several countries, including the US.

⁷⁴ <http://www.planttreaty.org/fr>

⁷⁵ The data I refer to was collected in 2015 and includes inter alia: the number of Contracting Parties (35), which have included PGRFA collections in the MLS and an estimated total number of accessions; data on CGIAR Centres' acquisition and distributions of PGRFA using the Standard Material Transfer Agreements (SMTA); data on the flow of PGRFA and on the SMTAs signed; list of countries, which passed legislation on Farmers' Rights; etc.

provided; finally the impact of their implementation is assessed using the above-mentioned cross-check evaluation.

(2) Stakeholder analysis

The legal analysis is confirmed and complemented with information provided directly by actors involved in the Treaty negotiation and implementation, through a stakeholder analysis.

A classical definition of stakeholders is “any group of individual who can affect or is affected by the achievement of the organization objectives.”⁷⁶ Stakeholders may be natural persons,⁷⁷ groups or legal entities; they are not limited to insiders within the organization. The stakeholder analysis is constituted by the edition of a book where 29 major stakeholders⁷⁸ within the Plant Treaty policy area agreed to share their views, experience and hopes on the past, present and future challenges in the negotiation and implementation of the Treaty.⁷⁹ Based on the content of stakeholders’ chapters, the needs and constraints spotted by authors were analysed and listed into 17 “specific implementation challenges and constraints”.⁸⁰ For the last step of the inductive research approach in Part III, these problems are addressed where the theory of the commons is proposed as one way to mitigate them and allow stakeholders to reach the Treaty’s objectives.

⁷⁶ R. E. FREEMAN, 2010, *Strategic Management : A Stakeholder Approach*, Cambridge [u.a.], Cambridge Univ. Pressat p. 46. Modern stakeholder theories include any group or individual that can be influenced by, or can itself influence, the activities of the organisation, see A. L. FRIEDMAN AND S. MILES, 2002, “Developing Stakeholder Theory”, *Journal of Management Studies*, Vol. 39, (1).

⁷⁷ According to Bjornstad, “Individuals earning the label entrepreneurial leaders seem to have been crucial for the adoption of the ITPGRFA, thus supporting Young’s assumption that leadership is a necessary condition for regime formation. These leaders have in several aspects also been fundamental in addressing the issues in such a way that the developing countries partly got their interests included. »I. B. BJORNSTAD, “Breakthrough for ‘the South’? An Analysis of the Recognition of Farmers’ Rights in the International Treaty on Plant Genetic Resources for Food and Agriculture”, 2004, p. 90.

⁷⁸ See Appendix 4 of the online PDF file of this thesis for the list of Stakeholders, available on my ResearchGate profile.

⁷⁹ C. FRISON, F. LÓPEZ, AND J. ESQUINAS-ALCÁZAR, T. (eds.), *Plant Genetic Resources and Food Security : Stakeholder Perspectives on the International Treaty on Plant Genetic Resources for Food and Agriculture*, Washington, DC, Earthscan, FAO and Bioversity International, 2011.

⁸⁰ See Table 20.1 “Constraints, needs and implementation tools” in C. FRISON, F. LÓPEZ, AND J. ESQUINAS-ALCÁZAR, T., *Plant Genetic Resources and Food Security : Stakeholder Perspectives on the International Treaty on Plant Genetic Resources for Food and Agriculture*, at pp. 276-277.

§ 3 (Thesis Part III) Planting the commons: towards redesigning the global seed commons

A. Objectives: moving towards an efficient Treaty by providing an equitable access to the global seed commons

Part III contains one chapter (Chapter 6). Its objective is so make normative proposals as to what can be done in the implementation of the Treaty for it to reach its objectives. Based on the results of Part II, six underlying principles derived from the coupled analysis of the theory of the commons and the Treaty are used to try solving the above identified Treaty constraints. These underlying principles are: sustainability, interdependence, anticommons dilemma, physical and informational components inextricably bound to the use of seeds; community; and diversity, heterogeneity and complexity. Eight recommendations are made to enhance the functioning of the global seed commons, presented as an alternative to overcome the limits of the current seed regulatory setting resulting from the public/private good dichotomy. One cross-cutting aspect that appears all along the analysis is the lack of recognition of the role and rights of smallholder farmers. Recognition of Farmers' Rights at the international level could overcome the imbalance of rights pertaining to seeds and contribute to reach the food security and sustainable agriculture overall goals of the Treaty.

B. Hypothesis

Enhancing the MLS as a global seed commons contributes to a more efficient implementation of the Treaty and to better reaching the Treaty's goals of food security and sustainable agriculture. It constitutes an alternative way to overcome the dichotomy that appeared in the Treaty analysis between seeds defined exclusively as private goods and seeds characterized as public goods.

C. Research question

What underlying principles of the theory on the commons are useful to overcome the identified constraints in the Treaty implementation, and how? (Chapter 6)

D. Method

Chapter 6 includes a governance approach to integrate the multilateral and multi-stakeholder cooperation dimension in support of the legal analysis of the Treaty. Looking at the governance dimension⁸¹ is helpful to analyse the role played by stakeholders in the creation and implementation of the Treaty as a set of international, formal and binding norms.⁸² The necessity of using such a wider “lens” is intrinsically linked to the universal and “common good nature” of PGRFA (i.e. the fact that all countries are highly interdependent). It implies that the success of the Treaty is rooted in a common interest of the main actors involved in the exchange of seeds, which leads to the creation of global common management mechanisms.⁸³ Moreover, the importance of informal means and channels cannot be made visible with a classic legal analysis, as they are not recognized by the formal system. Understanding law in a broad sense, as the creation of norms and rules to regulate actors, which includes informal norms, social norms,⁸⁴ and self-regulation,⁸⁵ can be done using political and social science concepts and methods. For these reasons, the theory of the commons (developed by Ostrom and others subsequently) is applied to see if and how managing seeds as a commons can mitigate the constraints identified in the Treaty implementation and overcome the problems raised by the legal imbalance of rights pertaining to seeds. The theoretical framework of the commons is explained below.

Section 3. Theoretical framework – the theory of the commons

The international management for the conservation, sustainable use and access to seeds is a global challenge that requires multilateral and multi-stakeholder cooperation. Globalization has significantly increased this fundamental interdependence between States and between stakeholders. Analysing the Plant Treaty from an exclusively legal perspective

⁸¹ D. LEVI-FAUR, 2012, *The Oxford Handbook of Governance*, Oxford University Press.

⁸² Understanding why and how stakeholders interact is rooted in the general theory on Collective Action. See M. OLSON, 1971, *The Logic of Collective Action : Public Goods and the Theory of Groups*, Harvard University Press; T. SANDLER, 2004, *Global Collective Action*, Cambridge, England ; New York, Cambridge University Press. Olson insists on the free rider problem raised by any collective action. Some Treaty stakeholders view Northern countries as free-riders when taking resources from the South, using them, profiting from their benefits without sharing with the South.

⁸³ M. ZÜRN, "Global Governance as Multi-Level Governance", in D. LEVI-FAUR (eds), *The Oxford Handbook of Global Governance*, Oxford, Oxford University Press, 2012, at p. 730.

⁸⁴ L. LESSIG, 1995, "The Regulation of Social Meaning", *The University of Chicago Law Review*, Vol. ; R. C. ELICKSON, 1998, "Law and Economics Discovers Social Norms", *The Journal of Legal Studies*, Vol. 27, (S2).

⁸⁵ I. AYRES AND J. BRAITHWAITE, 1992, *Responsive Regulation: Transcending the Deregulation Debate*, Oxford University Press.

would miss out much of the issues at stake. Indeed, policy is deeply intertwined with the international law-making process. To integrate this multilateral and multi-stakeholder cooperation dimension in support to the legal analysis of the Plant Treaty, this research is framed by a major theory from political sciences: the theory of the commons. Indeed, it provides a governance dimension⁸⁶ necessary to understand the role played by stakeholders in the creation and implementation of the Treaty as a set of international, formal and binding norms. Such a governance approach allows examining the legal shortcomings of the Treaty and understanding the interplay between stakeholders in the negotiation and implementation of the Treaty.

In this dissertation, it is argued that the wide international cooperation⁸⁷ between all stakeholders for the provision of PGRFA has resulted in the creation of a seed commons-type mechanism through the design of the Treaty's MLS. Indeed, the Treaty is the result of global cooperation based on commons principles;⁸⁸ and the mechanism that the Treaty puts in place is evidence of a "new multilateralism", echoing what UN Secretary General Ban Ki-moon called for at the Fifth Summit of the Americas in 2009:

"We need a new vision, a new paradigm, a new multilateralism. A multilateralism that is organized around delivering a set of global goods. A multilateralism that harnesses both power and principle. A multilateralism that recognizes the interconnected nature of global challenges."⁸⁹

The legal and stakeholder analyses⁹⁰ carried out in the central Part to this work highlight this multilateralism in managing global challenges, but they also point to constraints in the Treaty implementation that need to be overcome for an efficient provision of the Treaty's objectives. Analysing these limitations through the lens of governance may contribute to clarify why the system is not functioning well and propose actions and directions for all stakeholders to improve the implementation of the Treaty. The theory of the commons is

⁸⁶ See Chapter 6 for details.

⁸⁷ B. VOLLAN AND E. OSTROM, 2010, "Cooperation and the Commons", *Science*, Vol. 330, (6006) at pp. 923-924.

⁸⁸ J. B. HOLDER AND T. FLESSAS, 2008, "Emerging Commons", *Social & Legal Studies*, Vol. 17, (3); W. P. FALCON AND C. FOWLER, 2002, "Carving up the Commons - Emergence of a New International Regime for Germplasm Development and Transfer", *Food Policy*, Vol. 27, (3); see also G. VAN OVERWALLE, "Lessons from the Genetic Resource Commons for Governance," in *Reflexive Governance in the Public Interest. Democratic Governance and Collective Action - Global public services and common goods* (Brussels 2010).

⁸⁹ B. KI-MOON, "Official Remarks of the United Nations Secretary-General Ban Ki-Moon at the Plenary Session of the Fifth Summit of the Americas," in *Fifth Summit of the Americas* (Port of Spain, Trinidad & Tobago April 17-19, 2009).

