

Forging a New Global Commons

Introducing common property into the global genetic
resource debate.

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List of Acronyms.

AT	Antarctic Treaty
ATCC	American Type Culture Collection
ATCM	Antarctic Treaty Consultative Meeting
ATS	Antarctic Treaty System
CBD	Convention on Biological Diversity
CCAMLR	Convention on the Conservation of Antarctic Marine Living Resources
CCAS	Convention for the Conservation of Antarctic Seals
CHM	Common Heritage of Mankind
CRADA	Cooperative Research and Development Agreement
CRAMRA	Convention on the Regulation of Antarctic Mineral Resource Activities
DNA	Deoxyribonucleic Acid
GGCT	Global Genetic Commons Treaty
GGCTS	Global Genetic Commons Treaty System
GRAIN	Genetic Resources Action International
FOET	Foundation on Economic Trends
HYV	High Yielding Varieties
IBGRI	International Board for Plant Genetic Resources
IGY	International Geophysical Year
IP	Intellectual Property
IPGRI	International Plant Genetic Resources Institute
IPR	Intellectual Property Right
IRRI	International Rice Research Institute
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
IU	International Undertaking on Plant Genetic Resources
MTA	Material Transfer Agreement
NGO	Non-Governmental Organisation
PCR	Polymerase Chain Reaction
RAFI	Rural Advancement Foundation international
SCAR	Scientific Committee on Antarctic Research
SEARICE	South East Asian Regional Institute for Community Education
TISGC	Treaty Initiative to Share the Genetic Commons

TEK	Traditional Ecological Knowledge
TRIPs	Trade Related Aspects of Intellectual Property Rights
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNCLOS	United Nations Convention on the Law of the Sea
UNEP	United Nations Environment Programme
UNFAO	United Nations Food and Agriculture Organisation
UPOV	Union for the Protection of New Varieties of Plants
USPTO	US Patent and Trademark Office
WCED	World Commission on the Environment and Development
WIPO	World Intellectual Property Organization
WRI	World Resources Institute
WSSD	World Summit on Sustainable Development
WSF	World Social Forum
WTO	World Trade Organisation

Abstract.

This thesis provides an analysis of recent attempts to regulate the governance of genetic resources through the initiation of new global commons regimes. These attempts have arisen out of a combination of the growing recognition of genetic resources' value and global nature; a new resurgence in support for the common property paradigm; and, during a period in which the world is becoming increasingly globalised, with many governance competencies moving to the supranational level. They can be viewed as part of a broader effort to proffer the common property approach as a legitimate alternative in the property regime debate: a debate that has increasingly become trapped in the public-private dichotomy at the dawn of the twenty-first century. The aim of this thesis is to investigate the success of these attempts, and offer suggestions about how future attempts might be more successful.

While there are a multitude of books, articles, opinion pieces and media reports produced that concern themselves with property theory, intellectual property theory, the efficacy or morality of applying property regimes to living materials, and the threats and promises of globalisation, all of which influence the notion of a potential global genetic commons, relatively little has been written directly on the idea of applying global common property regimes to genetic resource governance issues.

The first part of this thesis constructs a theory of a global genetic commons, drawing inspiration from a variety of sources, while the second part tests this theory in order to analyse the outcomes of the recent attempts, and suggest directions for future research. The thesis finds that the conception of a global genetic commons is indeed a valid one, and that while not all attempts so far have been successful, the common property paradigm does offer valuable insights for the future governance of genetic resources at the global level.

Chapter I

Introduction.

“The forces of technical change have been unleashed, but the agencies for the control or guidance of technology are still rudimentary.”¹

Introduction.

Conflicts over the access to and ownership of genetic resources have been a permanent fixture throughout all of human history. The current debate over how genetic resources should be owned and managed revolves around a perceived choice between public and private ownership, with public ownership usually being defined in terms of national sovereignty or government control, and private ownership being conceived of as the use of Intellectual Property Rights (IPRs) awarded to individuals, academic institutions, or, most often, transnational corporations, offering exclusive control over these resources to these individuals or legal entities. This thesis is an analysis of attempts to provide an alternative to the current choice by introducing to the genetic resource debate a third ownership paradigm: a common property paradigm that claims to provide fairer and more equitable outcomes from the control of genetic resources.

Before going more deeply into the rationale behind and method employed for this thesis, two short case studies will be used to illustrate how current debates over the access to and ownership of genetic resources revolve around a choice between public or private property regimes, with nary a mention of a common property alternative.

Whose Rice is it Anyway?

For generation upon generation, the farmers of the Isan region have cultivated what is known today as Khao Hom Mali on the saline and sandy soils of northeast Thailand. For the local farmers, Thai Jasmine rice, as it is known in English, is a symbol of local wisdom and traditional culture. For the country as a whole, it represents a valuable part of their history and agricultural sector: a billion dollar export industry representing 25%

¹ Robert L. Heilbroner, “Do Machines Make History,” in Sungook Hong, “Unfaithful Offspring? Technologies and their trajectories,” *Perspectives on Science* v6 i3 (Fall 1998): 262.

of all Thailand's rice exports.² However, on July 22nd 1998, the future of the famed aromatic rice became the focus of a protest by five hundred Thai farmers outside the United States embassy in Bangkok.³ Thailand's premier export crop was under threat.

Due to the meaning of Jasmine rice for Thailand, this perceived threat was of both economic and cultural dimensions, and was directly attributed to the US-led expansion of western-style intellectual property (IP) regimes around the world via international institutions such as the World Trade Organisation (WTO). The Thai farmers were protesting against the expansion of IP laws that allowed the patenting of life forms or were related to other areas of ownership over biodiversity and indigenous knowledge. Their argument was that the use of patents, or other monopoly rights, to reward western scientists or transnational corporations for genetically manipulating a plant such as Jasmine rice in order to create new commercial strains, amounted to nothing less than legalising, then encouraging, a way of stealing Thailand's natural resources and cultural heritage. Furthermore, these same regimes disallowed monopoly rights on any plant that had not been engineered, leaving the communities whose ancestors had developed the original strains that western researchers depend on unable to prevent exploitation or gain any rewards themselves.

While at this time their concerns were about the possible future occurrence of this "theft" (commonly termed biopiracy amongst developing nations and certain Non-Governmental Organisations [NGOs]), it was a possibility that found precedent in the patenting of Basmati rice in the US by a Texan company, Rice Tech Inc..⁴ Basmati is the other major Asian fragrant rice that has been bred over hundreds of years by farmers in regions of India and Pakistan, and the Thai farmers were concerned that if a US company could gain patents on new strains of this rice, patents on their own Jasmine rice were surely not far behind.

In the letter that accompanied their protest to the embassy, a third concern was outlined in which the farmers called upon the US government to prohibit the use of the

² BIOTHAI, "Thai People's Movements Mobilise To Protect Jasmine Rice," *BIOTHAI Information Release*, 26 April 1998, <<http://www.poptel.org.uk/panap/archives/la-thais.htm>> (2 September 2002).

³ BIOTHAI, "Open Letter from Thai Farmers to the United States Government Regarding American Intellectual Property Claims to Jasmine Rice," *BIOTHAI Information Release*, 1999, <<http://www.poptel.org.uk/panap/archives/la-thai.htm>> (31 March 2002).

⁴ Ben Lilliston, "Stop Biopiracy – Drop Basmati Patent," *Synthesis/Regeneration* (Winter 2001): 44.

trademark “Jasmati”, (also owned by Rice Tech Inc.), in US markets. They felt that it deliberately misinformed consumers by suggesting that the rice sold under this brand was in some way related to both Jasmine and Basmati rice, and that this misinformation would therefore damage both export industries. In fact, the new variety was actually derived from an American rice, Della, itself derived from the Italian rice Bertone.⁵ For the farmers, this simply demonstrated another way in which US companies were using western IP laws to exploit a developing nation’s natural resources and cultural heritage.

By November 2001, the number of protesting farmers had swelled to more than 10,000,⁶ and in the intervening three years their cause for concern had gone from a possibility to a distinct probability. Not only had the spread of western-style IP laws not been checked, a market survey conducted by the Thai commercial attaché found that over half of American consumers bought Jasmati rice because they thought it was related to Basmati and Jasmine rice.⁷ In addition, the patent on Basmati rice had not been revoked, and figures from India showed that their export industry had lost an estimated US\$200 million due to the Jasmati trademark alone.⁸ The fear was growing that Thailand’s losses could be much greater if a strain of Jasmine rice was patented in the US.

This fear became all the more real when it was announced that two American scientists from Florida, with funding and support from the US Department of Agriculture, had successfully engineered a new strain of Jasmine rice that would be suited for commercial release in North American conditions.⁹

Outrage at the announcement was apparent at all levels of Thai society. The Isan farmers and Thai NGOs led protests that spread throughout the country, with black magic rituals, supporters clad in Bin Laden t-shirts, and burnt effigies of US President George W. Bush and WTO head Mike Moore.¹⁰ The Thai government pledged to defend

⁵ BIOTHAI, “Thai People’s Movements.”

⁶ Kultida Samabuddhi, “Mass rally to oppose US rice venture,” *Bangkok Post Online*, 4 November 2001, <http://scoop.bangkokpost.co.th/bkkpost/2001/november2001/bp20011104/news/04nov2001_news04.html> (2 September 2002).

⁷ Chris Westcott, “Thai Jasmine Rice and the Threat of the US Biotech Industry,” *Global Exchange*, 18 December 2001, <<http://www.globalexchange.org/wto/rice121801.html>> (31 March, 2002).

⁸ Porpot Changyawa, “Experts may register rice as trademark,” *Bangkok Post Online*, 27 November 2001, <http://scoop.bangkokpost.co.th/bkkpost/2001/november2001/bp20011127/news/27nov2001_news23.html> (2 September 2002).

⁹ Paul Kimpel, “Gourmet-Style Thai Jasmine Rice May Be Future U.S. Crop,” *University of Florida News*, 11 September 2001, <<http://www.napa.ufl.edu/2001news/jasmine.htm>> (2 September 2002).

¹⁰ Westcott, “Thai Jasmine Rice.”

Thailand's cultural heritage and export industry and promptly hired American lawyers to defend against any possible patent applications in US courts. At even higher levels, Prime Minister Thaksin Shinawatra expressed concern over the issue to the US President during his talks at the White House,¹¹ and issues relating to biopiracy were raised by Thailand at the Doha round of WTO talks. Thai farmers, NGOs and the government were particularly concerned about where the original seeds the American researchers had used had come from: about how they had ended up losing control over one of their most famous natural resources.

The principle scientist involved in the project, Chris Deren, claimed from the outset that all genetic material used had originated from the International Rice Research Institute's (IRRI) gene banks in the Philippines, while the IRRI itself claimed that it was not aware that he had ever taken such material. In the end it appears that Deren had probably received the initial seeds from fellow researchers at the IRRI, thus bypassing the official channels.¹² For countries such as Thailand, who alone has over 5,500 varieties of rice stored in this gene bank,¹³ this is especially concerning as the catalogued biodiversity stored in such banks represents a large part of their cultural and genetic heritage. If they had lost control over this valuable resource with one scientist bypassing the official channels, it is possible that many more could also access this genetic material, and that some may already have.

After months of protest, accusations and political manoeuvring, the issue was somewhat resolved with Chris Deren agreeing to sign a Material Transfer Agreement (MTA) with the IRRI. Agreements such as these, which should be signed when the genetic materials are first acquired, are designed to prevent patenting or any form of monopoly ownership of seeds donated from such gene banks.¹⁴ In his defence, Deren said that he had never planned to patent his strain of rice and that the strain itself was still at least seven years from commercial release in the US. Other commentators argued that its development could actually help Thai farmers by expanding export markets and offering them a

¹¹ Saritdet Marukatat, "Bush told about rice concerns: US leader sounds out position on Burma," *Bangkok Post Online*, 16 December 2001, <http://scoop.bangkokpost.co.th/bkkpost/2001/December2001/bp20011216/news/16dec2001_news23.html> (2 September 2002).

¹² Noel Rajesh, "And now, Thai Jasmine rice," *India Together*, August 2002, <http://www.Indiatgether.org/agriculture/articles/noel_jasmine.htm> (1 September 2002).

¹³ Westcott, "Thai Jasmine Rice."

¹⁴ *Ibid.*

further crop each year in the Thai domestic setting.¹⁵ For their part, the Thai government, who found they no longer needed the lawyers retained to protect against patent applications, set about registering Thai Jasmine rice as a trademark in the US in order to protect against future exploitation of their crop.¹⁶

However, while the immediate crisis had passed, concerns still remain about the future ownership of Jasmine rice, and the ownership of all developing nations' traditional crops in general. It is not known if Thailand could have stopped any patent applications in America, and with commercial agricultural companies already showing interest in the new strain, the worry is that engineered rice crops derived from Deren's rice could be patented in the future. Furthermore, the question over the ability of gene banks such as the IRRI to properly safeguard developing nations' genetic resources has been left unanswered.

The anger, and in some respects confusion, over the question of ownership of Khao Hom Mali is probably best summed up by Lai Lamgram, a farmer from the Surin province in northeast Thailand.

“Since our ancestors began to grow jasmine rice, it has belonged to Thai farmers, and Thai village communities. Nobody, not anyone, can claim ownership or assume exclusive rights. Any attempt at patenting of jasmine rice or the misuse of its name is a shameless theft towards us, the small-scale Thai farmers, and a violation of our most basic rights.”¹⁷

A fitting postscript to this story occurred in early January 2004, when the US agreed to allow Thailand to patent its Pathum Thani 1 rice strain,¹⁸ originally developed from Kao Hom Mali 105 fragrant rice, the Jasmine rice strain at the centre of the Chris Deren debate. While the original strain was ineligible for such protection due to it being distributed for decades, this new variety will now enjoy the same protection that the Thai government so vigorously fought against in relation to the strain developed by Deren. The key difference in this case, of course, is that it is the Thai government who owns the

¹⁵ Anne Marie Ruff, “US research may well be a boon,” *Bangkok Post Online*, 31 October, 2001, <http://scoop.bangkokpost.co.th/bkkpost/2001/september2001/bp20011031/news/31oct2001_news32.html> (18 March 2002).

¹⁶ Changyawa, “Experts.”

¹⁷ Rajesh, “Thai Jasmine rice.”

¹⁸ Kultida Samabuddhi, “US patent likely for new strains of fragrant Pathum Thani rice,” *Bangkok Post Online*, 14 January 2004, <http://www.bangkokpost.com/140104_news/14Jan2004_news23.html> (17 January 2004).

property rights and thus can exert some control over the future development of Jasmine rice.

The Bioprospecting Question: A work in progress.

Half a world away from the Isan region with its saline and sandy soils, a conflict over property rights in relation to microbial life sampled from some of the earth's most inhospitable habitats was taking place at the world's original National Park, Yellowstone.

On August 17, 1997, at a ceremony held to commemorate the park's 125th anniversary, top environmental policymakers, including the then Vice President Al Gore, and park officials announced a unique deal that had been struck between the federal government and San Diego-based Diversa Corporation.¹⁹ This contract, Yellowstone's Cooperative Research and Development Agreement (CRADA), allowed Diversa the right to bioprospect for potentially valuable microbial organisms in Yellowstone, in exchange for an agreement to share the potential financial returns with the park. This precedent-setting contract was the first time such a partnership had been entered into between the government and commercial interests over research ownership rights on public lands, and it sparked a two-year lawsuit to decide if this style of contract would become the blueprint for the future management of such resources.

While the exploitation of nature is as old as humanity, it is only in the last twenty years that the technology, and the attendant biotech industry, have advanced to the point where the genetic and biochemical information found in wild plants, animals and micro organisms has become as valuable, if not more so, than the individual organisms themselves. The term "bioprospecting" refers to this new type of natural resource use – one where it is the biodiversity of nature itself that is sifted through for valuable wild genetic resources²⁰ – and as a new activity, it raises the sometimes controversial question over whether governments should seek compensation for this form of resource extraction.

¹⁹ Edmonds Institute v. Babbitt, Civil Action 98-561 (RCL), United States District Court for the District of Columbia, 2000.

²⁰ John R. Adair, "The Bioprospecting Question: Should the United States charge biotechnology companies for the commercial use of public wild genetic resources?" *Ecology Law Quarterly* v24 n1 (February 1997): 1.

Historically, the answer to this question was “no”, as wild genetic resources were seen as part of a “common heritage of mankind” and so open to exploitation by all. However, this view has been changing as the technology has advanced and IP laws have been strengthened, and after the 1992 Convention on Biological Diversity (CBD) the answer to the question for much of the international community has changed to a resounding “yes”.²¹ Wild genetic resources are now seen as simply another resource, and therefore national governments deserve compensation from any commercially valuable products derived from them.

Bioprospecting is a term that for many conjures up images of khaki-clad biologists, sloughing through thick, humid, equatorial jungles hoping to find new and exciting species to sample in a kind of “gene-rush”²² on the frontiers of biodiversity, occurring predominantly in remote, tropical, developing nations. However, while there is some truth to this image – 95.7% of genetic material for the twenty most important food crops is sourced from developing nations²³ – developed countries are slowly waking up to the idea that their own biodiversity can be valuable. In Yellowstone’s case, a single microbe originally identified in 1966 led to the discovery of an industrial process that is now considered an indispensable tool in many biotech industries, and one which is extremely profitable for its owners.

The microbe in question is named *Thermus aquaticus*, just one among thousands of thermophilic organisms that scientists believe have yet to be discovered in Yellowstone, including another eight that have already had industrial uses found for them.²⁴ *T. aquaticus* was discovered in 1966 and deposited in the American Type Culture Collection (ATCC) where it remained until 1983, when it was requested by the Cetus Corporation in the hope that a thermophilic organism would help them solve a problem they had encountered while developing their groundbreaking polymerase chain reaction (PCR) process. The PCR process is one that allows researchers to create large batches of identical DNA from a small original sample – a DNA photocopying machine. Unfortunately, the cyclic heating stages of the process tended to destroy the original DNA sample, and so the Cetus researchers turned to *T. aquaticus* in the hope that such a

²¹ *Ibid.*

²² Charles C. Chester, “Controversy over Yellowstone’s biological resources,” *Environment* v38 n8 (October 1996): 12.