⁹⁰ See below Chapters 4 and 5 for the detailed content.

proposed as the governance approach to study the Treaty.⁹¹ The concept of commons is not very well defined, and has even grown fuzzier with globalization and the complexification of wider resource governing systems. In 1968, Garrett Hardin published an (over-exploited) allegory named the “Tragedy of the Commons”⁹², where he analyzed the problems related to over-exploitation of finite resources under unlimited and free access conditions to all. He took the example of grazing and posed the pre-condition that rational people would always try to get the maximum and immediate profit from the use of a “common resource”,⁹³ and therefore lead to overgrazing and the destruction of the common pasture.⁹⁴ Hardin proposes three solutions to his tragedy: reducing world population to avoid overconsumption; or establishing an external institution to regulate the use of the resource, whether through public management (State) or through the market (i.e. enclose the commons).⁹⁵ Yet, his “explanation for the need to enclose the commons confounded the resource with its governance regime”.⁹⁶

Later on, as a reaction to the supremacy of property rights (whether state or private) as the “best” system to manage resources, Elinor Ostrom⁹⁷ studied the management of common

⁹¹ Authors have applied such mechanism to microbial resources or PGRFA: T. DEDEURWAERDERE *et al.*, 2009, “The Use and Exchange of Microbial Genetic Resources for Food and Agriculture”, *Commission on genetic resources for food and agriculture*, Vol., (46); and M. HALEWOOD, 2010, “Governing the Management and Use of Pooled Microbial Genetic Resources: Lessons from the Global Crop Commons”, *International Journal of the Commons*, Vol. 4, (1).

⁹² G. HARDIN, 1968, “The Tragedy of the Commons”, *Science*, Vol. 162, (3859).

⁹³ In game theory, this has been modeled under the prisoner’s dilemma. See A. RAPOPORT AND A. M. CHAMMAH, 1965, “*Prisoner’s Dilemma: A Study in Conflict and Cooperation*”, University of Michigan press.

⁹⁴ Hardin states that “[e]ach man is locked into a system that compels him to increase his herd without limit – in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom of the commons brings the ruin to all.” G. HARDIN, 1968 *op.cit.* at p. 1244. This view is supported by Mancur Olson in his work on the logic of collective action, who states that “unless the number of individuals is quite small, or unless there is coercion or some other special device to make individuals act in their common interest, *rational, self-interested individuals will not act to achieve their common or group interest*” (emphasis in original text). M. OLSON, 1965, “*The Logic of Collective Action : Public Goods and the Theory of Groups*”, Harvard University Press, at p. 2. Although Olson was much more precautionary than Hardin in the proposed solution to the “tragedy”, leaving the question of common management open.

⁹⁵ “The tragedy of the commons as a food basket is averted by private property, or something formally like it.” G. HARDIN, 1968 *op.cit.* at p. 1245.

⁹⁶ E. BERGE AND F. VAN LAERHOVEN, 2011, “*Governing the Commons for Two Decades: A Complex Story*” at p. 161. Other criticism can be formulated against Hardin’s views, including the fact that in real life, people communicate and are rarely put in a situation where a common resource is used by different person who do not talk to each other and discuss how to manage the resource commonly. See also E. OSTROM, 1990, “*Governing the Commons : The Evolution of Institutions for Collective Action*”, Cambridge ; New York, Cambridge University Press at p. 7. Another criticism relates to the rational character of the human being. According to Sen, who worked on welfare economics, peoples’ values and commitments will also influence economic policies in terms of their effects on the well-being of the community. Therefore, ethical aspects are also important and may counterbalance the “rational part” of human’s behavior. A. SEN, 2003, “*Éthique Et Économie*”, Paris, PUF at p. 15 and 40; and more generally A. K. SEN, 1970, “*Collective Choice and Social Welfare*”, Elsevier. More details on the criticism to Hardin’s vision are provided below in Chapter 6.

⁹⁷ The theory of the Commons gained much visibility in 2009 when Elinor Ostrom received the Nobel Prize in Economic Sciences.

resources using a “bundle of rights” approach,⁹⁸ where she distinguishes between operational-level property rights and collective-choice property rights.⁹⁹ Indeed, according to Schlager and Ostrom, “[a]ssigning full ownership rights does not guarantee an avoidance of resource degradation and overinvestment”.¹⁰⁰ To get a deeper comprehension of the conditions for sustainable resource use and governance regimes, she analyzed Common Pool Resource (CPR) institutional arrangements¹⁰¹ based on extensive field studies.¹⁰² In her famous book “Governing the Commons”, Ostrom focused on case studies in agricultural production systems, e.g. irrigation, forestry, or fishery management systems. In her understanding, a commons is “any natural or manmade resource that is or could be held and used in common.”¹⁰³ Ostrom showed that stakeholders¹⁰⁴ can effectively set up rules together (i.e. self-organization) to manage resources established in a local common pool for their own use, and outside of the market or governmental intervention (i.e. self-governance). Thanks to these data and to her observations, she designed eight principles useful to govern an efficient CPR system¹⁰⁵:

1. Clearly defined boundaries (i.e. effective exclusion of external unentitled parties);
2. Congruence between appropriation and provision rules and local conditions;
3. Collective-choice arrangements (i.e. allow most resource appropriators to participate in and modify the operational rules);
4. Effective monitoring (by monitors who are part of or accountable to the appropriators);

⁹⁸ The objective for Schlager and Ostrom is “to propose a property-rights scale ranging from authorized user, to claimant, to proprietor, and to owner, that provides a better analytical scheme for beginning to explain outcomes achieved by joint users of a common-pool resource (...). By examining the evidence (...), we are calling attention to the importance of discriminating among a range of incentives.” E. SCHLAGER AND E. OSTROM, 1992, “Property-Rights Regimes and Natural Resources: A Conceptual Analysis”, *Land economics*, Vol. at p. 259.

⁹⁹ “Operational activities are constrained and made predictable by operational-level rules regardless of the source of these rules. By the term “rules” we refer to generally agreed-upon and enforced prescriptions that require, forbid, or permit specific actions for more than a single individual. (...) Operational rules are changed by collective-choice actions. Such actions are undertaken within a set of collective-choice rules that specify who may participate in changing operational rules and the level of agreement required for their change. With regard to common-pool resources, the most relevant operational-level property rights are “access” and “withdrawal” rights. In regard to common-pool resources, collective-choice property rights include management, exclusion, and alienation.” E. SCHLAGER AND E. OSTROM, 1992 *op.cit.* at pp. 250-251.

¹⁰⁰ E. SCHLAGER AND E. OSTROM, 1992 *op.cit.* at p. 259.

¹⁰¹ E. OSTROM, *cit.*.

¹⁰² Ostrom conducted wide meta-analysis of existing common-pool resources case studies.; see E. OSTROM, *cit.*

¹⁰³ E. BERGE AND F. VAN LAERHOVEN, *cit.* at p. 161.

¹⁰⁴ Ostrom takes stakeholders as a point of departure for her research (whether empirical or theoretical); see E. OSTROM, *cit.* This approach is close to the research method I have implemented; see Section 1.

¹⁰⁵ Ostrom, (2009) *Governing the Commons*, table 3.1, at p. 90.

5. Graduated sanctions (scale of sanctions for appropriators violating community rules);
6. Conflict-resolution mechanisms (cheap and of easy access);
7. Minimal recognition of rights to organize (the self-determination of the community is recognized by higher-level/governmental authorities);

Plus, for CPRs that are parts of larger systems:

8. Nested enterprises (organization in the form of multiple layers of nested enterprises, with small local CPRs at the base level).

These design principles are helpful (but not compulsory) to identify whether other resource-management systems can be qualified as CPR or not.¹⁰⁶ Indeed, Ostrom leaves much space for heterogeneity and diversity in systems and places, insisting on the fact that the institutional arrangement should always be adapted to local needs and conditions in order to be efficient (which implies that other design principles may be better adapted to different situations).¹⁰⁷

In 2008, there was little legal scientific literature talking about the Plant Treaty,¹⁰⁸ and hence very little on the relationship between the Treaty and the commons theory. Since then, some authors, including non-academics, have assimilated the Treaty's MLS to a commons-type management regime.¹⁰⁹ The MLS, as a virtual pool management mechanism for selected plants, has been qualified as "global commons" or "global crop commons",¹¹⁰ "PGRFA

¹⁰⁶ E. OSTROM AND P. L. DELVILLE, 2009, "Pour Des Systèmes Irrigués Autogérés Et Durables: Façonner Les Institutions", Groupe de recherche et d'échanges technologiques, at p. 8 and 13 ; see also C. H. QUINN *et al.*, 2007, "Design Principles and Common Pool Resource Management: An Institutional Approach to Evaluating Community Management in Semi-Arid Tanzania", *Journal of Environmental Management*, Vol. 84, (1).

¹⁰⁷ E. OSTROM, *cit.*; later confirmed in E. OSTROM (eds.), "Understanding Institutional Diversity", Princeton University Press, 2005; E. OSTROM, 2009, "Design Principles of Robust Property-Rights Institutions: What Have We Learned?", *PROPERTY RIGHTS AND LAND POLICIES*, K. Gregory Ingram, Yu-Hung Hong, eds., Cambridge, MA: Lincoln Institute of Land Policy, Vol. ; see also M. COX, G. ARNOLD, AND S. V. TOMÁS, 2010, "A Review of Design Principles for Community-Based Natural Resource Management", *Ecology and Society* Vol. 15, ((4))

¹⁰⁸ End of 2007, less than 25 scientific publications on the Plant Treaty were collected, more than half of which are authored by non-academics. FAO documents and publications are not counted in this list. To cite examples: D. COOPER, 2002, "The International Treaty on Plant Genetic Resources for Food and Agriculture", *Review of European Community and International Environmental Law*, Vol. 11, (1); I. B. BJORNSTAD, 2004; M. RUIZ-MULLER, 2006, "Non-Conventional Uses of Plant Genetic Resources for Food and Agriculture: The Situation of International Centres under the International Treaty on Plant Genetic Resources for Food and Agriculture", *Yearbook of International Environmental Law*, Vol. 15, (1); E. TSIJOMANI, *ibid.* International Treaty on Plant Genetic Resources for Food and Agriculture: Legal and Policy Questions from Adoption to Implementation", Vol. ; C. GERSTETTER *et al.*, 2007, "The International Treaty on Plant Genetic Resources for Food and Agriculture within the Current Legal Regime Complex on Plant Genetic Resources", *Journal of world intellectual property*, Vol. 10, (3/4).

¹⁰⁹ T. DEDEURWAERDERE, 2010, "Institutionalizing Global Genetic Resource Commons: Towards Alternative Models for Facilitating Access in the Global Biodiversity Regime", *International Journal of Ecological Economics and Statistics*, Vol.

¹¹⁰ M. HALEWOOD, I. L. NORIEGA, AND S. LOUAFI, 2012, "Crop Genetic Resources as a Global Commons: Challenges in International Law and Governance", Routledge.

Commons”,¹¹¹ “communal seed treasury”,¹¹² “common seed pool”,¹¹³ “global genetic commons”,¹¹⁴ “positive commons”,¹¹⁵ etc. These terms are often used loosely in relation to the Treaty, without a precise definition or application¹¹⁶ of existing solid scientific literature on the commons theory.¹¹⁷ Building on this trend, Ostrom’s theory is used as a framework to screen the MLS through the lens of the commons. The aim is to analyse whether the MLS, as it has been created by Contracting Parties to the Treaty, can be understood as a CPR, according to Ostrom’s definition. My analysis leads to the conclusion that it is not fully the case.¹¹⁸ One of the difficulties relates to the global dimension of the MLS.¹¹⁹ Another problem lies in the fact that Contracting Parties have designed the institutional arrangement (even if it is based on prior existing practices by specific PGRFA stakeholders), and are managing it, with no formal space for all stakeholders to participate in the management of the MLS,¹²⁰ and with little trust emanating from stakeholders’ collaboration in the Governing Body forum.¹²¹ Recent developments in the theory of the commons have expanded its frontier to other disciplines (law, philosophy, sociology) and have allowed for reconceptualising Ostrom’s institutional analysis into envisaging the commons as a collective political construct.¹²² These new

¹¹¹ M. HALEWOOD AND K. NNADOZIE, "Giving Priority to the Commons: The International Treaty on Plant Genetic Resources for Food and Agriculture", in G. TANSEY AND T. RAJOTTE (eds), *The Future Control of Food - a Guide to International Negotiations and Rules on Intellectual Property, Biodiversity and Food Security*, London, Earthscan, 2008 at p 120.

¹¹² K. RAUSTIALA AND D. G. VICTOR, 2004, "The Regime Complex for Plant Genetic Resources", *International Organization*, Vol. 58, (2) at p. 303; and L. R. HELFER, 2004 at p. 87.

¹¹³ K. RAUSTIALA AND D. G. VICTOR, 2004 *op.cit.* at p. 303.

¹¹⁴ S. SAFRIN, 2004 *op.cit.* at p. 644. W. P. FALCON AND C. FOWLER, 2002 *op.cit.* at p. 200; see also L. R. HELFER, "Using Intellectual Property Rights to Preserve the Global Genetic Commons: The Itpgrfa", in K. MASKUS AND J. REICHMAN (eds), *International Public Goods and Transfer of Technology under a Globalized Intellectual Property Regime*, Cambridge, Cambridge University Press, 2005 at pp. 219-220.

¹¹⁵ G. VAN OVERWALLE, "L'intérêt Général, Le Domaine Public, Les Commons Et Le Droit Des Brevets D'invention", in M. BUYDENS AND S. DUSSOLIER (eds), *L'intérêt Général Et L'accès À L'information En Propriété Intellectuelle*, Bruxelles, Bruylant, 2008.

¹¹⁶ With the notable exception of the following publication: M. HALEWOOD, 2013, "What Kind of Goods Are Plant Genetic Resources for Food and Agriculture? Towards the Identification and Development of a New Global Commons", *op.cit.*

¹¹⁷ To cite only the most famous authors from an economic perspective on 'negative commons': G. HARDIN, 1968 *op.cit.*; on 'positive commons' E. OSTROM, "Governing the Commons : The Evolution of Institutions for Collective Action", *op. cit.* And E. OSTROM *et al.*, 1999, "Revisiting the Commons: Local Lessons, Global Challenges", *Science*, Vol. 284, (5412); and finally on a more legal perspectives of common goods see U. MATTEI, 2011, "Beni Comuni : Un Manifesto", Roma, Laterza And F. CAPRA AND U. MATTEI, 2015, "The Ecology of Law : Toward a Legal System in Tune with Nature and Community", Berrett-Koehler.

¹¹⁸ See Chapter 6 below.

¹¹⁹ See T. DEDEURWAERDERE, 2012, "Design Principles of Successful Genetic-Resource Commons for Food and Agriculture", *International Journal of Ecological Economics and Statistics*, Vol. 26, (3); and E. BROUSSEAU *et al.*, 2012, "Global Environmental Commons: Analytical and Political Challenges in Building Governance Mechanisms", Oxford University Press. As confirmed by Henry and Dietz or by Stern, a transposition of the design principles from the local to a global setting is not self-evident. A. D. HENRY AND T. DIETZ, 2011, "Information, Networks, and the Complexity of Trust in Commons Governance" or P. C. STERN, *ibid.* "Design Principles for Global Commons: Natural Resources and Emerging Technologies".

¹²⁰ For more details, see Chapter 6 section 8.

¹²¹ B. SIX *et al.*, 2015, "Trust and Social Capital in the Design and Evolution of Institutions for Collective Action", *International Journal of the Commons*, Vol. 9, (1), at pp. 164-167.

¹²² P. DARDOT AND C. LAVAL, 2014, "Commun: Essai Sur La Révolution Au Xxie Siècle", la Découverte; see also P. DARDOT AND C. LAVAL, 2010, "Du Public Au Commun", *Revue du MAUSS*, Vol. 35, (1).

“commons narratives”¹²³ are concisely explored and used to make normative proposals to mitigate the identified conceptual constraints in the Treaty functioning.

Section 4. Research motivation

Hearing about this new Treaty in 2004, I was fascinated by the way it attempted to strike a balance between public and private interests: alleviate poverty, secure food for all and at the same time protect and promote innovation in breeding activities.¹²⁴ The MLS, as an international tool to manage access and benefit-sharing for food and agriculture plants, creatively addresses these public/private objectives in its legal provisions.

However, studying “law in books” is restrictive. As a researcher, one can gain a lot of information and experience from the study of “law in action”.¹²⁵ Investigating actively the Plant Treaty from the inside, allowed me to gain a thorough contextual understanding of this international law in formation.¹²⁶ During my participation in Plant Treaty meetings as a negotiator and observer, I could comprehend better the issues at stake, and had a direct access to important informal information and to networking stakeholders. Most of all, this field experience facilitated my comprehension of underlying and sometimes hidden issues in the negotiations. It contributed to my choice of combining research methods as a support to

¹²³ For an economic perspective see the French economist Benjamin Coriat: B. CORIAT, 2013, “Le Retour Des Communs. Sources Et Origines D’un Programme De Recherche”, *Revue de la régulation. Capitalisme, institutions, pouvoirs*, Vol., (14) and B. CORIAT, 2015, “Le Retour Des Communs: & La Crise De L’idéologie Propriétaire”, Éditions Les Liens qui libèrent. For a legal perspective, see the Italian school with Ugo Mattei, Alberto Lucarelli and others: F. CAPRA AND U. MATTEI, 2015, “*The Ecology of Law: Toward a Legal System in Tune with Nature and Community*”, Berrett-Koehler Publishers; U. MATTEI, 2011, “*Beni Comuni-Un Manifesto (in Italian)*”; A. LUCARELLI, 2011, “Note Minime Per Una Teoria Giuridica Dei Beni Comuni”, *Espaço Jurídico*, Vol. 12, (2); A. LUCARELLI, 2013, “*La Democrazia Dei Beni Comuni*”, Editore Laterza; A. DANI, 2014, “Il Concetto Giuridico Di “Beni Comuni” Tra Passato E Presente”, *Historia et ius*, Vol. and also S. RODOTÀ, 2012, “*Il Diritto Di Avere Diritti*”, Laterza Roma-Bari. For a socio-philosophical perspective see the works from Pierre Dardot and Christian Laval: P. DARDOT AND C. LAVAL, 2010, “Du Public Au Commun”, *op.cit.*; and P. DARDOT AND C. LAVAL, “*Commun: Essai Sur La Révolution Au Xxie Siècle*”, *op. cit.*; see also S. GUTWIRTH AND I. STENGERS, 2016, “Le Droit À L’épreuve De La Résurgence Des Communs”, Vol.

¹²⁴ In 2003-2004, I wrote my LL.M Master thesis on “the influence of “communalism” in the International Treaty on Plant Genetic Resources for Food and Agriculture”.

¹²⁵ The phrase “law in action” is attributed to Roscoe Pound: R. POUND, 1910, “Law in Books and Law in Action”, *American Law Review*, Vol. 44. Further work following *legal realists scholars in the law-and-society tradition*, developed a “bottom up” approach. See J.-L. HALPERIN, 2011, “Law in Books and Law in Action: The Problem of Legal Change”, *Maine Law Review*, Vol. 64. For an easy approach to the topic, read the blog post by Bill Clune, Voss-Bascom Professor of Law Emeritus, University of Wisconsin Law School, “Law in action and law on the books: A primer”, posted on 12 June, 2013, available at <https://newlegalrealism.wordpress.com/2013/06/12/law-in-action-and-law-on-the-books-a-primer/>.

¹²⁶ This contextual analysis is explained below under Section 5.

the legal methodology. Indeed, understanding the law in the right way necessitates a clear contextual picture, which can be provided by complementary research means.¹²⁷

When I started my PhD research, the legal innovation in the MLS tickled my curiosity, but at that time it was (and still is) a young instrument, being complemented by implementation tools developed and adopted during the Governing Body meetings taking place every two years since 2006. Throughout my field experience, I could detect tensions between stakeholders, and issues that remained unresolved.¹²⁸ I was hoping that conducting research on the Plant Treaty and more specifically the MLS could help smoothen these tensions and promote the implementation of the Treaty. At that time, this was the main purpose for my study: contribute to an efficient implementation of the Treaty by identifying issues where tensions remained and propose solutions to alleviate them. After some time gaining scientific experience and theoretical knowledge, I was able to frame an innovative research approach¹²⁹ analysing the Treaty management system through the lens of the commons theory as explained above.