²³ Adair, “Bioprospecting,” 134.

²⁴ Chester, C. C. “Yellowstone’s biological resources,” 13.

thermophilic organism, with its ability to withstand high temperatures, could help create a polymerase that resisted destruction. Within three weeks of receiving the microbe, their hunch was proven right.

PCR is a hugely important process; one that won its inventor, Kary Mullis, the Nobel Prize,²⁵ and one that has been described by James Watson, co-discoverer of DNA's structure, as being "ranked with cloning and DNA sequencing as an indispensable tool in the molecular biologists' armamentarium".²⁶ It is also a process that nets its owners, Hoffman-LaRoche and its partner Perkin-Elmer, over US\$100 million annually.²⁷ While the park has not seen a cent of these profits, it is hoped deals like the one with Diversa will mean that in the future such profits help conservation as well as corporate bottom lines.

Bioprospecting is not new in Yellowstone; researchers have been collecting samples from the Park's hot pools since 1898²⁸ and Park authorities now issue 250 to 300 research permits each year.²⁹ Many of these permits already go to commercial organisations such as Promega, Novo Nordisk, Eli Lilly and Dupont,³⁰ who all hope that the organisms they discover turn out to lead to patents as lucrative as the Cetus Corporation's *T. aquaticus* research. What is new is the gradual shift from taking specimens from the Park's pools for research purposes, towards taking specimens for purely commercial, patent-driven intent that has occurred over the last twenty years. For many commentators, CRADA, and future agreements like it, are simply a sign that the government and national parks are finally catching up with industry in the realisation of how valuable Yellowstone's microbial resources truly are. They are a fine example of how it is possible to balance a national park's competing goals – use and preservation – by offering access for research whilst gaining in return funds for future conservation.³¹ However, for others the real questions that need to be answered go beyond the mere management of Yellowstone's physical resources, to questions about the place of science in national parks, and the

²⁵ Holly Doremus, "Nature, knowledge and profit: the Yellowstone bioprospecting controversy and the core purpose of America's national parks," *Ecology Law Quarterly* v26 i3 (August 1999): 1.

²⁶ Chester, C. C. "Yellowstone's biological resources," 13.

²⁷ Andrew Pollack, "Bioprospecting Deal Gains in Yellowstone," *New York Times Online*, 25 April 2000, <<http://www.nytimes.com/library/national/science/042500sci-enviro-biotech.html>> (12 September 2002).

²⁸ Elizabeth G. Daerr, "Yellowstone to Receive Royalties," *National Parks* (Jul 2000): 12.

²⁹ Pollack, "Bioprospecting Deal."

³⁰ Adair, "Bioprospecting," 142.

³¹ Chester, C. C. "Yellowstone's biological resources," 12.

commercialisation and commodification of life. Not surprisingly then, within months of the agreement being announced, a lawsuit challenging it had been filed by a coalition of environmental groups led by the Edmonds Institute.

Initially, the lawsuit was successful, with the federal judge ordering a temporary halt to the agreement. The judge noted that the bioprospecting policy issue in the US was a work in progress”, but that the agreement represented a “dramatic change” in that policy. Of particular concern was the fact that this had occurred even though “the Government as of yet has not engaged in any public debate”.³² By July 2000, however, the same federal court ruled that CRADA was a valid agreement between the Park and Diversa, noting that the only difference between this and previous bioprospecting agreements within the park was that Yellowstone could share some of the benefits of the research.³³ Despite this ruling, CRADA remained suspended pending the completion of an environmental impact assessment ordered as part of the necessary public debate over the future of national park resources, the plaintiffs announced they would appeal the ruling, and the debate continued. While CRADA is the first of these deals to be entered into in the US, it undoubtedly will not be the last.

While this was America’s first foray into the debate into corporate-government partnerships in bioprospecting, it was a late starter compared to many countries around the world. Many see these partnerships as a way to use market mechanisms to encourage both developed and developing nations to protect their biodiversity while profiting from their natural resources. On the other hand, there are many who see these developments as yet another form of legalised stealing, arguing that developing nations do not have the legal system of the US and so opponents cannot appeal against their government’s bioprospecting decisions or the commodification of nature. Others point out that market mechanisms do not a level playing field make – that far from empowering nations to protect their natural biodiversity, they encourage further exploitation of these resources and play into the hands of the large corporations. It is a debate that will continue around the world as people seek to balance issues of access to and ownership of living materials

³² Andrew Pollack, “Judge Halts Yellowstone Royalty Agreement With Biotechnology Company,” *GENTECH archive*, 26 March 1999, <<http://www.gene.ch/gentech/1999/Mar-Apr/msg00092.html>> (12 September 2002).

³³ Pollack, “Bioprospecting.”

that in reality concern all of nature, not just that found within the boundaries of a National park in America.

The Rationale and Logic Behind this Thesis.

Even before the very first patent was awarded to a life form in 1980, opposition to the extension of private ownership rights to living materials was growing. By the 1990s, many groups, organisations, and individuals dedicated to halting and reversing the spread of IPRs over life had come into existence around the globe. Regardless of their country of origin, the number of members, or the sophistication of their movement, they all shared this goal. In 2002, a coalition of these anti-IPR organisations announced the formation of a new initiative that aimed to become the “first globally coordinated campaign among biotech activists.”³⁴ This campaign came in the form of a treaty initiative that was offered as a means to turn this widespread opposition to IPRs into widespread and concerted support for the concept of a global commons for the Earth’s gene pool. The authors of the treaty felt that in this way, what had been a largely negative movement up until that point could be channelled into a positive call for change.

This campaign was known as the Treaty Initiative to Share the Genetic Commons (TISGC). Launched in February 2002, it was hoped by its supporters that it would replace the Convention on Biological Diversity (CBD) as the defining document for how we as a species govern the Earth’s genetic resources. This replacement was due to take place at the second World Summit on Sustainable Development (Rio +10) conference to be held in September 2002. However, the initiative failed to be introduced to the international community at this conference, and has subsequently disappeared entirely from view.

This thesis seeks to uncover why an initiative that quickly gained the support of over 325 anti-IPR organisations across the globe³⁵ disappeared so quickly from view after failing to meet its initial deadline. Were the ideas and concepts that underpinned the enterprise at fault? Was this a case of an international political movement that failed to generate

³⁴ Ben Lilliston, “NGOs support a treaty to establish the gene pool as a global commons,” *Synthesis/Regeneration* (Spring 2002): 36.

³⁵ FOET, “RE: Update on the Treaty Initiative to Share the Genetic Commons,” *Foundation on Economic Trends*, 5 April 2002, <<http://www.foet.org/5-%20April.htm>> (12 February 2004).

enough momentum to carry it beyond this initial failure? Or was this initiative just another “utopian statement”³⁶ in the contentious environment of genetic resource governance that lacked any real political organisation or willpower, and so could never have gone the distance?

While an investigation of this campaign forms a vital part of this thesis, of more importance are the ideas behind it that suggest that common property is a viable, and appropriate, response to concerns that surround genetic resource governance. As such, this thesis seeks to answer deeper questions than those posed by the failure of just one movement advocating common property principles as a solution to genetic resource concerns.

In an article on common property regimes in the Bay Region of southern Somalia, Gill Shepherd has suggested that, “Most descriptions of common property resource regimes describe past or passing systems, either because national laws have undermined them, or because a technological change has irretrievably altered the way in which they are exploited.”³⁷ However, in genetic resources, we find a resource that is at once both ancient in the extreme, and yet exceedingly new in terms of the recognition of its current form and how it is now exploited. What’s more, we find that the recognition of the genetic nature of this resource has occurred at a point in global history where supranational governance is becoming increasingly the norm, especially in relation to this resource itself. Furthermore, while technological change has indeed “irretrievably altered” both the resource and the way it is exploited, these changes have also meant that for the first time these resources can be considered in truly global terms.

Far from discussions of the possibility of a common property resource regime to govern genetic resources being debates over a past or passing system, this thesis would suggest that it is precisely because of the recent changes in governance and technology that genetic resources can be considered in such terms. Thus, this thesis posits that the creation of a global genetic commons is a valid possibility for future attempts to solve issues surrounding the access to and ownership of genetic resources.

³⁶ Cary Fowler, “Re: A political science thesis,” 17 August 2003, personal email (18 August 2003).

³⁷ Gill Shepherd, “The Reality of the Commons: Answering Hardin From Somalia,” *Social Forestry Network*, Network Paper 6d, (May 1988), 10.

Note on Terminology.

Throughout this thesis and in many other publications, articles and external sources, genetic resources are referred to in multiple ways. For the purposes of this thesis, I have attempted to use the term “genetic resources” where possible when discussing them, however, other terms such as biological resources, genes, gene pools and living materials are also used in places, mostly when referring to how other individuals, groups or organisations describe such resources, or when drawing ideas from these descriptions. A further term used occasionally throughout is drawn from the most basic understanding of these resources, and is the primary reason that the debates that surround these resources can be so controversial. What is being dealt with in this thesis and in similar debates is, in a word, life.

Methodology.

Qualitative research, by its very nature, is “exploratory, fluid and flexible, data-driven and context sensitive.”³⁸ Thus, rather than being set in stone at the beginning of a research effort, or indeed at any time throughout, decisions regarding research design and strategy are of necessity “ongoing and are grounded in the practice, process and context of the research itself.”³⁹ Therefore, the methodological strategy outlined in this section is not a methodology that has been formally described elsewhere in relation to the subject matter. Instead this section seeks to describe the logic employed in this thesis to answer the overall research question that lies at the heart of this thesis’ investigation into a global genetic commons.

This thesis occurs at the intersection of debates over the access to and ownership of genetic resources; the more general debate over private and public property regimes; the calls for a reinstatement of the common property paradigm as a legitimate option in future debates surrounding concepts of property; and, the even larger debate over globalisation, and with regards to this subject, the perceived imposition of Western concepts of property and ethics surrounding humanity’s relationship to living materials. While there are a plethora of books, articles, opinion pieces and newspaper reports regarding each of

³⁸ Jennifer Mason, *Qualitative Researching*, 2nd ed. (London, Thousand Oaks, New Delhi: SAGE Publications, 2002), 24.

³⁹ *Ibid.*

the above conflicts, relatively little has been written directly concerning the idea of employing a global common property regime to address the issues of access to and ownership of genetic resources. However, despite this relative lack of available data or theoretical discussion *specifically* on the topic at hand, several attempts at creating such a global common property regime have already occurred. Here lies the nub of the research question: this thesis seeks not only to investigate these attempts to institute global commons regimes, but also to construct a theory of this new global commons, conspicuous in its absence, against which these and future attempts can be measured.

As such, this thesis is structured in two overarching parts: the first an attempt to build a theory about a future global genetic commons, the second aimed at testing this theory against those attempts that have already been made.

The Part I (chapters 2-4) assembles a body of information pertaining to the various debates that swirl around question of a global genetic commons. This part consists of marshalling the required terms and concepts; examining the requisite theoretical questions; and providing historical analyses and case studies to garner an understanding of why concepts such as common property or genetic resources are considered in the manner they are today. Academic books and articles, media sources, opinion pieces, online resources, and correspondence with some of the actors involved in this area, all form the pool from which the data for these purposes is drawn. At the close of this part, a model of a theoretical global genetic commons is constructed with which to test the actual attempts to institute commons that have occurred.

The Part II (chapters 5 and 6) of this thesis looks to construct two case studies of two attempts at creating global genetic commons; one successful, one not so. The thesis uses a comparison between these two case studies to generate practical lessons about how the idea of a global genetic commons might be advanced successfully in the future. These lessons are then compared with the theoretical framework outlined at the end of part one. From this further comparison, a refined theoretical framework is developed, along with suggestions about further avenues of research .

This second part draws its data from a similar pool as the first, although as this section is primarily concerned with constructing case studies of these actual attempts, the sources

tend to be less theoretical in nature, outlining the more practical experiences of many people involved in these processes.

The Structure of this Thesis.

As noted above, this thesis is structured in two parts. Part one encompasses chapters II, III and IV, while part two consists of chapters V and VI.

Chapter II examines the concepts of common property and presents a history of the common property movement up until the present day. It will thus not only attempt to introduce the reader to key terms found in any debate involving property, but also to place current efforts to introduce the common property paradigm into the genetic resource debate within broader calls for the introduction of common property, or the protection of existing commons, around the world

Chapter III examines the notion of “genetic resources”. It then illustrates the ways in which historical forces have shaped, and continue to shape, the way humanity deals with genetic resources, and how these same forces have led us to the point at which they can be truly considered in global terms. The central aim of this chapter is to demonstrate why genetic resource governance can and should be considered at the global level.

Chapter IV moves to a discussion about the existing global commons, the atmosphere, the oceans, outer space and Antarctica, and why they are considered such. This chapter looks to use the lessons gained from these global commons, especially the experiences from Antarctica outlined in an in-depth case study, to generate a theory about what a global genetic commons might look like in the future.

Chapter V looks to the real world for examples of past attempts to institute global commons regimes for genetic resources that might help test and refine the theory developed in chapter IV. For this, the thesis returns to its point of origin, the Treaty Initiative to Share the Genetic Commons, and to another attempt at an international commons treaty that occurred concurrently: The International Treaty on Plant Genetic Resources for Food and Agriculture. the two treaty initiatives are investigated and

analysed, and conclusions are presented regarding the reasons for their very different outcomes.

In the concluding chapter, the lessons derived from these cases are compared to the theory generated in Chapter IV, and suggestions are made regarding future possible research questions or directions that might be fruitful for the study of how genetic resource governance might proceed in the future, whether or not this future is one containing the common property paradigm.

Chapter II

The Common Property Paradigm.

“The commons is not the market and it is not the state. It is the space around and between, the source and context of both. It has a natural dimension, such as the oceans and atmosphere, rivers and wild places, the diversity of species, the quiet of the night. The commons has also a social dimension: language and culture, the stories and games of childhood, the street life of cities, the vast stores of human know-how and knowledge, the new informational crossroads of the World Wide Web.”¹

Introduction.

The calls made by the backers of the Treaty Initiative to Share the Genetic Commons (TISGC) to declare the Earth’s gene pool a new “global commons” by no means occurred in a conceptual vacuum. The Initiative represents but one facet of a resurgent common property movement that is growing in influence around the world. Issues as diverse as computer programming, water rights, and the protection of the sky above us, inspire a range of policy suggestions from proponents of the common property paradigm.

This chapter primarily seeks to develop an understanding of the common property paradigm, in order to comprehend what is being called for by initiatives such as the TISGC. An important aspect of this comprehension lies in discovering the history of common property, in turn uncovering the reasons behind the present resurgence in support for this paradigm.

Definitions and Concepts: Of property, regimes, commons, and paradigms.

A clear understanding of what the terms used throughout this thesis represent is essential. While there are many accounts of the commons, the global commons, or common property in general to draw from, they do not all necessarily consider similar terms or concepts in the same ways. Below is a summary of several of these accounts, outlining how these concepts are defined for the purposes of this thesis.

¹ Jonathan Rowe, “The promise of the commons,” *Earth Island Journal* v17 i3 (Autumn 2002): 28.

An understanding of the concept of *property* needs to be developed prior to defining common property. Property is not a physical thing. It is not a characteristic inherent in objects, but rather a social institution governing how humans relate to objects and each other in relation to these objects. It is historically and politically contingent, and while the present conceptual understanding would suggest that property, as it is considered today, has always been with us, it is an institution that can change according to social and political requirements.² As such, for many, property can be seen as a social instrument; the choosing of particular property regimes can advance particular social purposes.³

This social institution as it stands today can be thought of in terms of *property rights*. Individuals or groups of individuals, such as communities, corporations or nation-states, may hold these rights. Generally speaking, they are guaranteed and protected by governments. A property right to an object is not a single right, but rather a bundle of rights, the exact composition of which varies according to the property rules applied.⁴ These property rules are defined in what are known as *property regimes*. While there can be many different rights described within different property regimes, the key right associated with all property is the ability of the individual or group who lays claim to these rights “to control the actions of others in respect to the objects of property.”⁵

Property can either be understood in terms of tangible objects, such as a tree or a house, or intangible objects, for example the genetic information contained within a tree, or the know-how used to construct a house. When considered in the intangible sense, property is referred to as *intellectual property*. At its simplest, intellectual property “suggests that ideas and knowledge can be paralleled into separable and transferable knowledge objects which enjoy similar characteristics to material property”,⁶ that in effect intangible knowledge objects are “no different from other resources and commodities which are recognised as property.”⁷ In the pursuit of the efficient use of innovations and new ideas, maximising public good and social welfare through rewarding those who would use

² Christopher May, *A Global Political Economy of Intellectual Property Rights: The new enclosures?* (London and New York: Routledge, 2000), 16-17.

³ James A. Swaney, “Are democracy and common property possible on our small earth?” *Journal of Economic Issues* v37 i2 (June 2003): 279.

⁴ Susan J. Buck, *The Global Commons: An Introduction*, (Washington DC: Island Press, 1998), 3.

⁵ May, *A Global Political Economy of Intellectual Property Rights*, p 16.

⁶ *Ibid.*, 47.

⁷ *Ibid.*, 46.

knowledge objects most efficiently, the ideas themselves “have become things which have rights linked to them, they have become transferable active property.”⁸

In more practical terms, the World Intellectual Property Office (WIPO) defines intellectual property as “creations of the mind” that encompass “inventions, artistic or literary works, and symbols, names and images used in commerce.”⁹ While there are many different types of intellectual property in use today, there are three major intellectual property categories: Patents, trademarks and copyright. A patent is an exclusive property right, which is limited by time, and is granted for an invention to its inventor. Once the patent expires, usually after a period of twenty years, the invention enters the public domain.¹⁰ A trademark is “a distinctive sign that indicates that specific goods or a service is produced or provided by a specific person, group or business.”¹¹ Copyright is the right given to creators of artistic or literary works to control how or when their works are used or reproduced.¹² Of these three major categories, patents are the area of intellectual property of most import to any study concerning the ownership of genetic resources, with some of the major battles over this ownership revolving around the definition of “invention”.

There are four primary categories of property into which various bundles of rights fall: *res nullius*, *res publica*, *res privatae*, and *res communes*. Originally drawn from Roman law, these categories are often still used today in order to define different types of property. Each has a different bundle of rights attached, and the sets of rules that define precisely what rights are contained within the bundles are referred to as *property regimes*. The categories are by no means discrete, and within each, many different property regimes can be found. *Res nullius* refers to objects that have no property rights attached to them at all, due to either being discarded or to not yet being claimed by any individual or group. Objects whose property rights are held by a government on behalf of the community they govern, such as roads, rivers or territorial seas, are considered *res publica*. Those objects that have been individuated, that have been taken into exclusive possession by an individual or group, fall into the category of *res privatae*. However, objects that cannot be

⁸ *Ibid.*, 48.

⁹ Curtis Cook, *Patents, Profits and Power: How intellectual property rules the global economy*, (London: Kogan Page, 2002), 39.

¹⁰ *Ibid.*, 39-40.

¹¹ *Ibid.*, 46.

¹² *Ibid.*, 51.

individuated by any individual, group or government, that are accessible by all but controllable by no one such as the light and air, are considered *res communes*.¹³

This thesis takes these general categories as a starting point, beginning its definition of *common property* as, at its most basic, neither public nor private property. However, neither is it the absence of property that this statement might suggest. Common property comprises a set of property rights held by a community that are distinct from both the state and the market. While the Roman understanding of *res communes* suggests that only those objects that cannot possibly be individuated are considered in the common property category, this does not have to be the case. A more modern understanding is that any object can be considered common property; that it is not the inherent characteristics of an object that determine which category it falls into, so much as the property regimes that govern it.¹⁴

In the context of this thesis, objects to which conceptions of property are attached will be regarded as *resources*. A resource can be understood as “anything that is used to meet the needs of an organism.”¹⁵ They can be considered as either *natural* or *spatial-extension resources*. Natural resources are materials that have value when extracted from their natural state, such as fish, iron or genetic information, while spatial-extension resources are those whose value is determined by their location, for example geostationary orbits in space which can only be occupied by a finite number of satellites at any one time. Resources that fall within common property regimes are considered *common property resources*.

Common property resources are located within what are known as *commons*. These are generally fixed spatial domains that range in size from very small, such as a communal parking lot, to very large, such as the high seas or the solar system.¹⁶ A commons can be considered a domain “to which no single decision-making unit holds exclusive title.”¹⁷ This state does not, however, mean that the common property resources found within such domains are available for all to use. As the history section that follows will illustrate, this is a misconception that has caused the discourse of common property to be

¹³ Buck, *Global Commons*, 4.

¹⁴ John Vogler, *The Global Commons: A Regime Analysis*, (Chichester, New York, Brisbane, Toronto, Singapore: John Wiley & Sons, 1995), 3.

¹⁵ Buck, *Global Commons*, 3.

¹⁶ *Ibid.*, 5.

¹⁷ Per Magnus Wijkman, “Managing the Global Commons,” Vogler, *The Global Commons*, 2.

undervalued for many decades. Rather than falling under the rubric of common property, resources that are available for use by anyone are considered *open access resources*, more precisely considered within the sphere of the Roman category of *res nullius*.

For a commons to be successful, forms of control and rules regarding access to and use of the common resources contained within are necessary. For these controls to be successful, a sense of community is necessary. Therefore, a common property regime can be thought of as a regime that excludes outsiders, and sets the rules for how insiders, the “community”, use the resources found within a commons.¹⁸ Furthermore, the common property resources contained within a commons can be thought of as “resources managed under a property regime in which a legally defined user pool cannot be efficiently excluded from the resource domain.”¹⁹

While commons range vastly in size, those that fall outside the control of any one nation-state are considered either *international commons* or *global commons*. These differ primarily depending on whether they are, or can be, exclusionary. That is, while an international commons *is* exclusionary, the commons’ community being made up of a definite and limited set of nations, *all* nations have legal access to global commons. For example, while the Mediterranean Sea is an international commons whose community contains only those states that border it, the atmosphere or outer space constitute global commons, as no member of the global community can be effectively excluded from partaking in the resources they contain.²⁰

Often in debates that surround the access to and ownership of the natural resources that occur within the global commons, the phrase “*the Common Heritage of Mankind*” (CHM)²¹ is employed to describe a set of property rights that differ from concepts of exclusive ownership, or of free and open access.²² Coined in 1967 by Arvid Pardo, Maltese ambassador to the United Nations (UN), the CHM looks to define those resources found within the global commons as the “property of the global human population.”²³

¹⁸ Swaney, “Democracy and common property,” 277.

¹⁹ Buck, *Global Commons*, 5.

²⁰ *Ibid.*, 6.

²¹ While this principle is now quite often referred to as “the Common Heritage of *Humankind*”, in most literature it is still described as the CHM. As such this thesis will follow this convention while acknowledging that the term is not as politically correct as may be desired at the current time.

²² Buck, *Global Commons*, 28.

²³ *Ibid.*, 28.

The idea was strongly supported by developing nations throughout the 1970s as they called for the institution of a New International Economic Order, one aspect of which involved addressing growing concerns over the fair and equitable sharing of resources found within commons such as Antarctica, the oceans, or even outer space.²⁴

The CHM principle was seen by developing countries as an assertion of their right to take part in the exploitation of these common natural resources, concerned as they were that the combination of overexploitation and the traditional first-come-first-served rule of resource use would be to their disadvantage in the future. It also acted as a moral claim on the developmental assistance that they needed in order to be able to take part in this exploitation. However, more than three decades on from its emergence, developing countries have yet to gain any real benefits from the principle.²⁵

While there are many different common property regimes in existence today, each with its own community, its own set of rules, and its own bundle of rights to the property contained within, there is a basic set of beliefs, ideas and values that underlie each and every one: what this thesis terms the *common property paradigm*. A *paradigm* is “a set of beliefs, ideas and values from which public policies and whole systems of behaviour flow logically.”²⁶ Thus, when showing how the common property paradigm might be successfully introduced into the genetic resource debate, this thesis seeks to illustrate how the sets of beliefs, ideas and values that are common to *all* common property regimes might be employed to reconcile conflicts over the access to and ownership of genetic resources.

A History of Common Property.

For many, the concept of property is inextricably linked to the idea of individual ownership. While property theories that focus on the *individual's* relationship to objects have largely evolved within a modern, Western framework, this conception of property is often one that is viewed as universal; applicable to all people, regardless of time or place.

²⁴ Lorraine M. Elliot, *International Environmental Politics: Protecting the Antarctic*, (London: St. Martin's Press, 1994), 106.

²⁵ Buck, *Global Commons*, 29.

²⁶ Gareth Porter and Janet Welsh Brown, *Global Environmental Politics*, (Colorado and Oxford: Westview Press, 1996), 22.

Arguably, this trans-political, individualistic view is incorrect, as while it may hold true in and between Western societies, many of the conflicts between nations over property rights today are in contention of this basic assumption.²⁷ For the purposes of this thesis, however, the history of common property will be the history of common property in Western societies. While it may seem wrong to discount other areas of the world where common property regimes have continued to function successfully up until the present day,²⁸ it is fair to say that the Western view of property as private and individualistic has become the dominant paradigm over the last three to four hundred years. Of interest is why this has been the case, and more importantly, why the private property paradigm is being challenged by the TISGC and other groups at the start of the twenty-first century.

The Industrial Revolution: The fall of common property.

While the origins of Western property law can be traced back to the Romans and beyond, the modern, mutually exclusive concepts of private property and common property began to emerge in the seventeenth century during the Industrial Revolution.

In the course of the sixteenth, eighteenth and nineteenth centuries, the English countryside underwent massive political transformations as the commons, those pastures and woodlands that had traditionally been set aside for the use of peasants, were transferred to private ownership in various waves of enclosure. Over 7,000 enclosure acts were passed, transforming what until then had been common resources into private real estate, forcing the commoners off the land and into the growing towns and cities, and creating a pool of labourers for the new industries that were arising.²⁹ The enclosure movement helped sever the old ties between people and the land forged under feudalism, and spread throughout Europe over the course of the following centuries.³⁰

The effects of this movement were enhanced by a shift in the way the regulation of property was conceptualised. During the medieval period, the underlying assumption was that property should be regulated by custom and culture in some sort of “divinely directed hierarchy”, however, with the discovery of the “individual” during the

²⁷ May, *Intellectual Property Rights*, 22.

²⁸ Vogler, *Global Commons*, 2.

²⁹ Rowe, “The promise of the commons,” 29.

³⁰ Jonathan S. D. Pauling, “The Politics of Food: Urban agriculture as a Radical Green alternative to the political economy of agriculture,” (MA thesis, University of Canterbury, 2001), 14-18.

Reformation, this assumption found itself being replaced by concepts of economic and political individualism. The individual became the unit of analysis for eighteenth century political-economic theorists, and cooperation became to be seen as not only undesirable, but impossible. Economic self-interest was promoted as the means to protect society, and the deadly sin of avarice was transformed into a virtue.³¹

These political upheavals and changes to the way the regulation of property was conceptualised, led to two significant changes in the concept of property itself. Firstly, prior to the seventeenth century, property rights had been limited and held conditionally by the individual concerned. It was not until after this period that property became fully alienable. From that point, rather than the rights themselves being owned conditionally, property rights flowed from the property being owned: objects became the thing to which the rights were attached.

Secondly, property began to be conceived as something that could *only* be owned privately, by an individual or an organization. Prior to this period, common property and private property had existed side-by-side. Post-seventeenth century, for Western societies the concept of common property had become almost a contradiction in terms. Common property was reduced to merely a critique of private property, rather than a valid option in itself.³²

The Cold War: The rise of anti-commons narratives.

With the rise of communism and the advent of the Cold War in the latter half of the twentieth century, many discussions about the efficacy of cooperation and collective ownership as organising principles were forestalled due to hostility between the West and the Soviet Bloc.³³ The use of the concept of common property as even a critique of private property regimes was no longer legitimate. During this same period, further criticisms of common property arose from within Western economic, scientific and social circles.

³¹ Buck, *Global Commons*, 26.

³² May, *Intellectual Property Rights*, 23.

³³ David Bollier, "Reclaiming the Commons: Why we need to protect our public resources from private encroachment," *Boston Review*, 2002, <<http://www.bostonreview.mit.edu/BR27.3/bollier.html>> (5 August 2002).

Critiques of common property are in no way new. Aristotle himself stated: “What is common to the greatest number gets the least amount of care. People pay most attention to what is their own: they care less for what is common; or, at any rate, they care for it only to the extent to which each is individually concerned.”³⁴ However, couched as they were in scientific and social scientific terms, the critiques that emerged from the 1950s onwards have continued to cast a long shadow over any consideration of common property.

In her book, *Managing the Commons: The evolution of institutions for collective action*, Elinor Ostrom describes three of the most influential critiques to emerge from this period. The Tragedy of the Commons, the prisoner’s dilemma, and the logic of collective action all purport to show why common property regimes are inherently prone to failure, and why the use of market- or state-based solutions are more appropriate approaches for governing resource use.

Garret Hardin’s famous article, *The Tragedy of the Commons*, published in *Science* in 1968, is possibly the best-known critique of common property in existence. His logic is similar to Aristotle’s, and closely resembles the logic found in H. Scott Gordon’s famous 1954 essay, *The Economic Theory of a Common-Property Resource: The Fishery*.³⁵ Hardin uses a metaphor based on a common meadow open to all. He discusses how a group of rational herders might act toward such a resource, suggesting that as they each receive direct benefit from the pasture’s use, yet only suffer a portion of the costs associated with this use, and a delayed one at that, each herder is therefore motivated to add more and more animals at the expense of the common resource. Thus, the resource is over-exploited, and this over-use destroys the commons.³⁶ While Hardin was writing to highlight the potential problems of over population in the future, his metaphor has gained a life of its own and the belief that commons are inherently tragic has since formed the starting point of many analyses about the pros and cons of common property.

³⁴ Aristotle, *Politics*, Book II, chapter 3, trans. Ernest Barker (New York: Oxford University Press, 1995), 42.

³⁵ H. Scott Gordon, “The Economic Theory of a Common-Property Resource: The Fishery,” *Journal of Political Economy* 62 (April 1954): 124-142.

³⁶ Garret Hardin, “The Tragedy of the Commons,” in *Valuing the Earth: Economics, Ecology, Ethics*, eds. Herman E. Daly and Kenneth N. Townsend, (Cambridge, London: The Massachusetts Institute of Technology Press, 1993), 127-144.

The prisoner's dilemma game has been used as a way of formally showing what Hardin's parable suggested; namely, that even if a user of a common property resource is aware that through exercising restraint the resource would be protected and even enhanced in the future for all users' benefits, it is still rational for them to ignore this consideration.³⁷ This seemingly non-rational outcome is due to the lack of trust between users, for if one were to show restraint, then another might seek to gain an advantage by taking the opportunity to use more of the resource than they should. The paradox seen in this game, that individually rational actions lead to collectively irrational outcomes,³⁸ speaks well to the behaviour that Hardin describes, reinforcing his tragic outlook.

Along somewhat similar lines, and starting from the same "possessive individualism"³⁹ premise as Hardin, the inconsistency between individual and collective interests is described in Mancur Olson's 1965 work addressing the provision of public goods by organizations: *The Logic of Collective Action*. In his analysis, those who obtain benefits from a collective good have little incentive to voluntarily contribute to the provision of that good,⁴⁰ therefore, a rational actor will tend to "free ride."

This free rider problem lies at the heart of all three of these models. As Ostrom states: "Whenever one person cannot be excluded from the benefits that others provide, each person is motivated not to contribute to the joint effort, but to free ride on the efforts of others."⁴¹ While the temptation is there for all to free ride, this would lead to a complete failure in the production of collective benefits. However, even if only some were to take the free rider option, a less than optimal provision of the collective benefit would be the outcome.

As they are each a slightly different take on the free rider problem, all three models are useful for explaining how rational individual decisions can produce seemingly irrational collective outcomes. The belief that the outcomes in a common property situation would be irrational is reinforced by each model, and is one that lay at the heart of almost all debates involving common property during this period.

³⁷ Vogler, *The Global Commons*, 11.

³⁸ Ostrom, *Governing the Commons*, 5.

³⁹ Vogler, *The Global Commons*, 12.

⁴⁰ Ostrom, *Governing the Commons*, 6.

⁴¹ *Ibid.*, 6.

While his original article inspired many of the subsequent studies into the problems with common property, a decade later Hardin also provided the solution to the free rider problem. As far as he was concerned, the only alternatives to the potential tragedy he saw lying in wait within his common meadow were either the choice of a private enterprise system or socialism. Indeed, in order to make sure that the necessary changes were made to protect resources by removing them from the commons in which they resided, Hardin felt that “if ruin is to be avoided in a crowded world, people must be responsive to a coercive force outside their individual psyches, a ‘Leviathan,’ to use Hobbes’s term.”⁴² In other words, people, as rational individuals, were unable to successfully govern resources held in common, and therefore this governance had to be regulated by an external authority, such as a strong central government.

Thus, by the 1980s, not only was the concept of common property considered essentially a contradiction in terms, the Cold War had rendered political discussion of the paradigm unwise, and the ascendant social and economic belief in individualistic, rational humans had shown that common property regimes were without doubt untenable. However, during the 1990s, these views started to change: a fledgling common property movement began to surface in the West.

The Re-emergence of the Common Property Paradigm.

The commons movement that has surfaced in the West over the past fifteen years gained momentum throughout the 1990s. It is a movement that insists that markets have limits, contrary to much of the popular wisdom dispensed by many politicians and business interests over this period, and that looks to offer serious alternatives to the historic options of market or state regulation of resources. Its primary goal is the reintroduction of the common property paradigm, all but absent from the West since the seventeenth century, as a legitimate discourse in debates over ownership. It does not seek to replace the market or the state as locations of property regimes, but to simply redress the balance between these and the commons. Its acolytes believe that supporting the commons “is

⁴² Garret Hardin, “Political Requirements for Preserving our Common Heritage,” in Ostrom, *Governing the Commons*, 9.

not just a reactive critique of the market. It is also about advocating a new and positive vision.”⁴³

There are many factors behind this re-emergence of support for the common property paradigm. While some may have been necessary, none are sufficient to have caused the rise in common property as a legitimate option: all have played a role, and it is the combination of these factors that has led to suggestions such as the TISGC being put forward as answers to some of the difficult resource issues humanity faces today.

The end of the Cold War is probably the single most important factor behind the rise of this movement. With the defeat of communism by the capitalist West, the threat posed by ideas of cooperation and collaboration was vastly reduced, and it became possible to discuss potential property regimes emerging from the common property paradigm once more.⁴⁴

However, other factors external to Western societies have played a role as well. For example, as Western property regimes, and therefore Western concepts of property, have spread around the world, they have come into conflict with other national and cultural approaches to property. The flip side of what many see as Western neo-colonialism in the form of globalisation, is that the West itself has been confronted with alternatives to its own concepts of property, and many of these alternatives have come in the form of common property regimes.

Internal factors have also helped spur the growth of this movement. For David Bollier, writing about America’s obsession with private property, the reaction against the “palpable excesses of [America’s] market culture”⁴⁵ by many Americans forms a central driving force behind the re-emergence. Not only does he see people “animated by the ripoff and abuse of public resources,”⁴⁶ he points to the alarm generated by the new frontiers of property that are being opened up by new technologies and regulatory decisions. In other words, alarm at new threats to the commons that remain. An example of these threats is the attempts to enclose the “frontier commons”, those being “features

⁴³ David Bollier, “Rediscovery Of The Commons,” *TomPaine.com*, 25 July 2002, <<http://www.tompaine.com/feature.cfm/ID/6016>> (26 July 2002).