Section 5. Contextual analysis

Interpreting the law requires having a clear understanding of the context in which the law is designed and implemented. To acquire such comprehension, the present research is fed with information obtained through different methods inspired from other disciplines, i.e. sociology and anthropology. Indeed, the strict legal analysis of the Treaty only partly explains its slow implementation and the points of tensions between its stakeholders. Therefore, guidance and evidence were sought through open interviews with Treaty stakeholders and participatory observation at all but one Treaty Governing Body meetings between 2006 and 2015.¹³⁰ This contextual analysis is not used as a method per se and will not present

¹²⁷ Clune contends that “[t]he meaning of law is often ambiguous and open to interpretive judgment, leaving room for considerations of policy, politics, ideology, and value judgments based on the distinctive facts of particular cases.” Clune, B., “Law in action and law on the books: A primer”, *op. cit.*

¹²⁸ C. Frison, “International governance for conservation and sustainable use of PGRFA”, presentation made at the “World Conservation Congress”, October 9, 2008, Barcelona, Spain.

¹²⁹ C. Frison “The Multilateral System of access and benefit-sharing of the International Treaty: a Commons?”, PowerPoint presentation made at an internal seminar, UCLouvain, March 2010; see also C. Frison “Intellectual property Rights and the Plant Commons”, presentation made at the “Workshop Intellectual Property Law” of the “Ius Commune Conference 2010”, Leuven, Friday 26 November 2010.

¹³⁰ I did not attend the Fifth Session of the Governing Body, which took place from 24 to 28 September 2013, in Muscat, Oman.

specifically identifiable results and outputs. Rather it is used as a support tool (to choose research directions and take decisions accordingly) to clarify the research context and understand the law accordingly.

§ 1 Open interviews

Interviews are a classical method to collect information in socio-anthropological research. During my participation in Treaty meetings, I had the opportunity to meet with many PGRFA stakeholders. Based on the experience gained in conducting qualitative interviews¹³¹ during a Belgian survey on biodiversity conservation,¹³² interviews of Treaty stakeholders were carried out at every Governing Body meeting in order to (1) provide information on sensitive or hidden issues; (2) explain complex negotiation bargains; (3) highlight the stakes for each stakeholder group; (4) and identify other people to talk to in order to prepare for the stakeholder analysis book. Prior to every meeting, a list of stakeholder groups to be interviewed and a list of issues to be discussed were established. Most of the time, these issues were part of the agenda items addressed at the meeting. To maximize positive response to interview requests, interviews were kept very informal, were not recorded¹³³ and were anonymous. To avoid directing stakeholders' responses, I intervened the least possible in what the stakeholder wanted to say.¹³⁴

In this PhD, interviews are not used as an empirical method of research but rather as a personal guide and cross-check information source for the legal and stakeholder analysis, strengthening the overall legal research. This approach proved to be useful as support to anecdotal evidence coming directly from experts in the field. It also confirmed or verified the fact that some stakeholders view the Treaty MLS as a common management system for seeds, as an alternative path aimed at solving the private/public tension dichotomy. Ostrom has been referred to several times by interviewees, thereby supporting the theoretical framework exploring the "global seed commons".

¹³¹ J. OLIVIER DE SARDAN, 2008, *"La Rigueur Du Qualitatif: Les Contraintes Empiriques De L'interprétation Socio-Anthropologique [the Rigor of Qualitative: Empirical Constraints of Socio-Anthropological Interpretation]"*, Louvain-la-Neuve, Belgium, Brylant.

¹³² C. FRISON AND T. DEDEURWAERDERE, "Access to, Conservation and Use of Biological Diversity in the General Interest", 2006 .

¹³³ Rigorous anthropological interviews require *inter alia* recording the interviews. It was decided not to do so because it was not well accepted by negotiators, as most issues discussed were very sensitive. I recognize this deviation from the classical method.

¹³⁴ L. V. CAMPENHOUDT AND R. QUIVY, 2006, *"Manuel De Recherche En Sciences Sociales"* at pp.58-68; see also J. OLIVIER DE SARDAN, *cit.* at pp. 54-65.

§ 2 Participatory observation: meetings of the Governing Body as “field” experience

Participatory observation¹³⁵ is used in socio-anthropological sciences as one method to collect data and material from a field trip. Since 2004, I participated in many international meetings, mainly but not only of the Plant Treaty, either as an observer or as a negotiator (depending on the funding and mandate I had). Inspired by this participatory observation justification,¹³⁶ my experience in these meetings¹³⁷ as “field trips” allowed me to step into the community of the Plant Treaty and to understand negotiating mechanisms that are not referred to in scientific publications, Treaty documents and website or elsewhere.

Experiencing this approach has been particularly helpful in understanding why and how some public actors (e.g. international research centres, national gene banks, big research institutes) and private actors (e.g. seed industry) had a major impact on the development and implementation of the Treaty while other actors (peasant communities or smaller seed collections, such as the farmers’ seed exchange networks in France, or consumers) have remained marginal in influencing the design of the Treaty mechanism.

The contextual analysis contributed to provide a deeper understanding of the social and political issues at stake during the negotiation and implementation of the Treaty, which clearly impact on the creation of the norm. It enriched the legal interpretation of the identified issues and has opened doors that would otherwise have remained closed in appreciating why the Treaty struggles in reaching its objectives. Nonetheless, the contextual analysis is not *per se* a research method scientifically and rigorously implemented in the present work. As mentioned earlier, it was rather used as a complementary method along each of the three inductive research steps, guiding the decisions and directions taken throughout the work.

Section 6. Scope of the research

The present research has a legal, a material and a temporal scope. All three aspects are delineated below.

¹³⁵ L. V. CAMPENHOUDT AND R. QUIVY, *cit.*; see also J. OLIVIER DE SARDAN, *cit.*, and P. LAURENT, 2011, “*Observation Participante Et Engagement En Anthropologie*”, Louvain-la-Neuve, Harmattan_Academia.

¹³⁶ L. V. CAMPENHOUDT AND R. QUIVY, *cit.*, at pp. 177-180; see also P. LAURENT, *cit.*, at pp. 58-60; and J. OLIVIER DE SARDAN, *cit.* at pp. 39-104.

¹³⁷ I participated to all Governing Body meetings, except its Fifth Session, which took place in 2013 in Oman.

§ 1 The legal scope

Regarding the legal scope, the research focuses on the analysis of the Treaty. Related international instruments such as the Convention on Biological Diversity (CBD),¹³⁸ the Trade related Aspects of Intellectual Property Rights (TRIPS Agreement), and the International Union for the Protection of New Varieties of Plant (UPOV) will be touched upon, but only to describe the context and serve the arguments made on the Treaty. A Human Rights approach¹³⁹ will similarly not be addressed, although it is contended that it is an important component, which requires further research.

A. The Convention on Biological Diversity and the Nagoya Protocol

Due to its “fall-back-regulatory-instrument” position, the CBD and its Nagoya Protocol will partly be addressed in Part I, but only to explain the access and benefit-sharing concept and mechanism.

B. TRIPS, UPOV and intellectual property rights issues

The TRIPS agreement and UPOV will be mentioned when talking about intellectual property rights (IPRs) issues related to plants.¹⁴⁰ Although the topic of this work is introduced with an example illustrating the issues at stake from the intellectual property field, it is clearly stated that this research is not an IPR piece of work, as this perspective has already been addressed.¹⁴¹ Future negotiation outcomes in the World Intellectual Property Organization

¹³⁸ For an assessment of the linkages between the Treaty and the CBD, see K. GARFORTH AND C. FRISON, "Key Issues for the Relationship between the Convention on Biological Diversity and the International Treaty on Plant Genetic Resources for Food and Agriculture", 2007 .

¹³⁹ O. DE SCHUTTER, "Building Resilience: A Human Rights Framework for World Food and Nutrition Security", 2008; in relating the Human Rights aspects with the question of IP see G. VAN OVERWALLE, 2010, "Human Rights' Limitations in Patent Law", *Intellectual Property and Human Rights: A Paradox*, Vol. ; see also P. CULLET, 2007, "Human Rights and Intellectual Property Protection in the Trips Era", *Human Rights Quarterly*, Vol. 29.

¹⁴⁰ P. CULLET, 1999, "Revision of the Trips Agreement Concerning the Protection of Plant Varieties", *op.cit.*; P. CULLET, 2001, "Plant Variety Protection in Africa: Towards Compliance with the Trips Agreement", *Journal of African Law*, Vol. 45, (01); P. CULLET AND R. KOLLURU, 2003, "Plant Variety Protection and Farmers' Rights-Towards a Broader Understanding", *Delhi Law Review*, Vol. 2; see also a national case study provided for India P. CULLET AND J. RAJA, 2004, "Intellectual Property Rights and Biodiversity Management: The Case of India", *Global Environmental Politics*, Vol. 4, (1).

¹⁴¹ Previous colleagues have already studied this topic from an IP perspective. See the PhD theses of Nicolas Brahy and Fulya Batur. N. BRAHY, 2006, "The Property Regime of Biodiversity and Traditional Knowledge : Institutions for Conservation and Innovation" (Université catholique de Louvain, 2006); and F. BATUR, 2014, "Agrobiodiversity Conservation and Plant Improvement : Adjustments in Intellectual Property Rights Reclaiming the Public Domain Towards Sustainability and Equity" (Université catholique de Louvain, 2014).

(WIPO) fora¹⁴² could be relevant to this research when dealing with the IP questions for genetic resources and traditional knowledge,¹⁴³ but as no legally binding instruments have been adopted yet and as the negotiations are on hold, these negotiations will not be addressed.¹⁴⁴ Consistently with this choice, the theoretical framework of this work is not the theory of property.¹⁴⁵ Analysing international seed management through this property lens would benefit the field. Further research in this direction is greatly encouraged.¹⁴⁶

C. Biosafety and GMOs

Biosafety international regulation¹⁴⁷ could also be relevant as the PGRFA covered by the Treaty are potentially genetically modified organisms (GMOs). However, The Cartagena Protocol on Biosafety regulates the safe transfers and the commercialization aspects of GMO products, and does not touch upon the common management for the conservation, sustainable use and access and benefit-sharing of PGRFA.¹⁴⁸ Therefore, this instrument is considered outside of the limits of this thesis.