⁴⁴ Bollier, “Rediscovery Of The Commons.”

⁴⁵ *Ibid.*

⁴⁶ *Ibid.*

of the natural world that have historically been too large, too small, or too elusive for any market regime to capture and that have often been regarded as parts of a common human heritage.”⁴⁷ Questions regarding the ownership of genetic resources fall into the category of concerns surrounding “frontier commons”, and form the basis for calls such as those made by the TISGC.

Threats to existing commons are also being noted by the likes of Stanford University’s Lawrence Lessig. In books such as *The Future of Ideas: The fate of the commons in a connected world*, Lessig explores new enclosures in the realm of cyberspace and innovation.⁴⁸ Unlike in the past, where those affected by enclosures had no power, those affected by these new enclosures are articulate and influential, and with the support of such prominent professors as Lessig, the idea of common property has regained a respectability it has not had for almost two hundred years.⁴⁹

Complementing these public concerns, within policy, economic and social science circles, the anti-commons narratives that dominated the common property discourse have found themselves critiqued. With regard to Hardin’s seminal essay, it is now widely accepted that the “open to all” meadow he was describing was an example of an open access regime, rather than a common property regime. This conflation of common property with no property is described as the “open-commons confusion,”⁵⁰ and is considered a frequent cause for the pessimism surrounding ideas about common property.

While this new generation of counter-critiques accepts that failures of the commons and free riding do occur, they suggest such failures are by no means inevitable.⁵¹ While Hardin’s analysis followed from his “assumptions of open access, lack of constraints on individual behaviour, conditions in which demand exceeds supply, and resource users who are incapable of altering the rules... actual common property situations often do not conform to all four of these assumptions.”⁵² Conclusions such as these have been reinforced by many practical examples of successful commons that have gained

⁴⁷ Bollier, “Reclaiming the Commons.”

⁴⁸ Lawrence Lessig, *The Future of Ideas: The Fate of the Commons in a Connected World*, (New York: Random House, 2001).

⁴⁹ Rowe, “The promise of the commons,” 30.

⁵⁰ Swaney, “Democracy and common property,” 278.

⁵¹ Bollier, “Reclaiming the Commons.”

⁵² David Feeny *et al.*, “The Tragedy of the Commons: Twenty-Two Years Later,” in *Managing the Commons*, eds. John Baden and Douglas S. Noonan, (Bloomington and Indianapolis: Indiana University Press, 1998), 86.

recognition over the past fifteen years. For all the pessimism surrounding the potential of common property regimes in the West since the seventeenth century, it has become clear that common property regimes have continued to be employed to manage resources effectively in many areas of the world.⁵³ For all the talk of tragedy, there were obviously different rationalities in the world beyond the possessive individualism assumed by the anti-commons narratives. Furthermore, the 1990s witnessed stunning levels of growth due mostly to what some termed “the biggest and most robust commons in history”: the Internet.⁵⁴ The fact that such a commons could be the source of massive wealth creation for the market called into question much of the economic theory that determined that common property regimes were doomed to failure.

Finally, in addition to the concerns that have been generated by the excesses of the capitalist market culture and the theoretical and practical challenges launched against the anti-commons narratives over this period, scholars are finding new promise in the common property paradigm for solving problems faced by all societies. Two examples of this are in the areas of democracy and the environment. As common property regimes “usually exhibit a fairly equal distribution of claims to resource services and typically involve all resource owners in important decisions,”⁵⁵ theorists such as James Swaney suggest that they are more conducive to democratic politics than either market or state based property regimes. The resurgence of grassroots democracy, public participation and local level planning has meant that centralised, exclusive official control of resources has fallen out of favour.⁵⁶ Not only this, Swaney suggests that as the forces of globalisation intensify, and the world begins to shrink as regions become increasingly interdependent on all others, private property regimes have become increasingly inappropriate for dealing with environmental resource concerns, and he suggests that the solutions to such concerns “will involve property institutions ‘more like’ common property and ‘less like’ either private or state property.”⁵⁷

⁵³ Swaney, “Democracy and common property,” 278.

⁵⁴ Bollier, “Rediscovery Of The Commons.”

⁵⁵ Swaney, “Democracy and common property,” 262.

⁵⁶ Feeny *et al*, “The Tragedy of the Commons,” 87-88.

⁵⁷ Swaney, “Democracy and common property,” 262.

Conclusions.

Since its rejection as a viable alternative to private or state property regimes in the seventeenth century, the common property paradigm had fallen further and further from the West's grace. However, the 1990s bore witness to the reversal of this trend, with the emergence of a new movement determined to promote common property's virtues and reintroduce it into the broader property discourse. This movement has risen for a number of reasons, but it is becoming more vocal, and it has led to attempts such as the TISGC to promote common property at all levels of society as a way of solving environmental, resource and social concerns. The goal of the common property movement is not to replace the market or the state as legitimate locations for property regimes, but to redress the balance between these two approaches and the commons, and to offer viable alternatives to current property regimes for dealing with resource issues in the Twenty First Century.

Central to this thesis is the question of whether a common property regime would be applicable to the concerns surrounding the access to and ownership of genetic resources. The TISGC suggests that the introduction of such a regime would be best done at the global level, in the form of a new global commons. Before being able to determine whether or not this is the case, in the chapter that follows, this thesis will look to identify what the term "genetic resources" actually represents, and whether they are global resources at all.

Chapter III

The Nature of Genetic Resources.

“Genetic Engineering may mean that agriculture’s Green revolution will be superseded by a ‘Gene Revolution’. This technology raises hopes of eventually harvesting crops from deserts, from seawater, and from other environments that did not previously support farming. Medical researchers see their own Gene Revolution bringing more innovative advances during the last two decades of this century than occurred during the previous 200 years.”¹

Introduction.

The ways in which we conceive of genetic resources and the social institutions that surround them are the products of social and political conflict, and scientific revolution throughout the course of human history. This chapter seeks to develop a working definition of genetic resources; of the major historical periods that have helped shape not only this definition, but also the institutions which govern them; and of the impact of historical forces on the introduction of the common property paradigm into the current debate over access and ownership concerns in relation to genetic resources. In doing so, this chapter will show that genetic resources are a global resource, and therefore that discussions regarding a potential global commons, or other forms of global governance,² are meaningful and legitimate.

While the historical analysis provided will illustrate why genetic resources are global in their nature, of primary concern is the identification of where meaningful decisions are made regarding which property paradigms are legitimated in the current debate. Understanding where these decisions are made, either at the local, national, regional or supranational level, is vital to understanding how the common property discourse might be successfully advanced. This chapter contends that the same forces that have led to the global nature of this resource, have also led to the decision-making surrounding genetic resources being elevated to the supranational level. In international fora such as the

¹ WCED, *Our Common Future*, (Oxford and New York: Oxford University Press, 1987), 156.

² Governance, when discussed in this thesis, is not referring to the creation of some form of world government. It instead applies to the idea that “there are certain control functions that have to be performed in any viable human system which do not require formal government.” It is a phrase that is at once more encompassing than any formal notion of government, and also one that “subsumes informal non-governmental mechanisms.” (see: John Vogler, *The Global Commons: A Regime Analysis*, (Chichester, New York, Brisbane, Toronto, Singapore: John Wiley & Sons, 1995), 18.)

United Nations Conference on Environment and Development (UNCED), the World Trade Organisation (WTO), and the United Nations Food and Agriculture Organisation (UNFAO), agreements such as the Convention on Biological Diversity (CBD), Trade Related Aspects of Intellectual Property Rights (TRIPs), and the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), respectively, now govern the way in which many local, national, regional and international bodies relate to genetic resources.

Thus, in order for the discourse of common property to be successfully introduced into the debate over how humanity approaches issues of access to and ownership of genetic resources, agreement legitimising this paradigm must be reached at the supranational level.

Definitions and Concepts: Of genetic resources.

The primary concern of the Treaty Initiative to Share the Genetic Commons (TISGC) is to create a global commons governing “the Earth’s gene pool, in all of its biological forms and manifestations.”³ However, the scope of this commons would appear to go beyond governing the gene pool alone, with the TISGC suggesting that it should encompass not only “genes and the products they code for, in their natural, purified or synthesized form,” but also “chromosomes, cells, tissues, organs and organisms, including cloned, transgenic and chimeric organisms.”⁴ This definition is useful as a starting point for defining genetic resources.

A widely accepted definition for genetic resources is contained in the CBD. In this international agreement, genetic resources are considered to be any material of plant, animal, microbial or other origin containing functional units of heredity of actual or potential value,⁵ a definition that is analogous to, albeit more concise than, that found in the TISGC. The World Resources Institute (WRI) offers a similar definition focussed on the importance of the functional units of heredity, stating that genetic resources are “the

³ FOET, “Treaty Support Letter,” *Foundation on Economic Trends*, 2002, <<http://www.foet.org/treatysupportletter.htm>> (14 April 2003).

⁴ FOET, “The Treaty Initiative to Share the Genetic Commons,” *Foundation on Economic Trends*, 2002, <<http://www.foet.org/treaty.htm>> (14 April 2003).

⁵ CBD, “Article 2. Use of Terms,” *Convention on Biological Diversity*, 6 December 2003, <<http://www.biodiv.org/convention/articles.asp?lg=0&a=cbd-02>> (16 September 2003).

genes found in plants and animals that are of actual or potential value to people,” and that this also includes “chemicals found in plants and animals, since these are based on genetic information.”⁶ In his article investigating how the United States of America should respond to the challenges presented by private use of genetic resources originating from public land, John Adair takes this definition a step further, removing any references to physical organisms, and identifying the value found in these resources as the genetic and biochemical information contained within plants, animals and microorganisms.⁷

These four definitions help to develop an understanding of the dual nature of genetic resources: they are at once both tangible (for example, an organism) and intangible (the genetic and biochemical *information* to be found within an organism). As will be seen in the historical analysis to follow, this dual nature is a relatively recent phenomenon. While conflict over tangible forms of property such as gold, oil, or the products derived from what are now regarded as genetic resources has always existed, the conflict over genetic resources in recent history has the added dimension of involving intangible property.⁸

Thus, genetic resources are conceptualised in a tangible manner as living material containing functional units of heredity of actual or potential value, with this value residing in the genetic or biochemical information that the resources contain. However, as it is the conflict over these intangible aspects of genetic resources that informs the current ownership paradigms, it is on this aspect that this thesis focuses its conceptualisation of genetic resources. Thus, when discussing the creation of a commons of genetic resources, this thesis is referring to the successful introduction of the common property paradigm into the debate over access to and ownership of the genetic information found within living material.

⁶ WRI, “Questions and Answers About ‘Bioprospecting’,” *World Resources Institute*, 2003, <<http://www.wri.org/biodiv/bp-facts.html>> (28 May 2003).

⁷ John R. Adair, “The Bioprospecting Question: Should the United States charge biotechnology companies for the commercial use of public wild genetic resources?” *Ecology Law Quarterly* v24 n1 (February 1997): 131.

⁸ Geoffrey Tansey, “Food for Thought: Intellectual Property Rights, food, and biodiversity,” *Harvard International Review* v24 i1 (Spring 2002): 54-59.

The Classification of Genetic Resources by Type.

The TISGC, proposed placing *all* genetic resources in a global commons. However, different types of genetic resource may well require different approaches to access and ownership issues: not all genetic resources are created equal. An example of this can be found in the classic bioethics distinction between human (red) and nonhuman (green). The way in which scientists approach these two types of resource is quite different. The ethics and morals that surround the use or abuse of human genetic resources form a part of the overall discourse on how the use of human body parts should be approached.⁹ The concerns that surround human genetic resources, and the scientific and technological possibilities surrounding them, have also generated such international statements as the Universal Declaration on the Human Genome and Human Rights.¹⁰

However, while discussions surrounding human genetic resources are part of a much wider, and much older, debate, the category of nonhuman genetic resources is not similarly coherent. It is a residual category, one that is simply made up of things *not* human; including genetic resources that do not necessarily have similar uses, origins, or ethical and moral bases to how they are considered or used. As such is an inadequate of classification, and debating policy decisions regarding genetic resources as a whole, even when breaking them down into the human and nonhuman categories, is not an appropriate way forward. An apt metaphor might be comparing genetic resources with energy resources. While a nation may have an overall energy policy, it does not treat all energy resources equally; oil reserves are not treated in the same way as wood or hydroelectric reserves, for example.

In a similar fashion, this thesis contends that any decisions surrounding conflict over the access to or ownership of genetic resources should be made in the context of *different types* of genetic resources. For example, added to the red/green split, categories such as agricultural, industrial, pharmaceutical, and perhaps even religious or spiritual genetic

⁹ The case of *John Moore v. The Regents of the University of California* is an interesting, and commonly referred to, example of how the issue of human genetics is challenging concepts of being human, raising questions about the commodification of human body parts in the form of intellectual property, and whether individuals have the right to own their own body parts. For a good discussion on this and many other issues involved with the use of human genetic resources, see Jeremy Rifkin, *The Biotech Century: Harnessing the gene and remaking the world*, (New York: Jeremy P. Tarcher/Putnam, 1998). For a discussion on the use of property rights to govern body parts, see Stephen R. Munzer, "An Uneasy Case Against Property Rights in Body Parts," *Social Philosophy and Policy* v11 n2, (Summer 1994): 259-286.

¹⁰ UNESCO, "Universal Declaration on the Human Genome and Human Rights," *United Nations Educational, Scientific and Cultural Organisation*, 1997, <http://www.unesco.org/shs/human_rights/hrbc.htm> (4 January 2004).

resources should be considered when designing appropriate property regimes, be they common, public or private property, to apply to such genetic resources.

Which Information is of Value? Debates that fall outside the scope of this thesis.

It is important to acknowledge some of the controversies that surround the information contained within genetic resources. These conflicts fall outside the scope of this thesis; however, they are a vital part of the overall genetic resource debate. They could be considered the *content* of the debate, whereas this thesis aims to identify the *structure* of the debate: it is more concerned with discovering *how* and *why* the structures that govern the access to and ownership of these resources have come to be, and how existing ownership paradigms might be challenged or augmented, than with arguments over *what* these resources are. The following examples are by no means exhaustive, however they do offer a hint of these other, underlying conflicts.

This thesis approaches the information contained within genetic resources in a largely instrumental manner. It focuses on the importance of genetic resources as units of heredity or as sources for biochemical information, in many ways conceptualising them solely as raw-material inputs for medical, agricultural and industrial biotechnologies.¹¹ However, within this Western scientific framework lie controversies over the very nature of these units of heredity and the validity of concepts such as “the gene”. Additionally, the efficacy of the technologies and products that arise from the science of genetics, such as genetic engineering and transgenic crops, are sources of conflict. Indeed, even the underlying scientific beliefs such as genetic determinism and genetic reductionism are points of controversy, with this “molecular vision of life”¹² being questioned by many.¹³

¹¹ Kathleen McAfee, “Neoliberalism on the molecular scale: Economic and genetic reductionism in biotechnology battles,” *Geoforum* 34 (2003): 203.

¹² Lily Kay, *The Molecular Vision of Life: Caltech, the Rockefeller Foundation, and the Rise of the New Biology*, in *Ibid.*, 216.

¹³ See: McAfee, “Neoliberalism”; Evelyn Fox Keller, *The Century of the Gene*, (Cambridge, Massachusetts and London, England: Harvard University Press, 2000); Mae-Wan Ho, *Genetic Engineering: Dream or Nightmare?* (Dublin, Ireland: Gateway, 1998); Jack A. Heinemann, “Challenges to Regulating the Industrial Gene: Views inspired by the New Zealand experience,” in *Challenging Science: Science and Society Issues in New Zealand*, eds. Kevin Dew and Ruth Fitzgerald, Palmerston North, New Zealand: Dunmore Press, Forthcoming; Vandana Shiva, *Biopiracy: The Plunder of Nature and Knowledge*, (Boston, Massachusetts: South End Press, 1997); Vandana Shiva, *Protect or Plunder? Understanding Intellectual Property Rights*, (London and New York: Zed Books Ltd., 1998).

There are other forms of information and knowledge attached to genetic resources that lie beyond the genetic and biochemical information contained within an organism. One of the central tenets of the scientific approach is an abstraction of these resources from the environmental and social contexts in which they evolve. It is here that controversies over which types of information associated with genetic resources should be considered legitimate, and therefore valuable, are found. An example of this conflict is the debate surrounding the access to and ownership of Traditional Ecological Knowledge (TEK).¹⁴ This debate is closely related to how the legitimacy of alternate systems of knowledge creation is determined; systems that do not fit with the standard Western approach involving a single point of innovation generating static, discrete packets of information.¹⁵

The relationship between identity and genetic resources is another important aspect of the debate. This can refer to concerns over the use of human genetic resources at the level of the individual, the community or humanity as a whole.¹⁶ It also relates to the use of genetic resources external to the human body that form part of a community's identity. An example of this is the controversy over the use of Thai Jasmine Rice outlined in Chapter One: for Western scientists and crop breeders, Jasmine rice contains heritable traits for long-grained, aromatic rice that grows well in saline and sandy conditions, but for the Thai farmers of the Isan region, it represents the work of their ancestors, a link to their past, and a part of their cultural heritage and identity.