¹⁴² Such as the Intergovernmental Committee (IGC) on Intellectual Property, Genetic Resources and Traditional Knowledge and Folklore, or within the context of the negotiations on Substantive Patent Law Treaty.

¹⁴³ G. VAN OVERWALLE, 2005, "Protecting and Sharing Biodiversity and Traditional Knowledge: Holder and User Tools", *Ecological Economics*, Vol. 53, (4); see also G. VAN OVERWALLE, "A Man of Flowers: A Reflection on Plant Patents, the Right to Food and Competition Law", in J. DREXL, *et al.* (eds), *Technology and Competition - Technologie Et Concurrence. Contributions in Honour of Hanns Ullrich - Mélanges En L'honneur De Hanns Ullrich*, Brussels, Larcier, 2009.

¹⁴⁴ The negotiations at the IGC are currently on hold, due to political holdbacks and blockages from certain countries. See "US Proposes Suspension of WIPO TK Committee; Switzerland and Others Counter" (11/09/2015) by Catherine Saez for "IP Watch"; available at <http://www.ip-watch.org/2015/09/11/us-proposes-suspension-of-wipo-tk-committee-switzerland-and-others-counter/> (accessed on September 10, 2015).

¹⁴⁵ Using law & economics, Nicolas Brahy has examined the management system for genetic resources and traditional knowledge from such property perspective. N. BRAHY, "The Property Regime of Biodiversity and Traditional Knowledge : Institutions for Conservation and Innovation,".

¹⁴⁶ In line with this suggestion, the Maison Française d'Oxford organizes a workshop on "CommonPlant - Reframing the legal system to face the challenges of an increasing world population and the preservation of agrobiodiversity", 30th September/1st October 2016 in Oxford, UK. The aim is to move beyond the reflection upon plant private property and access using the theory of property towards a third way between public and public property: the commons.

¹⁴⁷ The Biosafety Cartagena Protocol to the CBD. A detailed analysis of its implementation is provided in the following book M.-C. CORDONIER SEGGER, F. PERRON-WELCH, AND C. FRISON, 2012, *Legal Aspects of Implementing the Cartagena Protocol on Biosafety*, Cambridge ; New York, Cambridge University Press.

¹⁴⁸ For information on the implementation of the Cartagena Protocol M.-C. CORDONIER SEGGER, F. PERRON-WELCH, AND C. FRISON, *cit.*; and especially in Africa, see C. FRISON AND T. JOIE, 2006, "Elaboration D'une Reglementation De Biosecurite Par Certains Pays En Developpement: Experiences Dans La Mise En Oeuvre Du Protocole De Cartagena En Afrique De L'ouest", *Law Env't & Dev. J.*, Vol. 2; and C. FRISON AND T. JOIE, "Expériences Sur L'élaboration De Nouvelles Lois De Développement De La Biosécurité Et De La Biotechnologie: Perspectives De Réformes Légales En Afrique De L'ouest", in T.F. MCINERNEY (eds), *Searching for Success: Narrative Accounts of Legal and Institutional Reform in Developing Countries*, Rome, International Development Law Organization IDLO, 2006.

D. International law versus national legislations on biodiversity or seed management

This work remains exclusively at the international level and will not dig into national implementation of the Treaty, or only mention them in a very limited way as examples. Seed legislations are largely national and will therefore not be dealt with (even though they have a strong impact on seed exchange), except when mentioned as illustrations. Indeed, attention is centred on the international level as the aim is to understand governing mechanisms set by stakeholders in the Treaty at the global level, using global theories.

E. Human rights

Furthermore, due to time, resources and scope restrictions, the Human Rights' perspective on access to seeds and the right to food have not been deeply explored.¹⁴⁹ The right to food can be defined as “the right to have regular, permanent and unrestricted access, either directly or by means of financial purchases, to quantitatively and qualitatively adequate and sufficient food corresponding to the cultural traditions of the people to which the consumer belongs, and which ensure a physical and mental, individual and collective, fulfilling and dignified life free of fear.”¹⁵⁰ The former United Nations Commission on Human Rights (now United Nations Human Rights Council) has established a specific mandate on the right to food¹⁵¹ since the year 2000 by nominating a Special Rapporteur in the right to food¹⁵² to promote the full realization of the right to food inter alia through the adoption of measures at

¹⁴⁹ G. VAN OVERWALLE, "A Man of Flowers: A Reflection on Plant Patents, the Right to Food and Competition Law", *op. cit.*, at pp. 311-329.

¹⁵⁰ This definition is in line with the core elements of the right to food as defined by General Comment No. 12 of the United Nations Committee on Economic, Social and Cultural Rights (the body in charge of monitoring the implementation of the International Covenant on Economic, Social and Cultural Rights in those states which are party to it). The Committee declared that “the right to adequate food is realized when every man, woman and child, alone or in community with others, has physical and economic access at all times to adequate food or means for its procurement. The right to adequate food shall therefore not be interpreted in a narrow or restrictive sense which equates it with a minimum package of calories, proteins and other specific nutrients. The right to adequate food will have to be realized progressively. However, States have a core obligation to take the necessary action to mitigate and alleviate hunger even in times of natural or other disasters.” Available at <http://www.ohchr.org/EN/issues/food/Pages/FoodIndex.aspx>

¹⁵¹ The Office of the High Commissioner for Human Rights defines the Special Rapporteur “as an independent expert appointed by the Human Rights Council to examine and report back on a country situation or a specific human rights theme. This position is honorary and the expert is not a staff of the United Nations nor paid for his/her work. Since 1979, special mechanisms have been created by the United Nations to examine specific country situations or themes from a human rights perspective. The United Nations Commission on Human Rights, replaced by the Human Rights Council in June 2006, has mandated experts to study particular human rights issues. These experts constitute what are known as the United Nations human rights mechanisms or mandates, or the system of special procedures.” Available at <http://www.ohchr.org/EN/issues/food/Pages/FoodIndex.aspx>

¹⁵² The first Special Rapporteur on the Right to Food was Jean Ziegler. He performed two mandates from 2000 to 2004 and then to 2008. Olivier De Schutter succeeded with two mandates from 2008 to 2014. The current Rapporteur is Hilal Elver.

the national, regional and international levels.¹⁵³ An example of such measures occurred in 2009, where UN countries have adopted a “Declaration of the World Summit on Food Security”,¹⁵⁴ where “Five Rome Principles for Sustainable Global Food Security” have been defined to achieve four strategic objectives to “take urgent action to eradicate hunger from the world”.¹⁵⁵ The Special Rapporteur on the right to food pleads to improve the global governance of food security. He stresses that “[i]n times of crisis, more than ever, only by strengthening multilateralism can we hope to effectively realize the right to food.”¹⁵⁶ Although the right to food is enjoying a growing recognition for the last decade,¹⁵⁷ it suffers serious implementation and enforcement problems.¹⁵⁸ In 2015, several studies have been published on the inter-relation of human rights, seeds laws and Farmers’ Rights,¹⁵⁹ paving the way for further research on the intersection between access to seeds and the right to food.¹⁶⁰

F. International law and international relations

Finally, State cooperation within international negotiating fora holds a key place and impact in this research. Notwithstanding the fact that the analysis shows that cooperation

¹⁵³ C. FRISON AND P. CLAEYS, "Right to Food in International Law", in P. THOMPSON AND D. KAPLAN (eds), *Encyclopedia of Food and Agricultural Ethics*, Springer Netherlands, 2014.

¹⁵⁴ “World leaders convened at FAO Headquarters for the World Summit on Food Security unanimously adopted a declaration pledging renewed commitment to eradicate hunger from the face of the earth sustainably and at the earliest date. Countries also agreed to work to reverse the decline in domestic and international funding for agriculture and promote new investment in the sector, to improve governance of global food issues in partnership with relevant stakeholders from the public and private sector, and to proactively face the challenges of climate change to food security.” See <http://www.fao.org/wsfs/en/>

¹⁵⁵ *Declaration of the World Summit on Food Security* § 1, at http://www.fao.org/fileadmin/templates/wsfs/Summit/Docs/Final_Declaration/WSFS09_Declaration.pdf

¹⁵⁶ Report “Crisis into opportunity: reinforcing multilateralism” presented to the Human Rights Council, Follow-up session on the Global Food Crisis at the 12th session, 17 September 2009, at p. 1 and 22-25, available at http://www.srfood.org/images/stories/pdf/officialreports/20090917_a-hrc-12-31_en.pdf

¹⁵⁷ C. SAGE, 2014, “Food Security, Food Sovereignty and the Special Rapporteur Shaping Food Policy Discourse through Realising the Right to Food”, *Dialogues in Human Geography*, Vol. 4, (2); see also P. CULLET, 2005, “Seeds Regulation, Food Security and Sustainable Development”, *op.cit.*; and N. LAMBEK *et al.*, 2014, *Rethinking Food Systems: Structural Challenges, New Strategies and the Law*, Springer Science & Business Media; C. FRISON AND P. CLAEYS, *op. cit.*; O. DE SCHUTTER, “The Role of the Right to Food in Achieving Sustainable Global Food Security”, 2009.

¹⁵⁸ L. NIADA, 2006, “Hunger and International Law: The Far-Reaching Scope of the Human Right to Food”, *Conn. J. Int'l L.*, Vol. 22, at pp. 177-199. Niada details extensively the enforcement of the right to food and suggests that the right to food may benefit from enforcement mechanisms other than judicial and legally binding ones (at p. 195). See also P. CLAEYS, 2015, “The Right to Food: Many Developments, More Challenges”, *Canadian Food Studies - La Revue Canadienne des Etudes sur l'Alimentation*, Vol. 2, (2 - Special Issue).