¹⁴ TEK can be defined as: "a body of knowledge built by a group of people through generations living in close contact with nature. It includes a system of classification, a set of empirical observations about the local environment, and a system of self-management that governs resource use." (Martha Johnson, "Research on Traditional Environmental Knowledge: Its Development and Its Role," in Graham Dutfield, "The Public and Private Domains: Intellectual property Rights in traditional Ecological Knowledge," *OIPRC Electronic Journal of Intellectual Property Rights*, March 1999, <<http://www.oiprc.ox.ac.uk/EJWP0399.html>> (30 January 2002).) A further definition of TEK is "any knowledge, innovation, or individual or collective practice of an indigenous population or local community, having real or potential value, associated with a biological resource, protected or not by intellectual property legislation." (Mariam Mayet, "Securing Sustainable Livelihoods: Imperatives underpinning the development of an appropriate regime to protect community rights to biodiversity," in Morris Mudiwa, "Global Commons: The Case of Indigenous Knowledge, Intellectual Property Rights and Biodiversity," presented at *The Commons in an Age of Globalisation*, the Ninth Conference of the International Association for the Study of Common Property, Victoria Falls, Zimbabwe, 17-21 June 2002, <<http://dlc.dlib.indiana.edu/documents/dir0/00/00/08/80/index.html>> (10 February 2004).) An important characteristic of TEK is that it is intergenerational; "those who hold the knowledge hold it as it were in trust with future generations." (*Ibid.*)

¹⁵ See: Dutfield, "Public and Private Domains"; Darrell A. Posey, "Protecting indigenous peoples' rights to biodiversity," *Environment* v38 n8 (October 1996): 6-28; Carlos M. Correa, "Traditional Knowledge and Intellectual Property: Issues and options surrounding the protection of traditional knowledge," *The Quaker United Nations Office*, November 2001, <<http://www.geneva.quino.info/pdf/tkmono1.pdf>> (21 March 2004).; Ajeet Mathur, "Who Owns Traditional Knowledge?" *Indian Council for Research on International Economic Relations*, Working Paper No. 96, January 2003, <<http://icrier.res.in/pdf/WP96-AjeetMathur.doc>> (21 March 2004); Hope Shand, "Patenting the planet," *Multinational Monitor* v15 n6 (June 1994): 9-13.

¹⁶ See: Rifkin, *Biotech Century*; Seth Shulman, "Toward Sharing the Genome," *Technology Review* (September/October 2000): 60-67; Margaret Everett, "The Social Life of Genes: Privacy, property and the new genetics," *Social Science and Medicine* 56 (2003): 53-65; Pilar N. Ossorio, "Property Rights and Human Bodies," in *Who Owns Life?* eds. David Magnus, Arthur Caplan and Glenn McGee, (New York: Prometheus Books, 2002).

As will be seen in the following sections, although access and ownership issues surrounding living materials are age old, the ability to identify and own the intangible aspects associated with these materials is a relatively new phenomenon. As such, an important part of this recent period of conflict is determining which of these intangible aspects are a legitimate part of the access and ownership debate: which of these types of information can be considered of “actual or potential value”.

A History of Plant Genetic Resources.

One of the problems faced when attempting to construct an historical framework in relation to genetic resources, is that prior to the recognition of the actual or potential value of genetic and biochemical information, not all such materials were treated with similar levels of importance. As such, it is difficult to develop an historical framework that covers these resources in totality. However, by narrowing the focus of this historical analysis to the area of plant genetic resources, it is possible to develop a framework that illustrates the way issues of access and ownership have been dealt with in different historical periods, and how these historical forces continue to impact on the issues surrounding all genetic resources today. The historical framework developed here also illustrates how human interaction with genetic resources over the ages has led to the point where they can be legitimately considered global resources today.

An analysis of plant genetic resources is especially valid due to their importance throughout history. From the development of agriculture somewhere between twelve and nine thousand years ago,¹⁷ plant genetic resources have been the most fundamental of all humanity’s “productive organs”:¹⁸ every society’s existence has been predicated on this resource base, as ultimately all food is derived from plants¹⁹ and for the vast majority of human history, natural products drawn from plants formed humanity’s pharmacopoeia.²⁰ Therefore, the relationship between this subset of genetic resources and humanity is relatively well documented. Basing this historical framework on plant

¹⁷ Jonathan S. D. Pauling, “The Politics of Food: Urban agriculture as a Radical Green alternative to the political economy of agriculture,” (MA thesis, University of Canterbury, 2001), 9.

¹⁸ Jack Ralph Kloppenberg Jr., *First the Seed: The political economy of plant biotechnology, 1492-2000*, (New York: Cambridge University Press, 1988), 1.

¹⁹ *Ibid.*

²⁰ John Merson, “Bio-prospecting or Bio-piracy: Intellectual Property Rights and Biodiversity in a Colonial Context,” *Osiris* (2001): 285.

genetic resources is also appropriate, as developments in the field of scientific crop breeding contributed largely to the discovery of genes and of the value to be found within this genetic information, and thus to the way genetic resources are conceptualised and managed today.

The history of human conflict over plant resources can be divided into four periods: Pre-Colonial, Colonial, National, and Global. In each of these periods, the conceptualisation of plant resources has evolved alongside changes in both the technological capacity to exploit them, and the organisational ability to create markets for them. This evolution involved a shift in the recognised unit of value in plant resources, the biological unit of value and control, from that of the species, down to the variety, and finally to the level of the gene. Concurrently, changes occurred in the mechanisms that were used to control these resources, and the level at which decisions were made governing these resources.

The Pre-Colonial Period.

For approximately 99% of the first two million years of its existence, the human species survived in hunter-gatherer societies. Somewhere between twelve and nine thousand years ago, this began to change, as hunters and gatherers moved to semi-permanent settlements and started to domesticate animals. Over the next three thousand years, the accumulation and storage of wild seeds, combined with the discovery of methods of resowing selected crops with preferred characteristics such as wheat, barley and legumes, led to the development of true agricultural societies. Within two millennia of the birth of agriculture, plant resources had supplanted meat as the primary source of nutrition for humans.²¹

Conflict over access to and ownership of these increasingly valuable plant resources dates back several thousand years.²² An early example of the international nature of this conflict was a plant collecting expedition mounted by the Egyptian army to East Africa on behest of the first Pharaoh, Queen Hatsehepsut, in 1482 BC.²³ The constant spread of cultivated plants, fuelled by natural adaptation and small-scale transportation between regions, was effective. By 1300, Europeans were cultivating barley, wheat, alfalfa and a

²¹ Pauling, "Politics of Food," 9-12.

²² Michel Petit *et al.*, *Why Governments Can't Make Policy: The case of plant genetic resources in the international arena*, (Lima, Peru: International Potato Center (CIP), 2001), 3.

²³ Cary Fowler, "Sharing agriculture's genetic bounty," *Science* v297 i5579 (12 July 2002): 157.

variety of vegetables not native to their continent. However, this movement was also extremely slow by today's standards, and the centres of crop origin and plant genetic diversity, the Vavilov Centres of Origin,²⁴ remained largely intact.²⁵

Thus, in the Pre-Colonial period, plant resources remained wedded to their centres of origin and could not be considered global in nature. As well, there were no real attempts made to control these resources at any biological level, nor any effective mechanisms available to do so. The spread from these centres remained extremely slow until the Old World came into contact with the New in the 15th century. The last five hundred years has borne witness to the unprecedented rapid movement of plant resources around the globe.

The Colonial Period.

The discovery of the New World was a plant resource boon for the Old World in two major respects. Not only did the Americas supply new resources of immense agricultural, medical and industrial significance, such as maize, quinine and rubber, they also provided new areas for the production of Old World commodities such as spices, bananas, tea, coffee and sugar. The "botanical chess game"²⁶ that resulted, as the European colonial powers shifted plant resources throughout their empires seeking to gain commercial hegemony, meant that over the next four centuries, plant resources were spread across the globe.²⁷

While the extraction of precious minerals initially formed the primary source of value in New World colonies, over time the emphasis shifted as plant resources came to be recognised as a valuable resource. The combination of the discovery of new and valuable plant resources, and the utilisation of the new colonies to expand areas of production of goods derived from plant resources both old and new alike, became a vital aid to the European powers; helping to staunch the flow of precious metals from Europe by providing replacements for plant derived products traditionally imported from the orient,

²⁴ Named after a young Russian scientist from the 1920s, Nikolai Ivanovich Vavilov, who set out to discover the origin and significance of genetic variation among crop plants. He found that the world's crop diversity was concentrated in particular regions, or "hot spots". There are twelve such centres, each the home to a dozen or so of some of the most important domesticated crops farmed today. (See Al Gore Jr, *Earth in the Balance: Ecology and the human spirit*, (New York, USA: Plume, 1993), 132-135; John Tuxill, "The Biodiversity That People Made," *World Watch* v13 n3 (May/June 2000): 26-29.)

²⁵ Kloppenberg Jr, *First the Seed*, 153.

²⁶ Pat Mooney, "The law of the seed," in *Ibid.*, 154.

²⁷ Kloppenberg Jr, *First the Seed*, 154.

such as tea, coffee and sugar.²⁸ Thus, Imperial powers sought to identify potentially valuable plants and gain commercial and military advantage through the control of specific species. Examples of the lengths that were undertaken to ensure this control include the destruction of all the nutmeg and clove trees in the Moluccas by the Dutch, except for on the three islands where their plantations were located. While for the French, the export of indigo seeds from Antigua became a capital offence.²⁹ Failure to successfully gain the necessary control over such resources could be disastrous, as in the case of Brazil, whose share of the rubber market dropped from 98% to virtually nothing within twenty years of the first rubber trees being planted in Malaysia.³⁰

The need to identify new species of potential value meant that by the time of James Cook's voyages to the South Pacific, the inclusion of botanists such as Joseph Banks was considered a legitimate part of the exploration endeavour.³¹ Botanical science was called into service in the creation of a network of botanical gardens throughout the colonial empires, helping to develop and test plant resources for new climates and areas of production.³²

The Colonial period saw both the biological unit of value in plant resources, and the control over these resources, conceptualised at the level of the species. This control was exercised through Imperial military and commercial might, and decisions governing these resources were made at the Imperial level.

The National Period.

Towards the end of the Colonial period, the Industrial Revolution induced two main paradigmatic shifts in agriculture. The rapid expansion in the global trade and movement of plant resources witnessed throughout the Colonial period, was further enhanced as imported agricultural products became essential for supporting the massive urban populations that had built up around newly industrialised towns and cities. Alongside the increased demand for imported food, the application of scientific principles to agriculture allowed an increase in food production through the adoption of new technologies.³³ The

²⁸ *Ibid.*

²⁹ *Ibid.*

³⁰ Merson, "Colonial Context," 286.

³¹ *Ibid.*, 285-286.

³² Kloppenberg Jr, *First the Seed*, 156.

³³ Pauling, "Politics of Food," 18-22.

second of these two shifts was to have a profound impact on the way in which plant resources were conceptualised and controlled in the ensuing two hundred years.

By the late nineteenth century, specific, differentiated varieties of domesticated crops began to be recognised as commercially valuable. Markets opened up for varieties such as the “Red Delicious” apple, a chance discovery on an Iowa farm in 1868 that quickly became popular. However, with this shift in the locus of value from the species level to that of the variety, so to came concerns surrounding the access to and ownership of these new biological units of value and control. While multiplication of the likes of the Red Delicious apple was easily accomplished through techniques such as grafting or seed saving, claims of ownership over this new form of plant resource could no longer be made in the same way as during Colonial days. Not only was control of an entire species no longer desirable, with the rise of nations and the corresponding decline of empires, the use of military might to exercise such control was no longer legitimate.³⁴

The new mechanisms that were needed to provide control over the access to and ownership of varieties found their genesis in calls by the US nursery industry to extend patent and trademark protection to new varieties of plants in the 1870s.³⁵ However, the courts of that time considered that intellectual property should not be applicable to products of nature, that while processes devised to extract what is found in nature could be patented, objects discovered there could not. Plant scientists such as Liberty Hyde Bailey of Cornell University reinforced this view, advising the nursery industry in 1891 that not only were new types of plants difficult to define or specify, most new varieties were accidents discovered by nurserymen rather than the results of systematic breeding, and therefore patent protection should not be extended to plants.³⁶

The rediscovery of Mendel’s laws of heredity in 1900 was to provide the scientific basis for future crop breeding and improvement, and much needed support for arguments in favour of intellectual property protection of plants. Plant breeders began “to think that the era of controlled plant innovation had arrived”, and by 1906 nurserymen had returned to the US Congress to demand patent protection for their products.³⁷ While

³⁴ Petit *et al*, *Why Governments Can’t Make Policy*, 3-4.

³⁵ *Ibid.*, 3.

³⁶ Daniel J. Kevles, *A history of patenting life in the United States with comparative attention to Europe and Canada*, (Luxembourg: Office for Official Publications of the European Communities, 2002), 2.

³⁷ *Ibid.*, 2-3.

these calls once again failed to produce results, this desire for intellectual property protection to be made available for plants was finally realised with the passing of the 1930 Plant Patent Act.³⁸

Despite the restricted coverage of the Act, limited to plants that could be reproduced asexually, although excluding tuber-propagated plants such as Irish potatoes, it did put in place the principle of intellectual property protection of plants developed by breeders for the first time. Internationally, its effects could be seen as similar laws were soon passed in other countries such as Germany (1933), Austria (1938), and the Netherlands (1941).³⁹

Thus, over the course of the National period of human conflict over plant resources, the biological unit of value and control shifted from that of the species to the variety. Coinciding with this shift, the decline of the Imperial powers meant that new mechanisms of control other than military and commercial might needed to be found. These new mechanisms were found in the extension of intellectual property rights, albeit limited, to plants for the first time, a move legitimated through the rediscovery of Mendel's laws and the application of scientific principles to crop breeding. During this period, decision-making surrounding concerns over the access to and ownership of plant resources was located at the national level, although decisions made in one country could influence those made in another.

The Global Period.

The Global period of human conflict over plant resources finds its origins in the 1950s. During this decade, scientific advances such as James Watson and Francis Crick's discovery of the DNA molecule, led to a revolution in the way biological resources were conceptualised.⁴⁰ In the area of governance, discussions within the European seed trade led to the formation of the Union for the Protection of New Varieties of Plants (UPOV) by six European countries in 1961, the first international agreement for intellectual property protecting plant resources.⁴¹

³⁸ *Ibid.*, 4-13.

³⁹ Petit *et al*, *Why Governments Can't Make Policy*, 3.

⁴⁰ Keller, *Century of the Gene*, 23-25.

⁴¹ Petit *et al*, *Why Governments Can't Make Policy*, 4.

Over the next four decades, this period would see a shift in the biological unit of value and control to the level of the gene, while witnessing the simultaneous rise of the level of governance to that of supranational institutions. With these changes, plant resources have reached a truly global state. The historical upheavals of the last five hundred years had strewn them across the globe, no longer found only close to their points of origin, the upheavals had left no one country or region genetically independent.⁴² Scientific advances and the technologies they have spawned have not only redefined the way in which humans conceptualise plant resources, realising their “genetic” nature, but also broken down the biological barriers between species, leaving a “global gene pool”⁴³, its components abstracted from their environmental and social contexts, from which scientists and crop breeders can draw. Finally, UPOV and its descendants have seen the level at which decisions are made regarding control over what are now considered genetic resources firmly located in supranational institutions.

The following section will seek to analyse this period more closely, identifying the reasons why these changes have occurred since the 1960s, and how these same forces impact upon the possibility of introducing the common property paradigm into the genetic resource debate.

The Globalisation of Genetic Governance.

There have been four primary forces that have helped to shape the debate surrounding genetic resource access and ownership issues over the course of the Global period of conflict. The first three relate directly to genetic resources themselves: the way in which their genetic nature became recognised; the development of the ability to manipulate and exploit them; and, the realisation of the pressing need to conserve this newly discovered resource. The final force is external to genetic resources. It is a force that has broadly affected all human societies over the past four decades in an increasingly intense fashion: globalisation.

⁴² Kloppenberg Jr, *First the Seed*, 180-184.

⁴³ *National Research Council Convocation on Genetic Engineering of Plants*, in *Ibid.*, 3.

The Recognition of the New Resource Within the Old.

The rediscovery of Mendel's laws of heredity in 1900 provoked immense scientific interest, and was pivotal in not only the recognition of the gene as the biological unit of significance in living materials, but also the recognition of the value that could be attached to this information.

In the realm of basic science, the rediscovery of Gregor Mendel's 1865 investigation into the heritable traits of pea plants led directly to the formation of the new science of "genetics". The actual term genetics was first coined in 1906, however, it was not until 1909 that the term "gene" was described by Wilhelm Johannsen,⁴⁴ who sought to name the difference between what is observed about an organism (its phenotype), and what contributes to the heritable traits passed from one generation to the next (its genotype).⁴⁵ For Johannsen, the word gene contained no hypothesis about its material nature; it simply represented the elements in an organism, proven by Mendel's experiments to exist as quantum units, which passed traits on to future generations. However, for many scientists that followed, such as H.J. Muller, the gene became "the fundamental unit of heredity" and "the basis of life". This basis of life was considered to be a physical entity, analogous to the molecules and atoms recently discovered in the physical sciences.⁴⁶

The search for the nature of this physical entity lasted until the 1950s. Watson and Crick's discovery of the molecular structure of deoxyribonucleic acid (DNA) in 1953 came as the last step in a decade-long investigation into DNA as the fundamental unit of heredity. No longer were there any doubts about the material nature of genes, and by the 1960s, the transition from Johannsen's abstract concept of the gene, to the understanding of its physical manifestation in the form of DNA, was essentially complete.⁴⁷ The identification of the DNA molecule as the genetic material led to the formation of powerful new techniques that replaced classical genetics with molecular genetics, in turn leading to the phenomenal advances witnessed in the areas of genetics and biotechnology over the last forty years.⁴⁸

⁴⁴ Keller, *Century of the Gene*, 1.

⁴⁵ Heinemann, "Industrial Gene," 2.

⁴⁶ Keller, *Century of the Gene*, 1-3.

⁴⁷ Heinemann, "Industrial Gene," 2-4.

⁴⁸ Keller, *Century of the Gene*, 3.

While it was this discovery of the physical manifestation of the gene that was the essential step in reconceptualising the way in which humans define living resources, the applied science of new crop breeding techniques based on Mendel's discoveries showed how valuable new advances in the area of molecular genetics would be in the future.