¹⁵⁹ A. CHRISTINCK AND M. WALLOE TVEDT, 2015, “The Upov Convention, Farmers’ Rights and Human Rights”, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH; LA VIA CAMPESINA AND GRAIN, “Seed Laws That Criminalize Farmers”, 2015 and T. BRAUNSCHEWIG *et al.*, “Owning Seeds, Accessing Food - a Human Rights Impact Assessment of Upov 1991 Based on Case Studies in Kenya, Peru and the Philippines”, 2014 THE BERNE DECLARATION; see also L. R. HELFER, “Mapping the Interface between Human Rights and Intellectual Property”, in C. GEIGER (eds), *Research Handbook on Human Rights and Intellectual Property*, Cheltenham, Edward Elgar Publishing Limited, 2015.

¹⁶⁰ The right to food requires that everyone has adequate access to food or the means to procure it. See *Report of Special Rapporteur on the Right to Food*, UNITED NATIONS GENERAL ASSEMBLY (Aug. 22, 2010), available at <http://www.righttofood.org/new/PDF/A62289.pdf>.

between states constitutes a very important aspect in understanding the seed regime-complex, due to the legal focus of the present research and to a lack of training in international relations (IR), I do not claim to conduct research following IR methods.¹⁶¹ Again, further research in the field would benefit the resolution of the issues at stake.

§ 2 The plant genetic resources for food and agriculture material scope

As for the material scope, it is limited to plant genetic resources for food and agriculture covered by the Treaty (Article 3). The Treaty defines PGRFA as “any genetic material of plant origin of actual or potential value for food and agriculture”.¹⁶² The Treaty defines “*genetic material*” as “any material of plant origin, including reproductive and vegetative propagating material, containing functional units of heredity.” However, the MLS creates a more restrictive sub-category of seeds, listed in Annex I to the Treaty. Article 11.2 stipulates that the MLS covers only the “PGRFA listed in Annex I that are under the management and control of the Contracting Parties and in the public domain.” Article 12.3 (a) further specifies that “access shall be provided solely for the purpose of utilization and conservation for *research, breeding and training for food and agriculture*, provided that such purpose does not include chemical, pharmaceutical and/or other non-food/feed industrial uses.” (Emphasis added)¹⁶³ This means that PGRFA that are used for another purpose, such as the production of bio-fuels, cosmetics or pharmaceuticals are not considered as PGRFA under the MLS. This distinction is important as the exchange mechanism and applicable law will differ when the subject matter is PGRFA or other plant genetic resources (i.e. plant genetic resources used for bio-fuels, cosmetics, pharmaceuticals, etc.). Indeed, for the latter, it is most likely that the CBD and its access and benefit-sharing (ABS) obligations under the Nagoya Protocol are applicable.¹⁶⁴

¹⁶¹ Yet, IR publications are referred to when appropriate; e.g. S. JUNG CURT, “Institutional Interplay in International Environmental Governance: Policy Interdependence and Strategic Interaction in the Regime Complex on Plant Genetic Resources for Food and Agriculture,”.

¹⁶² Plant Treaty, Article 2.

¹⁶³ See Chapter 4, section 2 for an extensive explanation of the Treaty scope issues.

¹⁶⁴ See Chapter 2, section 5.

§ 3 The temporal scope

Lastly, regarding the temporal scope, the historical analysis of seed management is limited to a period of time covering the second half of the twentieth century (1960-2000), and the legal analysis of the implementation of the Treaty is concentrated on the last decade (2004-2016). This temporal scope covers the important historical facts that have influenced the design of the Treaty, i.e. the development of IPRs and plant breeders' rights; the rise of Farmers' Rights and the recognition of States' sovereign rights over their genetic resources; and the emergence of a common governing tool to manage PGRFA.

Section 7. Contribution to the state of the art

The added value of this research is three-fold: on the theoretical level; on the methodological level; and on the technical level.

§ 1 Contribution to the theoretical state of the art

On the theoretical level, it is the first time that a legal analysis of the Plant Treaty is carried out in such depth, screening all legal documents related to the Treaty negotiation and implementation (until October 2015). Furthermore, the legal analysis has been expanded to include policy dimension, in order to take into account the fact that the international regulation of PGRFA is a highly politicized topic.¹⁶⁵ Added to this, it is also the first time that the Treaty is examined using a governance lens, i.e. the theory of the commons, and with an all-embracing perspective. The identification of six important underlying principles relating the Treaty to the theory of the commons is a contribution to the understanding of the commons theory. Using these principles as well as the classic (Ostrom) and new vogue (*inter alia* Mattei, Dardot and Laval) commons scholars' work to make normative proposals towards redesigning an effective global seed commons constitutes a further contribution to the study of the theory of the commons.

¹⁶⁵ In 2010, a legal thesis on the Treaty was carried out in a restrictive approach; see T. T. V. DINH, 2010, "Le Traité International Sur Les Ressources Phytogénétiques Pour L'alimentation Et L'agriculture: Instrument Innovant Pour La Gestion De L'agro-Phytodiversité" (Université de Limoges, 2010).

§ 2 Contribution to the methodological state of the art

On the methodological level, widening the research methods to other concepts, theories and methods from other disciplines (political sciences, sociology, and anthropology) allows to embrace a 360° analysis of the subject. Doing so addresses well topics relating to sustainable development, such as the Treaty. Undertaking a legal and a stakeholder analyses through the lens of governance enables to cover many different aspects, which a sole legal analysis would miss. This method also answers the rising call to implement interdisciplinary methods in scientific research. Furthermore, doing so using an inductive research approach (starting from the context and moving up towards a case-study and finally towards a theory) is unusual and original, as generally, a theory is applied to a specific case study. While results found by using an inductive approach are more uncertain, it allows for greater creativity in the normative contribution to the state of the art.

§ 3 Contribution to the technical state of the art

Finally, at a technical level, this thesis aims at formulating recommendations addressed at Treaty stakeholders. Following the identification of 17 constraints in the implementation of the Treaty, eight specific conceptual constraints are highlighted as problematic in the current design of the common management of seeds. Using the theory of the commons and specifically identified underlying principles, eight recommendations are made to mitigate these conceptual constraints and feed the debate and negotiations during the review process of the Treaty, currently taking place in the Governing Body. Thereby, the author of the present work hopes to contribute to clarifying challenging issues at stake during the Treaty's review process and guiding the redesign of an effective global seed commons for reaching food security and sustainable agriculture.

Overall conclusion and further developments

Synthesis

Access to seeds for farmers (like access to land or to water) is an essential component for reaching food security and sustainable agriculture. However, there are several impediments to easy access including: erosion of agrobiodiversity; legal and technological tools enclosing PGRFA; political hurdles. These impediments are amplified by risks and hazards resulting from climate change. These are immediate challenges which Humanity has to address in the collective interest.

The present PhD thesis attempted to unravel some of the questions and difficulties related to these challenges by analysing in great detail the International Treaty on Plant Genetic Resources for Food and Agriculture, which aims at conserving, sustainably using and facilitating access to PGRFA. Implementing an unusual inductive research approach, where several disciplines, theories, concepts and methods are mixed, a thorough legal analysis of the Treaty was carried out and complemented by a stakeholders' analysis and a participatory observation-type field research within the Treaty's forum. This mixed method allowed to capture a 360° view and to understand the issues at stake in the international negotiations regulating access to seeds.

The research results showed that, although the Treaty and its instruments (Multilateral System of access and benefit-sharing, Third Party Beneficiary, Benefit-sharing Fund, etc.) are very innovative from an international law perspective, the in-depth study of their implementation revealed major dysfunctions. Their examination enabled to identify eight important conceptual constraints in the Treaty's structure, which hinder Contracting Parties to reach the set objectives. The theory of the commons has been identified as a useful theoretical framework to address these constraints. Six commons' underlying principles were set forward to mitigate these constraints, and eight recommendations were formulated in an attempt to improve the Treaty at the conceptual level. Table 6.2 below provides a summary of the conceptual constraints and recommendations.

Overall Conclusion

By transforming the current intergovernmental multilateral legal instrument into an effective and collectively constructed political *Global Seed Commons*, the overall objective of this work is to contribute to designing an alternative path to the current seed regulatory setting entangled in an out-of-date public/private good dichotomy appropriation scheme. One cross-cutting aspect that appears all along the analysis is the lack of recognition of the role and rights of smallholder farmers. Recognition of Farmers' Rights at the international level is promoted as a compulsory step in order to overcome the imbalance of rights pertaining to seeds and to reach the food security and sustainable agriculture overall goals of the Treaty.

Treaty topics	Conceptual constraints	Recommendations
1. Sustainable agriculture & food security	Overall goals of Treaty not reached <i>inter alia</i> because not recognized as direct objectives	Formally recognize food & nutrition security and sustainable agriculture as direct objectives of the Treaty
2. Scope	Difference between scope of Treaty and scope of MLS leading to dysfunction	Harmonize the scope of the MLS with that of the Treaty to include all PGRFA Expand the Treaty boundaries to make it truly global
3. Farmers' Rights	No recognition of farmers' role in PGRFA management and of their associated rights at the international level in the same terms as IPRs	Formally recognize Farmers' Rights at the international law level Commit to implement these rights at the national level
4. Facilitated access	Facilitated access is absent for the ultimate beneficiaries i.e. farmers	Recognize a direct facilitated access to PGRFA for farmers Promote <i>sui generis</i> PVP systems to recreate effective farmers' exemption
5. Benefit-sharing / Benefit-sharing Fund	Farmers are put in a passive situation of beneficiaries denying their <i>de facto</i> active role as main stakeholder in the food production chain	Benefits of the Treaty should reach all beneficiaries Reposition Farmers as active stakeholders in the Treaty, MLS and BSF management

6. Information / knowledge	<p>Appropriation, Protection</p> <p>Availability mainly of one type of information of interest to breeders</p>	<p>Develop the GLIS keeping in mind the overall goals of the Treaty and the needs of smallholder farmers</p> <p>Seek means to turn the MLS into a space where traditional knowledge would be protected from misappropriation</p>
7. Third Party Beneficiary	<p>Preservation of MLS rights, but not preservation of all stakeholders' rights.</p> <p>Lack of system to balance powers</p>	<p>Advertise on the 3PB's role & procedures to the Treaty community and the public</p> <p>Deal with 3PB cases in a more transparent way</p> <p>Expand 3PB's mandate to compliance</p>
8. Participation / governance	<p>Governance of MLS remains at state level</p> <p>Lack of inclusion of all stakeholders at all levels</p> <p>Problem of trust</p>	<p>Allow all stakeholders to effectively participate in the global seed commons governance</p>

Table 6.2: Summary table of recommendations

Future Developments

This doctoral thesis provides recommendations for the political construct of a global seed commons, which are hoped to be useful in the current review process of the Treaty. However, it does not provide all the answers, but rather opens many more questions. In the following last paragraphs, two kinds of further research are proposed: developments on the theoretical level and on the technical level.