Since the end of the Second World War, the application of scientific techniques to agriculture has produced dramatic crop yield increases worldwide. First described as the "Green Revolution" in 1968, these advances saw most developed countries achieve sustained food surpluses by the mid twentieth century⁴⁹ and led to a rise in the global grain output, from 692 million tonnes in 1950⁵⁰ to 1.9 billion tonnes in 1998.⁵¹ Several factors contributed to this revolution, including the growth in the use of modern chemical fertilisers and pesticides, and the increase in the size and effectiveness of irrigation schemes. However, it was the creation of semi-dwarf, high yielding varieties (HYV) of crops in the 1950s, that provided the necessary means of combining all three of the previous technologies together to produce the stunning production gains of the Green Revolution.⁵²

This foray into the field of "applied evolutionary science"⁵³ proved to be a global demonstration of the power of applying scientific principles to important crop staples such as wheat and corn. The roots of the Green Revolution can be traced back to the Mexican croplands of the 1940s, where the US-based Rockefeller Foundation initiated the Mexican Agricultural Programme. This resulted in Mexico's "quiet" wheat revolution in the late 1950s, and the crop improvement techniques developed there were soon extended to other crops and other regions of the world, with India, Pakistan and the Philippines benefiting through the 1970s and 1980s.⁵⁴

⁴⁹ IFPRI, "Green Revolution: Curse or Blessing?" *International Food Policy Research Institute*, 2002, <<http://www.ifpri.org/pubs/ib/ib11.pdf>> (21 March 2004).

⁵⁰ actionbioscience.org, "Biotechnology and the Green Revolution: Interview with Norman Borlaug, PhD," *actionbioscience.org*, 2003, <<http://www.actionbioscience.org/biotech/borlaug.html>> (3 January 2004).

⁵¹ Lester R. Brown, "Feeding Nine Billion," in ed, Linda Starke, *State of the World 1999: A Worldwatch Institute Report on Progress Toward a Sustainable Society*, (New York and London: W.W. Norton and Company, 1999), 115.

⁵² Pauling, "Politics of Food," 23-24.

⁵³ Kloppenberg Jr, *First the Seed*, 2.

⁵⁴ Norman E. Borlaug, "The Green Revolution Revisited and The Road Ahead," presented at *The Special 30th Anniversary Lecture*, The Norwegian Nobel Institute, Oslo, 8 September 2000, <<http://www.nobel.se/peace/articles/borlaug>> (21 March 2004).

The results of the application of these new technologies were dramatic. In Indonesia, the Green Revolution led to a doubling of the grain output, while India saw a tripling of their wheat yields, and Mexico experienced a four-fold increase in their grain production.⁵⁵ These astonishing increases had a dual impact on the recognition of the importance of genetic resources. They illustrated the power of applying science to agriculture; the huge crop yield increases encouraged investment in the sector, particularly in new technologies such as biotechnology. They also demonstrated that agricultural technologies and techniques developed in one part of the world could be successfully transferred to other regions, suggesting that global markets for new crops and their associated technologies, not just agricultural products obtained from these inventions, could be realised in the future.⁵⁶

Thus, the rediscovery of Mendel's laws led both to the science of genetics and the discovery of the gene, and to the recognition of the vast potential associated with the application of modern crop-breeding techniques, and therefore with the new technologies that were developed from this knowledge.

The Manipulation and Exploitation of Genetic Resources.

The genetic nature of living materials, and of the immense potential contained within this genetic information, was effectively recognised by the end of the 1960s. However, it was not until the 1970s that the ability to manipulate genetic resources was developed, and until the 1980s that ownership of such resources at the genetic level was legitimated.

While biotechnology can claim its origins in the work of Mendel and the subsequent scientific advances based on his discoveries, the birth of the modern techniques that lie at the heart of the industry today is a much more recent event. In 1972, Herbert Boyer and Stanley Cohen both presented papers at a conference in Hawaii detailing separate research projects they were undertaking at the Universities of California, San Francisco,

⁵⁵ Pauling, "Politics of Food," 24-25.

⁵⁶ This is not to say that the Green Revolution has been criticism-free. While the yield gains may have been stunning, there are many who point to adverse social and nutritional effects, and changes in the way agriculture is practised throughout developing nations, with increased reliance on mono-cultures and agri-chemical inputs, as examples of the negative impact that the Green Revolution has had in many parts of the world. Also, the claims of transferability of the new HYVs has been questioned by many, as the interplay between the genetic makeup of organisms and the environment that surrounds them becomes better understood. However, these criticisms do not undermine the basic point that with the development of HYVs, the power of scientific approaches to crop-breeding and the value of genetic resources, were forcefully demonstrated for all the world to see. For a good discussion of some of the major criticisms of the Green revolution, see: Vandana Shiva, *The Violence of the Green Revolution: Third world agriculture, ecology, and politics*, (London; Atlantic Highlands, N.J., USA: Zed Books, 1991).

and Stanford, respectively. They realised that through a combination of their techniques they would have a powerful tool, with the ability to splice a gene of interest into a microorganism or another cell. The technique of gene cloning that they subsequently invented forms the basis of genetic engineering and the biotechnology industry today.⁵⁷

The advances stemming from this technique and the science of genetics in general have led to what some commentators describe as “the second great technological revolution in world history”.⁵⁸ While the twentieth century was “the century of physics and chemistry”, they view the next as “the century of biology”.⁵⁹ The industry that has developed around these advances has seen incredibly rapid growth, reaching a total market capital of around USD\$100 billion by 1999, with 1,300 biotechnology companies registered in the US alone, and over 5,000 biotechnology patents being lodged in the period from 1996-1999.⁶⁰ More importantly, transnational corporations such as Du Pont, Novartis, Monsanto and Eli Lilly are investing heavily in the new technologies.⁶¹ Thus, not only have the new science and attendant technologies created what could functionally be considered a “global gene pool”, the markets for the technologies and products are global, and the corporate actors becoming involved in the biotechnology industry are some of the biggest global companies in the world.

However, the application of the science of genetics and the creation of new biotechnologies is only half the reason for the astonishing rise of the biotech industry over the past twenty-five years. The second development of importance in this period was the emergence of modern intellectual property law, and its subsequent spread around the world.

Many see the protection extended by intellectual property laws as essential for encouraging innovation and investment in areas such as biotechnology.⁶² Without this

⁵⁷ “The Birth of Biotech,” *Technology Review (Cambridge, Massachusetts)* v103 i4 (July 2000), 120.

⁵⁸ Rifkin, *Biotech Century*, 15.

⁵⁹ *Ibid.*

⁶⁰ John R. La Montagne, “Biotechnology and research: promise and problems,” *The Lancet* v358 i9294 (17 November 2001), 1723.

⁶¹ Rifkin, *Biotech Century*, 15.

⁶² The notion that strong intellectual property laws are essential to encourage innovation is one that is highly contested. It stems from the Western theory of romantic entitlement: that individual authors and inventors deserve property rights in the products that spring from their minds, regardless of what has come in the past. (Pamela Samuelson, “Shamans, Software, and Spleens: Law and the Construction of the Information Society,” (book reviews), *Michigan Law Review* v94 n6 (May 1996): 2029-2057.) However, there are some who are dubious that this metaphor holds true, and who claim that intellectual property laws are more about keeping control over technologies and creating dependence, than about rewarding creators. (Henk Hobbelink, *Biotechnology and the*

protection, private actors would not be able to recover the costs of developing new technologies and products, as they would not be able to own them.⁶³ As discussed in chapter II, intellectual property seeks to equate ideas, inventions and other intangible objects with tangible objects; suggesting that intangible property should enjoy similar characteristics to material property. Thus, not only was the identification of the DNA molecule as the gene important in terms of scientific and technological advances, a molecule such as this that is “fully describable, discrete and associated with a function that ultimately can be sold”⁶⁴ was essential for the promotion of commercial interest in the biotech industry. In effect, the gene became the “separable and transferable knowledge object” that has allowed the extension of intellectual property to genetic resources.

However, the creation of favourable new laws, court rulings and regulations that eventually led to this extension did not begin until 1980, with the landmark US Supreme Court ruling in the case of *Diamond v. Chakrabarty* allowing genetically engineered micro-organisms to be patented.⁶⁵ By 1987, the US Patent and Trademark Office (USPTO) had ruled that genetically engineered animals were also patentable.⁶⁶ These decisions illustrated the transformation that had taken place during the course of the twentieth century in relation to patent law: the “shift from primarily granting patents on conventional mechanical inventions to patenting chemicals, plants and animals, and even genes.”⁶⁷

The extension of patent protection to living materials coincided with a more general shift in the way intellectual property laws were regarded. While the rise of the importance of

Future of World Agriculture, (London and New Jersey: Zed Books Ltd, 1991), 100.) As well, there are increasing concerns that these laws may actually inhibit the innovation they are meant to encourage within certain high-tech industries such as Information Technology. (James Bessen and Eric Maskin, “Sequential Innovation, Patents, and Imitation,” *Massachusetts Institute of Technology and Harvard University, Department of Economics*, Working Paper 00-01, January 2000, < http://papers.ssrn.com/paper.taf?abstract_id=206189> (14 April 2003).) There are also concerns being expressed that while intellectual property laws are being pushed for in all countries, they are not necessarily appropriate for developing nations: that the cost of the implementation of such laws would prove prohibitive, and the results would in fact delay the diffusion of new technologies by preventing imitation, traditionally a vital driving force behind innovation. (“Intellectual Property: Patently Problematic,” *The Economist* (14 September 2002): 67-68.) However, once again in regards to this thesis, these criticisms while valid, do not undermine the central point that the belief that intellectual property laws encourage and reward innovation is a strong one, and one that has been used as support for calls to extend these protections into the realm of biotechnology.

⁶³ Adair, “Bioprospecting,” 132.

⁶⁴ Heinemann, “Industrial Gene,” 2.

⁶⁵ Kevles, D. J. 2002. *Op cit* pp 14-39

⁶⁶ Shand, “Patenting the planet,” 9-14.

⁶⁷ Jack Wilson, “Patenting Organisms: Intellectual Property Law Meets Biology,” in *Who Owns Life?* eds. David Magnus, Arthur Caplan and Glenn McGee, (New York: Prometheus Books, 2002), 26.

these laws can largely be attributed to major developments in communication, information and biotechnologies,⁶⁸ it was the decline in traditional industries and the introduction of cheaper, better goods from abroad into the US market in the 1970s, that led the nation's policy makers to identify intellectual property as an essential part of the US' future competitive advantage in the global economy.⁶⁹ Domestically, the early 1980s saw significant changes to the patent system. The court system was reformed in favour of patents, with consolidation of all patent appeals under the newly established Court of Appeals for the Federal Circuit, which tended to come down very strongly in favour of patent rights. The USPTO was empowered, receiving new financial support from Congress while the rank of Commissioner of Patents and Trademarks was raised to the level of Assistant Secretary. Simultaneously, sectors of government that traditionally opposed strong patent protection, such as the Antitrust Division of the Department of Justice, were decreased or even abolished. The protection of intellectual property rights also became a primary focus of US trade policy, culminating in the WTO treaty in 1994, with the USPTO being the principle source of the draft language used in the WTO's critical intellectual property provisions of the TRIPs agreement.⁷⁰

Thus, intellectual property protection was extended to cover genetic resources during the same period as intellectual property laws in general were strengthened domestically in the US, and then exported to the rest of the world through US trade policies and the formation of the WTO. With the extension of the social institution of intellectual property to genetic resources, the ability to commercially exploit them was now aligned to the ability to develop new technologies and products from them. Not only was the genetic nature of these resources now recognized; both their tangible and intangible aspects, through the application of new scientific techniques and the introduction of intellectual property laws, could now be owned and controlled.

The Pressing Need to Conserve Genetic Resources.

In a departure from the previous periods of conflict over access to and ownership of living materials, the recognition of genetic resources, and the development of means to manipulate and exploit them, was matched in the Global period by a growing concern

⁶⁸ Tansey, "Food for Thought," 54.

⁶⁹ Hon. Bruce Lehman, "Making the World Safe for Biotech Patents," A discussion paper prepared for the *International Intellectual Property Institute*, Boston, Massachusetts, 26 June 2002, 1.

⁷⁰ *Ibid.*, 1-2.

over the need to conserve them.⁷¹ Calls to protect biological diversity on the farm and in the wild were spurred on by fears of genetic erosion and environmental degradation, and therefore the loss of this newly recognised resource. This need to conserve has not only added a unique flavour to the genetic resource debate, it has helped to cement decision-making surrounding genetic resources at the supranational level, coinciding as it has with the birth of the global environmental movement.

By the 1970s, it was recognised that the technological bind of the improved crop varieties developed during the Green Revolution, was that they invariably eliminated the resource upon which they were based.⁷² The replacement of traditional cultivars by their improved descendants, meant that over the course of the twentieth century the varietal diversity of many domesticated crops on farmland plummeted by 90% in the US alone, with similar losses being estimated at around the industrialised world.⁷³ The inherent risks of genetic erosion on the world's cropland were highlighted in two instances during the 1970s. The first was the 1970 corn blight, in which 15% of the US corn harvest was lost to a leaf blight to which 90% of the existing corn crop was susceptible,⁷⁴ while the second occurred a year and a half later when the Soviet Union's winter wheat crop failed due to genetic uniformity of the varieties planted.⁷⁵ These events not only heightened awareness of the necessity of genetic diversity in cropland, they generated an awareness of the broader issue of the need to address the global erosion of genetic diversity. It was recognised that environmental degradation in the centres of origin of the world's staple food crops represented the loss of the raw materials necessary to combat future pest and pathogen challenges.⁷⁶

Crop genetic resources had become an issue of international importance, and in 1974 the United Nations (UN) joined forces with international aid donors and created the International Board for Plant Genetic Resources (IBGRI). Now known as the International Plant Genetic Resources Institute (IPGRI), its mandate was to create a global network of gene banks to store large quantities of seeds, thus securing the world's agricultural genetic resources for future breeding efforts. The total number of varieties

⁷¹ Cary Fowler, "Re: A political science thesis," 17 August 2003, personal email (18 August 2003).

⁷² Kloppenberg Jr, *First the Seed*, 162.

⁷³ Tuxill, "Biodiversity," 30-31.

⁷⁴ Kloppenberg Jr, *Fist the Seed*, 163.

⁷⁵ Tuxill, "Biodiversity," 33.

⁷⁶ Kloppenberg Jr, *First the Seed*, 163.

stored in this network now exceeds six million, an important stockpile of valuable genetic raw materials.⁷⁷

While the efforts of IPGRI focussed on genetic resources essential to agriculture, the creation of this organisation fell within the larger context of the burgeoning global environmental movement. Prior to the 1970s, few if any transborder environmental degradation issues were of recognised importance for any country, yet by the end of the twentieth century, over one hundred international environmental treaties had been signed.⁷⁸ The growth of this movement was not only dramatic, it also played an important role in the genetic resource debate.

The birth of the global environmental movement is often traced back to the release of Rachel Carson's book, *Silent Spring*, in the American summer of 1962. Within eight years, the new ideas regarding humanity's relationship with the environment that many first encountered in Carson's book had blossomed, with 300,000 Americans taking part in Earth Day demonstrations, and a declaration by *Time* magazine that the environment was *the* issue for 1970.⁷⁹ Internationally, environmental concerns were also growing, and in 1972 one of the biggest UN conferences ever held, the Stockholm conference, became "the single most influential event in the evolution of the international environmental movement".⁸⁰ It marked a shift to a more global outlook for environmental concerns, and during its proceedings, issues of biological diversity were granted political and legal legitimacy at the international level for the first time.⁸¹ By its close, the United Nations Environment Programme (UNEP) had been created, further confirmation that environmental concerns were now global in nature.

In 1987, the report of the World Commission on the Environment and Development (WCED) was published as *Our Common Future*, four years after the UN General Assembly called for the Commission's creation in order to study the relationship between the environment and development.⁸² The report identified the conservation of living natural

⁷⁷ Tuxill, "Biodiversity," 33.

⁷⁸ Jan Aart Scholte, *Globalization: A critical introduction*, (New York, USA: Palgrave, 2000), 83-84.

⁷⁹ John McCormick, *The Global Environmental Movement: Reclaiming Paradise*, (London: Belhaven Press, 1989), 47.

⁸⁰ *Ibid.*, 104.

⁸¹ Vicente Sanchez, "The Convention on Biological Diversity: Negotiation and contents," in *Biodiplomacy: Genetic Resources and International Relations*, eds. Vicente Sanchez and Calestous Juma, (Nairobi: African Centre for Technology Studies, 1994), 8.

⁸² McCormick, *Global Environmental Movement*, 192-193.

resources as crucial for future economic development, particularly for developing nations, home to the majority of biological diversity,⁸³ and noted that “a powerful economic rationale [was] emerging to bolster the ethical, aesthetic and scientific cases for preserving them.”⁸⁴

By the 1990s, concerns regarding the global environment had become increasingly intertwined with those of international economic relations and policies.⁸⁵ In June 1992, the United Nations Conference on Environment and Development (UNCED), was held in Rio de Janeiro. The Earth Summit, as it became known, was the world’s first truly global summit meeting. While Agenda 21, a non-binding, global action plan for sustainable societies worldwide,⁸⁶ was the major agreement to emerge from this process, of more importance to the conservation of biological diversity and issues of access to and control over genetic resources, was the concurrent signing of the Convention on Biological Diversity (CBD). Negotiated as part of the UNCED preparations, the CBD was a perfect example of how environmental and economic concerns had become intertwined at the international level, and of the WCED’s “powerful economic rationale” in action.

The recognition of the need to conserve genetic resources was paralleled by the recognition that in order to conserve them, both in the domestic and wild arenas, conservation had to be attempted at the global level. All countries and regions were dependent on each other for these resources, largely due to the “botanical chess game” of previous centuries, and there was a growing realisation that with the invention of new biotechnologies, the concept of a global gene pool was now realisable. The drive to conserve was set against the backdrop of the birth of the global environmental movement, and was itself a vital component of the movement’s rise. By the 1990s, these conservation efforts had become firmly located within the intertwined discourses of international economic and environmental concerns; conflict over access to and ownership of genetic resources in this period found itself caught between questions of development and conservation. The creation of the CBD was an example of the struggle to articulate economic and environmental considerations within the debate, and a

⁸³ For example, of the twenty most important food crops, 95.7% of the genetic material used as the basis of these crops is to be found in developing nations. (Adair, “Bioprospecting,” 134.)