On the theoretical level, several directions could be followed.

First, as a continuation to the present use of the theory of the commons, further work could be carried out with what has been called “the new vogue of the commons”.¹⁶¹⁰ Dardot

¹⁶¹⁰ See the above mentioned authors in Chapter 6 such as Ugo Mattei, Pierre Dardot and Christian Laval, Benjamin Coriat, etc.

and Laval¹⁶¹¹ question the notion of appropriation and promote the collective and political decision to design specific resources or services as not appropriable. Inappropriability is envisaged as a necessary new category, next to the public and the private ownership and management of resources or services, if the objective is to serve the collective interest and sustainability requirement. Could inappropriability be envisaged for governing PGRFA? Mattei and Capra¹⁶¹² call for a new vision of the role of Law, as an all-embracing science, an integral part of a whole, i.e. taking an ecological perspective of the Law. This is a seducing perspective for those observing the functioning of nature and humanity within nature as a “holistic system”. Applying this to PGRFA management would require to position ourselves differently; to rethink our approach to the farmer-seed (human-nature) relationship.

Second, the Treaty, and the present research findings, could be examined through the lens of the Global Public Goods (GPG) theory developed in the early 2000s by Inge Kaul *et al.*¹⁶¹³ The GPG theory attempts to provide answers to problems related to globalization. Kaul *et al* argue that many contemporary’s international crises – such as food crises – have their roots in serious Global Public Goods undersupply. They identify three policy gaps to be closed for their theory to reach normative and effective impacts on international legal regimes: a “jurisdictional gap”, a “participation gap”, and an “incentive gap”. The jurisdictional gap focuses on the “discrepancy between a globalized world and national, separate units of policy-making.” The participation gap highlights that today, international cooperation is still mainly an intergovernmental process, whereas important new global actors, such as international non-governmental organizations or citizens’ actions, have emerged. The incentive gap stresses the importance of promoting international cooperation in the implementation of international agreements. These gaps match quite well many of the Treaty constraints identified above. Further research could assess if and how mitigating these gaps would improve the effectiveness of the Global Seed Commons.¹⁶¹⁴ A general questioning of the role of States in international law would need to be addressed with regard to the necessary transition towards

¹⁶¹¹ P. DARDOT AND C. LAVAL, 2010, "Du Public Au Commun", *op.cit.* ; P. DARDOT AND C. LAVAL, "Commun: Essai Sur La Révolution Au Xxie Siècle", *op. cit.*.

¹⁶¹² F. CAPRA AND U. MATTEI, "The Ecology of Law: Toward a Legal System in Tune with Nature and Community", *op. cit.*.

¹⁶¹³ I. KAUL, I. GRUNBERG, AND M. A. STERN (eds.), "Global Public Goods - International Cooperation in the 21st Century", Oxford, Oxford University Press, 1999 ; I. KAUL *et al.*, "Providing Global Public Goods - Managing Globalization", ; I. KAUL AND P. CONCEIÇÃO, 2006, "The New Public Finance : Responding to Global Challenges", New York, Oxford University Press .

¹⁶¹⁴ This research is underway, with a preliminary study to be presented at the “3rd Thematic IASC Conference on Knowledge Commons” taking place next October in Paris. The paper to be presented with my colleague Charlotte de Callataÿ is entitled “Exploring the normativity and effectiveness of Global Public Goods with two case studies: the Global Seed Commons and the Convention on the Law of the Non-navigational Uses of International Watercourses”.

agro-ecologically sustainable systems.¹⁶¹⁵ Indeed, States ought to find a new role, responding to the challenges of our transitioning Anthropocene, different from the welfare state or the liberal State, and facilitating or even empowering citizens in their initiatives towards sustainable livelihoods.

Studying the Treaty through the lens of Human Rights could also complement the present work, in particular regarding the formal recognition of Farmers' Rights at the international level. Indeed, developments taking place in promoting and recognizing specific rights to seeds, to land, to water, to food, and all embracing peasants' rights¹⁶¹⁶ within different fora could greatly enhance the Treaty's implementation. Using the concept of "essential resource"¹⁶¹⁷ as a complementary concept promoting the common management of PGRFA could be one way to enter this human rights approach.

Several other theoretical frameworks could be useful to work on the Treaty. Behavioral studies could be an interesting field to research in order to unravel the delicate question of trust during Treaty negotiations and in collective management systems, especially within communities constituted by heterogeneous seed stakeholders. In international relations, studies could further build on the results of this thesis by digging the difficult question of designing horizontally coherent international policies. That is to say, to develop policies with a holistic view of the general system in which the policy is designed (i.e. relate it with neighboring policies). Applied to PGRFA management, this would mean to relate the international agricultural policy to a (currently inexistent) international food policy, involving health-, environmental-, and economic-related policies, etc...

Further research at a technical level could also supplement this work. While it is not the direct objective of this PhD to propose ready-to-implement solutions to the Treaty implementation constraints identified throughout the analysis, the overall objective is to serve the discussions of the Treaty review process, which aims at mitigating the said constraints. Along that line, several suggestions are made to propose additional technical investigations.

¹⁶¹⁵ O. DE SCHUTTER, "La Cage Et Le Labyrinthe : S'évader De La Religion De La Croissance," in *21ème Congrès des économistes belges de langue française* (Liège2015), at pp. 9-10.

¹⁶¹⁶ *Draft Declaration On The Rights Of Peasants And Other People Working In Rural Areas*, Advanced Version 27/01/2015, Discussed at the Third Session of the Open-ended Intergovernmental Working Group of the United Nations Human Rights Council, which took place from 17 to 20 May 2016, in Geneva, available at <http://www.ohchr.org/en/hrbodies/hrc/ruralareas/pages/3rdsession.aspx>

¹⁶¹⁷ K. PISTOR AND O. DE SCHUTTER, *cit.*.

First, in the IP field, further exploration on how to (re-)design a farmer's exemption in the MLS in relation to the existing legislation on plant variety protection and patents is greatly needed, in furtherance of Correas' proposal.¹⁶¹⁸ Could the MLS coupled with *sui generis* plant variety protection laws recreate an effective farmer's exemption? Additionally, a clearer understanding and vision of how to protect PGRFA-related traditional knowledge is required. Besides, further work is needed to mitigate the impediments of access to PGRFA due to national seed laws. Digging into the technicalities of intellectual property protection legislation and seed laws is therefore crucial.

In addition, in international relations studies and public international law, further exploration is needed to review the governance systems in the Treaty. Would an adaptation of the Governing Body rules allow for a FAO Committee on World Food Security-type of multi-stakeholder governance? How could participatory democracy¹⁶¹⁹ be mobilized to promote an effective multi-stakeholders governance in the Treaty?

Additionally, highly technical issues have been raised regarding the administrative burden of PGRFA management and exchanges between stakeholders. A deeper examination of the SMTA technical rules regarding tracking and identification would be useful in order to facilitate the access to Annex I PGRFA. Financial issues are also key to the dysfunction of the Treaty. Different means of funding the Treaty ought to be envisaged and tested, etc. The list of technical developments could be quite long.¹⁶²⁰

These theoretical and technical developments provide interesting avenues for further investigation.

¹⁶¹⁸ C. M. CORREA, "Plant Variety Protection in Developing Countries: A Tool for Designing a Sui Generis Plant Variety Protection System: An Alternative to Upov 1991,".

¹⁶¹⁹ L. BLONDIAUX, 2008, "*Le Nouvel Esprit De La Démocratie: Actualité De La Démocratie Participative*", Seuil Paris ; and moving towards a deliberative democracy, see C. GIRARD AND A. LE GOFF, 2010, "*La Démocratie Délibérative: Anthologie De Textes Fondamentaux*", Hermann.

¹⁶²⁰ Not to mention biodiversity-related studies, where innovative strategies and technologies for conservation and sustainable use of PGRFA would benefit the implementation of the Treaty, and in particular focus on *in situ* and on-farm conservation and sustainable development strategies. N. MAXTED, B. V. FORD-LLOYD, AND J. G. HAWKES, 2013, "*Plant Genetic Conservation: The in Situ Approach*", Springer Science & Business Media; E. DULLOO, "Conservation and Availability of Plant Genetic Diversity: Innovative Strategies and Technologies" (paper presented at the IV International Symposium on Plant Genetic Resources, Acta Horticulturae 2015,

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1969 - *Vienna Convention on the Law of Treaties*, 23 May 1969, 8 I.L.M. 679.

1972 - *Declaration of the United Nations Conference on the Human Environment*, Stockholm 1972, 16 June - UN Doc. A/CONF.48/14, 11 ILM 1461 (1972).

1973 - *Convention on the Grant of European Patents (European Patent Convention)* of 5th October 1973, as amended by decisions of the Administrative Council of the European Patent Organization of 21 December 1978, 13 December 1994, 20 October 1995, 5 December 1996, 10 December 1998 and 27 October 2005.

1983 - *International Undertaking on Plant Genetic Resources*, adopted by FAO Conference Resolution 8/83 in Rome on 23rd November 1983.

1992 - *Agenda 21*, adopted by Resolution 3 of the Nairobi Conference, the UNCED, held in Rio de Janeiro in 1992. 22 May 1992 at the UNEP Conference held in Nairobi, Kenya

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2000 - *Millennium Development Goals (MDGs)* adopted during the 6-8 September 2000 United Nations Millennium Summit, in New York.

2001 - *International Treaty on Plant Genetic Resources for Food and Agriculture*, adopted by FAO Conference Resolution 3/01, on 3rd November 2001 (entry into force 23 June 2004), 2400 UNTS 303.