⁸⁴ WCED, *Our Common Future*, 147.

⁸⁵ Gareth Porter and Janet Welsh Brown, *Global Environmental Politics*, (Colorado and Oxford: Westview Press, 1996), 107.

⁸⁶ *Ibid.*, 115.

confirmation that these issues now had to be decided at the global level in supranational fora. Arguably, it is the most important agreement to govern genetic resources in existence today.

The Globalisation of Governance.

During the Global period of conflict over access to and ownership of genetic resources, the three internal forces discussed above, recognition of the genetic nature of genetic resources, the development of the ability to manipulate and commercially exploit them, and the need to conserve them, all conspired to see the level of debate shift to the global stage. The most meaningful decisions regarding how humanity governs genetic resources now occur in supranational fora. However, these forces have not operated in a vacuum. Since the 1960s, all areas of human endeavour have been subjected, in an increasingly intense fashion, to a force many commentators describe as “globalisation”.⁸⁷ The genetic resource debate has been an intrinsic part of globalisation, both in helping create and drive it, and in turn being affected by its outcomes.

While issues such as the global loss of biological diversity were essential in the growth of the global environmental movement, they were also a spur to the spread of a new global consciousness. Prior to the 1970s, only a small portion of humanity thought in global terms, yet by the close of the twentieth century, concepts of globality were commonplace in academic, commercial, political and popular thinking. Large proportions of humanity had begun to conceptualise the world as a single place.⁸⁸ Added to this, and indeed largely because of it, there has been unprecedented expansion of global organisations since the 1960s. In the areas of global business, global civic organisations, and global governance agencies, there has been a rapid expansion of the number of organisations, the competencies of these organisations, and the number of members they involve or employ, over the last forty years.⁸⁹ In terms of the genetic resource debate, this expansion can be seen in the rise of the transnational biotech companies since the 1980s; the role that Non-Governmental Organisations (NGOs) have played, initially at the

⁸⁷ “Globalisation” is a term that has no universal definition. It is a highly contested term used by lawyers and scholars, protestors and politicians to represent a multitude of promises, and a multitude of sins. Arguments range over what globalisation is, when it began, what drives it, or even whether it has ever existed in the first place, and while it is vitally important to provide a rigorous conceptualisation of this phenomenon for any meaningful discussion about it to take place, unfortunately there is no room in this thesis for just that. Hence, this thesis will employ the understanding of globalisation found in Jan Aart Scholte’s *Globalisation: A critical introduction*, itself an attempt to offer a critical analysis of the current discourses that surround this elusive concept.

⁸⁸ Scholte, *Globalisation*, 85.

⁸⁹ *Ibid.*, 82-83.

Stockholm conference,⁹⁰ then in their subsequent influence over environment regime formation;⁹¹ and, in the creation of UN agencies such as UNEP and IPGRI since the 1970s.

For Jan Aart Scholte, the spread of a global consciousness and the growth in the number of global organisations are but two examples of the effects of what he terms “Full Scale Globalisation”,⁹² in evidence since the 1960s. Both examples are illustrative of the distinctive concept that he uses to describe globalisation, that of deterritorialisation.⁹³ This term can be understood as describing the growth of the number of social connections that are detached from the traditional “territorial logic” that has marked all previous human history. In other words, the “proliferation and spread of supraterritorial connections” witnessed in the closing decades of the twentieth century is leading to a delinking of culture, governance, identity and community with geographical boundaries.⁹⁴

The effects of this are visible in much wider circles than just the genetic resource debate, leading to questions on the continued viability of the state in its present form, and the shifts in the contours of regulatory authority. Scholte acknowledges that while national governments are still important to the regulatory process, governance has become more multilayered, with the rise of global governance agencies that exhibit certain autonomies from states, and the increased importance of the roles played by global business and civic organisations in these processes.⁹⁵

Thus, while the shift of the decision-making processes in the debate over access to and ownership of genetic resources to the global level over the previous forty years has occurred largely due to factors that relate directly to genetic resources, this shift has occurred as part of more general global social changes. These changes have seen the globalisation of many areas of human society, and although these changes are by no

⁹⁰ McCormick, *Global Environmental Movement*, 104.

⁹¹ Porter and Brown *Global Environmental Politics*, 54-57.

⁹² Scholte, *Globalisation*, 74.

⁹³ In a brief aside, the concept of deterritorialisation is one that eerily echoes the notion of the creation of a functional “global gene pool”. While for Jan Aart Scholte, this concept refers to the delinking of social ties with geographic boundaries, the belief in modern biotechnology that suggests genes can be similarly delinked from their original social and environmental contexts, in effect their own geographic boundaries, is one that parallels deterritorialisation. Given that the genetic resource debate is already so intrinsically tied into discussions of globalisation, this may be an interesting direction for further study. However, at the present time, it falls far outside the scope of this particular thesis, and so will be left as this brief footnote.

⁹⁴ Scholte, *Globalisation*, 46.

⁹⁵ *Ibid.*, 22.

means uniform throughout the globe, with the North being more affected than the South, and urban centres feeling the effects to a much greater extent than rural areas,⁹⁶ they have affected all countries and people to some extent. In regards to genetic resources, as noted above, this is especially the case.

The Legitimacy of Global Genetic Governance.

Prior to the ratification of the CBD in 1993, genetic resources had historically been considered under the aegis of the “Common Heritage of Mankind” (CHM) principle. In practical terms, this meant that they were considered a free good: that the only cost associated with their use was in their acquisition,⁹⁷ and therefore that bioprospectors were allowed to take genetic resources free of charge from the wild.⁹⁸ That they were thought of as the CHM also arguably represented an implicit recognition of the global nature of genetic resources, decades prior to the explicit recognition of this fact. This notion of CHM arose during the first half of the twentieth century. As the biological unit of value shifted to the level of the variety, national and imperial ownership of living materials was replaced by individual ownership of varieties under the burgeoning intellectual property regimes.⁹⁹ Only those varieties that had been “invented” under the rules of the new regimes could be owned, all other genetic resources were considered the raw materials for these inventions, and therefore available for all to use.¹⁰⁰

The CBD represented a rejection of the CHM principle at the global level. While it could be interpreted as perhaps a return to pre-CHM days, equally it could be seen in the context of the continuation of the global trend towards the nationalisation of natural resources, occurring since the 1950s,¹⁰¹ albeit lagging behind other natural resources due to the late recognition of the importance of genetic resources. It is a framework agreement that outlines goals and policies for the conservation of biodiversity, but which leaves individual governments to enact legislation to reach these goals or implement the policies.¹⁰² On the other hand, the TRIPs agreement, ratified in 1994 and an integral

⁹⁶ *Ibid.*, 87.

⁹⁷ Kloppenberg Jr, *First the Seed*, 152.

⁹⁸ Adair, “Bioprospecting,” 131.

⁹⁹ Petit *et al*, *Why Governments Can’t Make Policy*, 4.

¹⁰⁰ *Ibid.*

¹⁰¹ Charlotte Hess and Elinor Ostrom, “Artifacts, Facilities, and Content: Information as a Common-Pool Resource,” presented at *Conference on the Public Domain*, Duke University Law School, Durham, NC, November 9-11, 2001, <<http://dlc.dlib.indiana.edu/documents/dir0/00/00/04/87/index.html>> (10 February 2004): 11.

¹⁰² Karin Timmermans, “Intellectual property rights and traditional medicine: policy dilemmas at the interface,” *Social Science and Medicine* 57 (2003): 747.

component of the WTO Agreements, creates international obligations on its Member States to implement intellectual property regimes at the national level.¹⁰³ As such, while the CBD extends the option of public rights for genetic resources to national governments, the TRIPs agreement mandates private rights for all WTO Member States.

Regardless of whether the implementation of these agreements is voluntary or not, an important aspect to note is that they are both international agreements originating from supranational fora, and that even before the existence of these international agreements there was an implicit belief evolving that suggested that genetic resources were all of humanity's resources and decisions concerning them were rightly located at the global level.

It does not matter where policies regarding the access to and ownership of genetic resources are being debated, from the USA,¹⁰⁴ to New Zealand,¹⁰⁵ to Bhutan:¹⁰⁶ it is these international agreements that inform the debate, and that essentially provide the range of options available to policy makers at the national level.

Conclusions.

While conflict over access to and ownership of living resources has been a feature of human history for thousands of years, the current state of the debate finds its origins at the beginnings of the twentieth century. By the 1960s, advances based on Mendel's discoveries had led to the reconceptualisation of them as genetic resources, this reconceptualisation leading to the realisation that the unit of greatest value within living materials resided at the genetic level: in the genetic and biochemical information they contain. This realisation spurred on efforts to extend intellectual property to genetic resources, and products of biotechnologies, thus protecting the newly discovered and valued intangible property contained within. By the 1980s, it had become possible to claim ownership over genetic resources in the US at the genetic level, and through the

¹⁰³ *Ibid.*

¹⁰⁴ Adair, "Bioprospecting."

¹⁰⁵ MED, *Bioprospecting in New Zealand: Discussing the options*, (Wellington, New Zealand: Ministry for Economic Development, November 2002).

¹⁰⁶ Gopilal Acharya, "Biodiversity Act to benefit Bhutanese farmers," *Kuensel Online*, 12 August 2003, <<http://www.kuenselonline.com/article.php?sid=3151>> (13 August 2003).

1990s the ownership of genetic resources became a key concern of international trade and development policy.

Due to their history, and the ability of the new biotechnologies that sprung from the science of genetics to abstract genes from their points of origin, genetic resources took on a global stature. This stature was one of the driving forces behind the birth of the global environmental movement during the 1970s, and was recognised in the growth of the international agreements and institutions, negotiated in supranational fora, which now surround them. As such, by the close of the twentieth century, international agreements such as the CBD and TRIPs, and institutions such as IPGRI, governed the issues of access to, and ownership and conservation of, genetic resources.

As well as the internal forces that have led to this globalisation of genetic governance, the current debate has taken place during a period of increasing globalisation in many different realms of human endeavour; concerns about genetic resources both helping to create and advance the globalisation process, and in turn being affected by this force itself. For the first time, genetic resources have been acknowledged as global resources. The threats to them are viewed as global; the opportunities to be had from the manipulation and exploitation of them are thought of in global terms; and, for the first time, the responses to both threats and opportunities have been conceived of in a truly global fashion.

They are now global resources, and therefore the paradigms that govern the access to and ownership of genetic resources are legitimated through debate and agreement reached in supranational fora. In order for the discourse of common property to be successfully introduced into the debate over how humanity approaches issues of access to and ownership of genetic resources, agreement legitimising this paradigm must be reached at the supranational level.

Chapter IV

The Global Commons.

“The traditional forms of national sovereignty are increasingly challenged by the realities of ecological and economic interdependence. Nowhere is this more true than in shared ecosystems and in ‘the global commons’ – those parts of the planet that fall outside national jurisdiction.”¹

Introduction.

The previous chapter has illuminated two important facets of the nature of genetic resources. Firstly, it has shown that they are a truly global resource, due both to their historical movements, and to recent technological advances that have provided a functionally global gene pool. Coupled with this, although also in part due to a general trend towards the globalisation of governance regimes, chapter III demonstrated that decisions regarding the legitimacy of the ownership paradigms that currently relate to genetic resources have occurred at the global level in the past, and are likely to do so in the future. Taking these two observations into account, it would therefore be fair to say that the introduction of a common property regime to govern genetic resources would need to be accomplished at the global level in a global forum, or fora.

The Treaty Initiative to Share the Genetic Commons (TISGC) tacitly supports this conclusion, and suggests that the best way to accomplish this introduction successfully would be through the formation of a new global genetic commons. However, while this may be a reasonable suggestion, it remains to be seen whether genetic resources fit the global commons mould, what that mould even resembles, or what form a future genetic global commons regime might take.

This chapter investigates the global commons that are already in existence, explore their characteristics, and draw lessons for a potential global genetic commons from these examples.

¹ WCED, *Our Common Future*, (Oxford and New York: Oxford University Press, 1987), 261.

Definitions and Concepts: Of the Global Commons.

In her book, *The Global Commons: An Introduction*, Susan Buck investigates the four different global commons: Antarctica, the oceans, the atmosphere, and outer space and telecommunications. Each contains vastly different types of resources within their bounds, and each is governed by unique property regimes that have evolved over different periods of time in very different circumstances. Needless to say, this makes comparison across these global commons difficult. Buck describes each of the commons thusly:

“Antarctica is a domain in which numerous kinds of resources, from oil (non-renewable and stationary) to penguins (renewable and fugitive), are found. Its geography provides unique opportunities for scientific research; thus, part of its resource base is spatial, just as space is a spatial-extension resource for telecommunications. A second commons, the oceans, contains resources that may be fugitive or stationary and renewable or non-renewable. Technology to exploit the non-renewable mineral resources of the deep seabed exists, but the depressed price of minerals makes mining unprofitable. The atmosphere and outer space are, for now, primarily spatial-extension resources, but this may change as exploration uncovers new sources of exploitable resources and technology improves to allow access.”²

Of the four global commons, the oceans, the atmosphere, and outer space and telecommunications are all global commons in the traditional sense of being resource domains to which all nations have legal access, and contain common property resources that none can be excluded from. While Antarctica is included in any discussion of the global commons, it does not have the same characteristics as the other three. It is governed by a regime that admits only a small group of nations and is therefore technically an international commons. However, as this group of nations is not regionally based,³ and as there is mounting evidence that what affects the Antarctic affects the rest of the world,⁴ Antarctica is considered one of the global commons.

This chapter investigates these two types of global commons; the first, those comprised of the atmosphere, the oceans and outer space, the second, comprised of Antarctica. Here it will determine if genetic resources have similar characteristics to those found in

² Susan J. Buck, *The Global Commons: An Introduction*, (Washington DC: Island Press, 1998), 11.

³ *Ibid.*, 6.

⁴ John Vogler, *The Global Commons: A Regime Analysis*, (Chichester, New York, Brisbane, Toronto, Singapore: John Wiley & Sons, 1995), 78.

the global commons, and therefore whether or not instituting a global regime of common property would be appropriate. It will also look to see if there are any lessons that can be taken from these examples as to how this new global commons might be implemented.

The Oceans, the Atmosphere, and Outer Space: The “global” global commons.

Goods or resources can be classified in two essential ways. The first is the degree to which the use of a resource by one party reduces that amount of the resource left for others, that is whether the good is rivalrous. The second concerns itself with how easy it is to exclude others from using the resource, that is whether the good is excludable. These are often shown in the form of a table (see table 4.1), although the definitions given to each cell of the table can vary from author to author.⁵

	Rivalrous	Non-rivalrous
Excludable	Private good	Toll goods
Non-excludable	Common pool goods	Public goods

Table 4.1: Categories of Goods⁶

A good that is both rivalrous and excludable is categorised as a private good. An example of a private good is a car, as it is fairly easy for an individual to exclude others from driving it, and only one person can drive it at a time. The classic example of a public good is that of national security, in that it is impossible to exclude any individual from

⁵ For a demonstration of how a seemingly similar table can lead to three similar, but slightly different interpretations, see: Buck, *Global Commons*, 5; Vogler, *Global Commons*, 5; Inge Kaul, Isabelle Grunberg and Marc A. Stern, “Defining Global Public Goods,” in *Global Public Goods: International Cooperation in the 21st Century*, eds. Inge Kaul, Isabelle Grunberg and Marc A. Stern, (New York, Oxford: Oxford University Press, 1999), 5; and Charlotte Hess and Elinor Ostrom, “Artifacts, Facilities, and Content: Information as a Common-Pool Resource,” presented at *Conference on the Public Domain*, Duke University Law School, Durham, NC, November 9-11, 2001, <<http://dlc.dlib.indiana.edu/documents/dir0/00/00/04/87/index.html>> (10 February 2004): 8. While not presented in table format, a similar definition is given by David Feeny *et al*, “The Tragedy of the Commons: Twenty-Two Years Later,” in *Managing the Commons*, eds. John Baden and Douglas S. Noonan, (Bloomington and Indianapolis: Indiana University Press, 1998), 78.

⁶ Buck, *Global Commons*, 5.

the benefits of a strong national defence policy, and one individual's protection does not detract from another's.⁷ However, these categories are not absolute, and few goods are purely private or public in their nature.⁸ A better way of conceptualising goods is along two continua, one being the ease of exclusion, the one being the level of rivalrousness.⁹ It is in the two "impure public goods"¹⁰ categories, described by Buck as "common pool goods" or "toll goods", that common property regimes tend to fall.

In the case of global commons such as the oceans, the atmosphere, and outer space, a primary defining feature is the impossibility of exclusion of nations from these resource domains. The resources they contain, however, are a combination of rivalrous and non-rivalrous. For example, geostationary orbits in outer space or fish caught on the high seas are rivalrous in their natures: they are goods "subject to congestion or depletion [respectively], yet accessible to all".¹¹ On the other hand, the high seas themselves or the ozone layer represent non-rivalrous resources: they are pure public goods that have value in their existence alone, and are not congested nor depleted with their use.¹² This suggests that a defining feature of these global commons is the non-excludability of the resource domain, regardless of whether the resources contained within the domain are rivalrous or not. In other words, it is the characteristics of the resource domain itself that determines whether it is a commons.

Applied to the question of a genetic global commons, this would suggest that in order to fit the global commons mould, the domain in which genetic resources are to be found must be non-excludable. Thus, there is a need to define the resource domain in which genetic resources are found to determine if it fits the pattern of this global commons.

Defining the resource domain in which genetic resources are found brings us back to the discussion over their dual nature in chapter III. Genetic resources are tangibly defined as living material containing functional units of heredity of actual or potential value. However, as the genetic or biochemical information that living materials contain is where the locus of this value lies, the *living materials* themselves can be considered the resource

⁷ *Ibid.*, 4.

⁸ Kaul, "Global Public Goods," 4.

⁹ Buck, *Global Commons*, 4.

¹⁰ Kaul, "Global Public Goods," 4.

¹¹ *Ibid.*, 5.