2002- *Bonn Guidelines on access to genetic resources and the fair and equitable sharing of the benefits arising from their utilization*, adopted at CBD-COP 6, in The Hague, Netherlands 7 - 19 April 2002, UNEP/CBD/COP/6/20, Annex 1, Decision VI/24A

2007 - *Declaration of Nyéléni* adopted in Sélingué, Mali on 27 February 2007 at the Global Forum for Food Sovereignty

2008 - *Cordoba Declaration on the Right to Food and the Governance of the Global Food and Agricultural Systems*, 10 December 2008, was launched on the occasion of the 60th anniversary of the Universal declaration of Human Rights following a process pursued at the Right to Food Forum organised by the FAO Right to Food Unit

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II. Ad Hoc Advisory Committee on the Funding Strategy

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- Report

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- Report

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- Report

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- Report

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- Report

Treaty Secretariat, "Report of the Seventh Meeting of the Ad Hoc Advisory Committee on the Funding Strategy", Seventh Meeting of the Ad Hoc Advisory Committee on the Funding Strategy, Doc. IT/ACFS-7/12/Report, Geneva, Switzerland, 18-20 September 2012.

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- Report

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III. Ad Hoc Technical Advisory Committee on the Standard Transfer Agreement and the Multilateral System

FIRST MEETING

- Report

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SECOND MEETING

- Report

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- Report

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FOURTH MEETING

- Report

Treaty Secretariat, "Report of the Fourth Meeting of the Ad Hoc Advisory Technical Committee on the SMTA and the MLS", Fourth Meeting of the Ad Hoc Technical Advisory Committee on the Standard Transfer Agreement and the Multilateral System, Doc. IT/AC-SMTA-MLS 4/12/Report, Rome, Italy, 6-7 November 2012.

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RESUMED FOURTH MEETING

- Report

Treaty Secretariat, "Resumed Fourth Meeting Of The Ad Hoc Advisory Technical Committee On The Standard Material Transfer Agreement And The Multilateral System", Resumed Fourth Meeting of the Ad Hoc Technical Advisory Committee on the Standard Transfer Agreement and the Multilateral System, Doc. IT/AC-SMTA-MLS Res4/13/Report, Rome, Italy, 12 April 2013.

IV. Ad Hoc Technical Committee on Sustainable Use of Plant Genetic Resources for Food and Agriculture

FIRST MEETING

- Report

Treaty Secretariat, "Report of the First Meeting of the Ad Hoc Technical Committee on Sustainable of Plant Genetic Resources for Food and Agriculture", First Meeting of the Ad Hoc Technical Committee on Sustainable of Plant Genetic Resources for Food and Agriculture, Doc. IT/ACSU-1/12/Report, Rome, Italy, 8-9 November 2012.

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SECOND MEETING

- Report

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Sustainable of Plant Genetic Resources for Food and Agriculture, Doc. IT/ACSU-2/15/3, Rome, Italy, 2-3 March 2015.

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V. Ad Hoc Open-ended Working Group to Enhance the Functioning of the Multilateral System of Access and Benefit-sharing

FIRST SESSION

- Report

Treaty Secretariat, "Report of the First Meeting of the Ad Hoc Open-ended Working Group to Enhance the Functioning of the Multilateral System", First Meeting of the Ad Hoc Open-ended Working Group to Enhance the Functioning of the Multilateral System, Doc. IT/OWG-EFMLS-1/14/Report, Geneva, Switzerland, 14-16 May 2014.

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Treaty Secretariat, "Background on the Work Undertaken by the Ad Hoc Advisory Committee on the Funding Strategy, and its Further Development", First Meeting of the Ad Hoc Open-ended Working Group to Enhance the Functioning of the Multilateral System, Doc. IT/OWG-EFMLS-1/14/3, Geneva, Switzerland, 14-16 May 2014.

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- **Invitations and Notifications**

Treaty Secretariat, "Information Event on 13th May: History and existing work on Innovative approaches to mobilize income to the Benefit-sharing Fund: outcomes of the work undertaken by the Ad Hoc Advisory Committee on the Funding Strategy", First Meeting of the Ad Hoc Open-ended Working Group to Enhance the Functioning of the Multilateral System, Doc. IT/OWG-EFMLS-1/14/Event, Geneva, Switzerland, 14-16 May 2014.

- **Others**

Treaty Secretariat, "Implementation of the Funding Strategy of the International Treaty - Resolution from GB5", First Meeting of the Ad Hoc Open-ended Working Group to Enhance the Functioning of the Multilateral System, Doc. Resolution 2/2013, Geneva, Switzerland, 14-16 May 2014.

Treaty Secretariat, "Report of the Fourth Meeting of the Ad Hoc Technical Advisory Committee on the Standard Material Transfer Agreement and the Multilateral System", First Meeting of the Ad Hoc Open-ended Working Group to Enhance the Functioning of the Multilateral System, Doc. IT/GB-5/13/Inf.3, Geneva, Switzerland, 14-16 May 2014.

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SECOND SESSION

- **Report**

Treaty Secretariat, "Report of the Second Meeting of the Ad Hoc Open-ended Working Group to Enhance the Functioning of the Multilateral System", Second Meeting of the Ad Hoc Open-ended Working Group to

Enhance the Functioning of the Multilateral System, Doc. IT/OWG-EFMLS-2/14/Report, Geneva, Switzerland, 9-11 December 2014.

- **Working Documents**

Treaty Secretariat, "Synoptic Study 1: Estimating Income to be Expected from Possible Changes in the Provisions Governing the Functioning of the Multilateral System", Second Meeting of the Ad Hoc Open-ended Working Group to Enhance the Functioning of the Multilateral System, Doc. IT/OWG-EFMLS-2/14/3, Geneva, Switzerland, 9-11 December 2014.

Treaty Secretariat, "Synoptic Study 2: Policy and Legal Study on the Feasibility and Effects of Changes to the Multilateral System", Second Meeting of the Ad Hoc Open-ended Working Group to Enhance the Functioning of the Multilateral System, Doc. IT/OWG-EFMLS-2/14/4, Geneva, Switzerland, 9-11 December 2014.

Treaty Secretariat, "Synoptic Study 3: an Analysis on how to Enhance Mechanisms for Capacity-Building, Technology-Transfer and Information-Exchange", Second Meeting of the Ad Hoc Open-ended Working Group to Enhance the Functioning of the Multilateral System, Doc. IT/OWG-EFMLS-2/14/5, Geneva, Switzerland, 9-11 December 2014.

Treaty Secretariat, "Synoptic Study 4: Consultation with Stakeholder Groups", Second Meeting of the Ad Hoc Open-ended Working Group to Enhance the Functioning of the Multilateral System, Doc. IT/OWG-EFMLS-2/14/6, Geneva, Switzerland, 9-11 December 2014.

- **Information Documents**

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Treaty Secretariat, "The Current Status Of The Multilateral System Of Access And Benefit-Sharing", Second Meeting of the Ad Hoc Open-ended Working Group to Enhance the Functioning of the Multilateral System, Doc. IT/OWG-EFMLS-2/14/Inf.3, Geneva, Switzerland, 9-11 December 2014.

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- **Background Study Papers**

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THIRD SESSION

- **Report**

Treaty Secretariat, "Report of the Third meeting of the Ad Hoc Open-ended Working Group", Third Meeting of the Ad Hoc Open-ended Working Group to Enhance the Functioning of the Multilateral System, Doc. IT/OWG-EFMLS-3/15/Report, Brasilia, Brazil, 2-5 June 2015.

- Working Documents

Treaty Secretariat, “Draft Resolution for Consideration by the Governing Body, At Its Sixth Session: Measures To Enhance The Functioning of the Multilateral System of Access and Benefit-Sharing”, Third Meeting of the Ad Hoc Open-ended Working Group to Enhance the Functioning of the Multilateral System, Doc. IT/OWG-EFMLS-3/15/3, Brasilia, Brazil, 2-5 June 2015.

- Information Documents

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Treaty Secretariat, “Expansion of the Access and Benefit-sharing Provisions of the International Treaty: Legal Options”, Third Meeting of the Ad Hoc Open-ended Working Group to Enhance the Functioning of the Multilateral System, Doc. IT/OWG-EFMLS-3/15/Inf.4 Rev.1, Brasilia, Brazil, 2-5 June 2015.

Treaty Secretariat, “Development of a Subscription System for users of Plant Genetic Resources for Food and Agriculture under the Treaty (Measure III): Background Information”, Third Meeting of the Ad Hoc Open-ended Working Group to Enhance the Functioning of the Multilateral System, Doc. IT/OWG-EFMLS-3/15/Inf.5, Brasilia, Brazil, 2-5 June 2015.

Treaty Secretariat, “Improving the Standard Material Transfer Agreement to Increase User-Based Payments and to Make it More User-Friendly (Measure IV): Background Information”, Third Meeting of the Ad Hoc Open-ended Working Group to Enhance the Functioning of the Multilateral System, Doc. IT/OWG-EFMLS-3/15/Inf.6, Brasilia, Brazil, 2-5 June 2015.

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Treaty Secretariat, “The Benefit-sharing Fund and the Global Crop Diversity Trust: Succinct Analysis of Targets, Contributions and Resource Mobilization Strategies and other Relevant Information”, Third Meeting of the Ad Hoc Open-ended Working Group to Enhance the Functioning of the Multilateral System, Doc. IT/OWG-EFMLS-3/15/Inf.8, Brasilia, Brazil, 2-5 June 2015.

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Treaty Secretariat, “Twenty five years of international exchanges of plant genetic resources facilitated by the CGIAR genebanks: a case study on international interdependence”, Third Meeting of the Ad Hoc Open-ended Working Group to Enhance the Functioning of the Multilateral System, Doc. IT/OWG-EFMLS-3/15/Research Paper 9, Brasilia, Brazil, 2-5 June 2015.

FOURTH SESSION

- Report

Treaty Secretariat, “Consolidated Report on the Deliberations of the Ad Hoc Open-Ended Working Group to Enhance the Functioning of the Multilateral System, during the 2014–2015 Biennium”, Fourth Meeting of the Ad Hoc Open-ended Working Group to Enhance the Functioning of the Multilateral System, Doc. IT/OWG-EFMLS-6/15/6 Rev.2, Rome, Italy, 5-9 October 2015.

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