¹² *Ibid.*

domain.¹³ The question of whether living materials are excludable or not, is therefore important in determining whether genetic resources fit the global commons mould.

At face value, that specific living materials are excludable in their nature seems self-evident; controlling living materials and the products derived from them has been a constant feature of all human history. However, as the resource that is of concern is the information contained within the living material, this supposed ease of excludability is in some respects false. For example, while controlling access to an oak tree is possible, the genetic and biochemical information that is contained in each individual oak tree is contained in the entire population. Therefore, in order to control this information, an individual or group would have to control *all* the instances of this type of oak. In other words, while controlling access to and ownership of individual instances of tangible living materials is possible, controlling access to and ownership of the information found within these materials is much more difficult, as the materials do not represent a contiguous resource domain.

The Non-exclusionary Nature of Living Materials.

The Colonial period of conflict over plant materials, discussed in chapter III, was an example of a period where the type of control needed to create excludable resource domains out of living materials was attempted. While the imperial powers used their vast military and commercial might to generate this level of control, in today's world, these mechanisms are no longer available, nor legitimate.¹⁴ Even though the “botanical chess game”¹⁵ that occurred during this period is long over, the legacy of the colonial struggles remains in *ex situ* collections of genetic resources in botanical gardens, and in their modern descendants, the seed collections contained in gene banks the world over. This legacy is the first reason why asserting total control over certain plants, animals or micro organisms today is a difficult proposition.

¹³ It could be argued that biodiversity as a whole could be considered the resource domain of genetic resources, as living materials require a functioning ecosystem for their existence. However, *specific* instances or types of genetic resources are drawn from *specific* living materials. Thus, keeping the resource domain at the level of living materials, rather than at the ecosystem as a whole, seems more appropriate for the purposes of this discussion.

¹⁴ Michel Petit *et al.*, *Why Governments Can't Make Policy: The case of plant genetic resources in the international arena*, (Lima, Peru: International Potato Center (CIP), 2001), 3-4.

¹⁵ Pat Mooney, “The law of the seed,” in Jack Ralph Kloppenberg Jr., *First the Seed: The political economy of plant biotechnology, 1492-2000*, (New York: Cambridge University Press, 1988), 154.

A second reason highlighting these difficulties relates to the international trade in wildlife. Hundreds of millions of plants and animals are traded each year,¹⁶ and while effective control can be asserted over legal trading, it is the illegal trade that creates difficulties. Fully one quarter of this trade is thought to fall under the control of international smugglers,¹⁷ a figure that leaves the illegal wildlife trade rating third only to the illegal trade in arms and narcotics in terms of worth, with an annual global turnover of around \$US6-10 billion annually.¹⁸ While this trade affects the biologically megadiverse countries such as Brazil, from whose forests it is estimated thirty-eight million animals are taken each year,¹⁹ it is also targeted at less likely candidates such as New Zealand.²⁰ Countries can either act as the source of the traded wildlife, markets for the smuggled species, or as a location to launder illegal trade items to get around country of origin specifications in certain treaties.²¹ While much of the concern surrounding this illegal trade is due to it targeting endangered species, threatening their very survival, there are also concerns regarding the spread of infectious diseases, and ecological concerns such as the possible effect of plants and animals released without authorisation into new environments.²²

While trade in wildlife, whether legal or illegal, involves the deliberate movement of living materials around the globe, a third reason for the difficulty of total control over organisms is their inadvertent movement due to the “more-or-less accidental ‘pathways’” that occur as a side effect of human endeavour.²³ These pathways have made previously impossible migration possible, breaking down the ecological barriers that have been essential evolutionary mechanisms in the past, and creating a mass “biotic upheaval” throughout the globe.²⁴ Whether it is the threat posed by the introduction of the Chinese mitten crab to the West Coast of the US in a ship’s ballast,²⁵ or the risks associated with

¹⁶ WWF-UK, “Stop the illegal wildlife trade,” *World Wildlife Fund Online*, <<http://www.wwf.org.uk/wildlifetrade/trade.asp>> (4 February 2004).

¹⁷ *Ibid.*

¹⁸ MAF, “New Zealand’s First Interpol Conference: Wildlife Smuggling,” *Ministry of Agriculture and Forestry, New Zealand*, 2003, <<http://www.maf.govt.nz/mafnet/press/131003interpol.htm>> (4 February 2004).

¹⁹ Axel Bugge, “Smugglers steal 38 million animals from Brazil’s forests,” *Planet Ark*, 14 November 2001, <<http://www.planetark.com/avantgo/dailynewsstory.cfm?newsid=13298>> (4 February 2004).

²⁰ “Smuggling of NZ orchids reported to be on the rise,” *Fairfax New Zealand Limited*, 20 January 2004, <<http://www.stuff.co.nz/stuff/print/0,1478,2788681a10,00.html>> (20 January 2004).

²¹ MAF, “Interpol Conference.”

²² *Ibid.*

²³ Chris Bright, *Life Out of Bounds: Bioinvasion in a borderless world*, (New York and London: W.W. Norton and Company, 1998), 159.

²⁴ *Ibid.*, 17-20.

²⁵ *Ibid.*, 151.

the international raw wood trade,²⁶ these examples and many others demonstrate the difficulty in controlling the movement of plants, animals and micro organisms.

The fourth cause for difficulty is contained within the essential nature of organisms themselves: their capacity to reproduce. A good example of this is the case laid out in Kloppenburg's *First the Seed*, in which he discusses the trouble that capital has had in gaining control over agriculture due to this inherent feature. He locates the difficulties capitalists have had in gaining this control at the level of the seed, because "seed is grain is seed is grain; the option to produce or consume is there in each seed."²⁷ This is true for living materials in general; given the chance, they will reproduce, making control over the genetic resources they contain, and exclusion of others from these resources, extremely difficult.

Generating Exclusion in the Case of Living Materials.

The above is not to suggest that it is difficult to exclude others from *all* living materials. Neither should it be taken to mean that it is impossible to create mechanisms that would render living materials exclusionary. It is important to remember that while the present discussion concerns living materials as the resource domain for genetic and biochemical information, they are property objects in and of themselves, and so subject to their own property regimes.

An instance in which it would be physically possible to exclude others from a resource domain represented by one type of living organism could involve the occurrence of a small population of organisms, located in a controlled situation or an environment that is difficult to reach. An example of such a situation would include the herd of cows bred by New Zealand's AgResearch in 2000 which had synthetic human genes inserted into them to produce milk containing a human protein. This small, genetically modified herd existed under strict terms of biological containment that mandated that all genetic material be kept within a high security facility at the research centre.²⁸ A more natural occurrence of this example might be a small population of extremophiles. Extremophiles are microorganisms that live in extreme conditions, such as high temperature, pressure or

²⁶ Ibid., 160-161.

²⁷ Kloppenburg Jr, *First the Seed*, 37.

²⁸ "GE cow research to go ahead," *Nzzoom.com: the homepage for New Zealanders*, 25 May 2001, <http://onenews.nzzoom.com/onenews_detail/0,1227,41329-1-7,00.html> (6 February 2004).

salt concentration.²⁹ As they inhabit extremes, they can occur in environments that are exceptionally difficult to reach, such as deep-sea sediments or on the Antarctic continent. As these environments are difficult to reach, it is less difficult to control access to them.

Another example of being physically able to exclude others from a resource domain represented by one type of living material would be the ability to control a unique organism or part of an organism: a mutation that provides genetic resources that does not occur in the population as a whole. One such example would be the case of John Moore, in which his spleen was removed as part of the treatment for hairy-cell leukaemia; the doctors involved then patented a cell-line developed from the removed spleen.³⁰ Leaving aside the legal implications of the case, commonly the aspects discussed, as Moore's spleen was the only known instance of this cell-line occurring, it would have been physically possible to control these genetic resources as they were not available in any other living material.

As discussed in chapter II, it is not the inherent characteristics of an object that determine how it is or should be controlled; the social institutions that surround an object are often of more importance.³¹ Some examples of how humans may seek to control living materials include law enforcement attempts to prevent smuggling,³² and the application of property regimes to the control of such organisms. An example of the latter would be the current courtroom battle between Canadian farmer Percy Schmeiser, and the trans-national corporation Monsanto. Monsanto are suing Schmeiser for using "their" crop, Ready Roundup Canola, after it had originally blown onto his property and was then saved by him as seed for future use.³³ This case is currently headed to Canada's high court in order to determine if Monsanto can control *all* instances of this crop through the legal mechanism of intellectual property laws.³⁴

²⁹ Dagmar Lohan and Sam Johnston, *The International Regime for Bioprospecting: Existing Policies and Emerging Issues for Antarctica*, (Tokyo: United Nations University Institute of Advanced Studies, 2003), 10.

³⁰ Pat Mooney, "John Moore's body," *New Internationalist* i217 (March 1991), retrieved from <<http://www.newint.org/issue217/body.htm>> (14 October 2002).

³¹ Vogler, *Global Commons*, 3.

³² "World-wide plant traffickers arrested," *Joint Media Release: Senator the Hon. Robert Hill and Senator the Hon. Christopher Ellison*, E159/01, 24 July 2001, <<http://www.deh.gov.au/minister/env/2001/mr24jul01.html>> (4 February 2004).

³³ BBC, "GM firm sues Canadian farmer," *BBC News Online*, 6 June 2000, <<http://news.bbc.co.uk/1/hi/world/americas/779265.stm>> (28 January 2004).

³⁴ Tim Hirsch, "Seed battle heads to supreme court," *BBC News Online*, 1 August 2003, <<http://news.bbc.co.uk/1/hi/sci/tech/3116713.stm>> (28 January 2004).

While there are physical and social reasons for certain types of living materials to be considered excludable, with advances in technology there are now also means to change the basic characteristics of living materials that render them *more* excludable than in their natural form. An example of one such technology is known as “Terminator technology”. While not widely in use, some of the major biotechnology companies have attempted to use this technology to produce genetically modified crops that produce grains which are infertile: in effect breaking the “seed is grain is seed” cycle. Thus, the natural impetus to reproduce is removed, and control over these living materials, and the genetic resources they contain, is enhanced.³⁵

The Oceans, the Atmosphere, and Outer Space: Conclusions.

The above discussion suggests that it is not whether genetic resources are rivalrous that determines their suitability for a global commons, but whether they occur in a resource domain from which one can exclude others. It also seeks to illustrate how different living materials, which are in effect the resource domains in which genetic resources are found, might tend towards different ends of the excludable/non-excludable continuum, due to natural, geographical or historical causes. Similarly, it demonstrates that this excludability can be enhanced through social, legal or now even technological means.

However, this enhancement is through choice, the application of a particular property regime or technology for a particular social purpose,³⁶ and it does not detract from the idea that certain genetic resources are contained within resource domains that can be considered extremely non-excludable, and therefore fit this particular characteristic of the global commons well. This is not to suggest that *all* genetic resources fit this mould, simply that some do, and therefore a discussion about a potential global genetic commons has merit, at least from this particular point of view.

³⁵ ETC Group, “Terminator Technology – Five Years Later,” *ETC Group Communiqué* i79 (2003): 1-10.

³⁶ James A. Swaney, “Are democracy and common property possible on our small earth?” *Journal of Economic Issues* v37 i2 (June 2003): 279.

The Antarctic: The international global commons.

Covering one tenth of the Earth's surface, the frozen commons of the Antarctic is the most coherent and stable of all the global commons regimes.³⁷ For almost fifty years, this unique treaty system has successfully governed one of the most inhospitable regions on the planet. It is unique in its origins, its content, and the approach of those nations involved in its governance. Its variation on the usual global commons theme has a lot to offer the debate on the potential of a global genetic commons.

That the treaty could inform the composition of this new type of global commons was first suggested by one of the TISGC's primary authors, Jeremy Rifkin of the Foundation on Economic Trends (FOET).³⁸ This section examines this suggestion through an in-depth examination of the history of the Antarctic Treaty System, and a consideration of its strengths and weaknesses. Claims that the experiences gained from the governance of this part of the world might offer something to the debate surrounding access to and ownership of genetic resources will then be examined.

The Origins of the Antarctic Treaty System.

The Antarctic Treaty System that governs this region today is the result of a history of scientific exploration, exploitation of a limited range of the available resources, and ability of national governments involved in the continent to compartmentalise Antarctic issues from other issues occurring on the wider world stage.³⁹

The Antarctic region had already been explored and exploited by the late eighteenth century.⁴⁰ Though the encountering of impassable ice fields by the ships of Captain James Cook during his round the world expeditions in 1772 and 1775 dispelled the myth of a habitable rich southern continent, this apparent lack of habitable land did not stop seal hunters and whalers from returning to the abundant hunting grounds that were to be

³⁷ Buck, *Global Commons*, 45-68.

³⁸ Jeremy Rifkin, "The price of life," *Guardian Unlimited*, 15 November 2000, <<http://guardian.co.uk/Archive/Article/0,4273,4091302,00.html>> (30 August 2002).

³⁹ Prabhas C. Sinha, "Towards Crafting Sustainable Commons, Third World, and the Antarctica Model," presented at *Constituting the Commons: Crafting Sustainable Commons in the New Millennium*, Bloomington, Indiana, USA, May 31-June 4, 2000, <<http://dlc.dlib.indiana.edu/documents/dir0/00/00/03/50/index.html>> (10 February 2004): 2.

⁴⁰ Buck, *Global Commons*, 45.

found in the southern seas. It was these expeditions, along with scientific curiosity, that formed the original basis for the exploration of the Antarctic.⁴¹

Though controversy still surrounds the question of who was the first to sight the Antarctic mainland, the event itself occurred in 1820.⁴² From this point until around 1900, very little exploration was conducted in the region itself due to imperial, technological and economic concerns. However, with events such as the closing of the American frontier, the discovery of new, efficient liquid fuels, and the rise in the profitability of whaling, new interest incited discovery of the potential contained within this southern region.⁴³

The origins of the regime that governs the Antarctic today can be found in the late nineteenth century, as nations began to lay claim to territories within this region. While the inaccessibility of the continent made such claims largely symbolic until recently,⁴⁴ the lack of international recognition of them led to significant tension in the region, largely overcome by the successful negotiation of the Antarctic Treaty in 1959.⁴⁵

The French made the first claim to territory in the Antarctic region, when they annexed Kerguelen Islands in 1892.⁴⁶ The first to lay formal claim to Antarctic territory on the continent itself were the British in 1908, when they sought to claim the territory in which their whalers hunted and attempted to control the harvest through a permit system.⁴⁷ This claim was detailed further in 1917, describing a specific sector with its apex at the South Pole, setting the standard for all future claims on Antarctic territory.⁴⁸ By 1943, the number of claimant countries had risen to seven, with Argentina, Australia, Chile, New Zealand and Norway joining France and Britain,⁴⁹ and with Japan,⁵⁰ the United States and the Soviet Union reserving the right to make claims as they saw fit.⁵¹

⁴¹ *Ibid.*, 46.

⁴² While Americans are taught that their own Nathaniel Palmer was the first to sight the mainland in November of that year, these are challenged by the Russian explorer Fabian Gottlieb's claims of the first sighting on January 28, and the British explorer Edward Bransfield's claims two days later. (see: *Ibid.*, 46-48.)

⁴³ *Ibid.*, 48-51.

⁴⁴ *Ibid.*, 51.

⁴⁵ Neil Gilbert, "Lecture Handout: Antarctica and Environmental Management," *Antarctica New Zealand*, December 2003, 4.

⁴⁶ Buck, *Global Commons*, 51.

⁴⁷ *Ibid.*

⁴⁸ Lorraine M. Elliot, *International Environmental Politics: Protecting the Antarctic*, (London: St. Martin's Press, 1994), 26.

⁴⁹ *Ibid.*

The potential for conflict in the post World War II period was generated by the advent of the Cold War, the reserved rights for future territorial claims, and by the overlapping claims of Argentina, Britain and Chile. It was this potential that saw the United States initiate discussions between the claimant states.⁵² However, as there was no urgent need to reach agreement by the involved parties,⁵³ and due to other factors such as the lack of real American leadership in the area and the impact of external factors such as the Korean War,⁵⁴ these discussions did not eventuate into any meaningful outcomes. It was not until the scientific community became involved that real progress was made towards what would eventually become the Antarctic Treaty System.

Between 1945 and 1950, at least ten nations sent scientific expeditions to the Antarctic.⁵⁵ This international scientific activity became more organised during the International Geophysical Year (IGY) in 1957-58, in which twelve countries, the original seven claimants plus the United States, Belgium, Japan, South Africa and the Soviet Union, took part in scientific programmes in over sixty research stations in Antarctica.⁵⁶ The IGY proved successful as the scientists involved were determined to sideline all political considerations,⁵⁷ and therefore created an atmosphere in which traditional adversaries such as the USSR and the US were able to work together.⁵⁸ Thus, the IGY provided the impetus needed to move beyond territorial boundary disputes that had plagued the formation of a treaty regarding the Antarctic previously, and encouraged the claimant countries to once more try and reach agreement.⁵⁹ This new impetus to generate an agreement over the future management of Antarctica was further enhanced by a new sense of urgency, as the Soviet Union had become an essential part of the considerations over the preceding decade, and the other Antarctic IGY states (Japan, South Africa and

⁵⁰ *Ibid.*, 28.

⁵¹ Gilbert, *Antarctic*, 3.

⁵² Elliot, *Environmental Politics*, 28.

⁵³ *Ibid.*, 29.

⁵⁴ Buck, *Global Commons*, 55-56.

⁵⁵ Elliot, *Environmental Politics*, 30.

⁵⁶ *Ibid.*

⁵⁷ Buck, *Global Commons*, 56.

⁵⁸ This is a prime example of the ability of countries to compartmentalise Antarctic issues with issues affecting the wider world stage. Other examples of such compartmentalisation include the continuing New Zealand/United States cooperation even after the fallout of New Zealand's anti-nuclear stance and the problems in the ANZUS relationship, or meetings between Britain and Argentina to discuss 'matters of common interest' even while all diplomatic channels were severed during the Falkland-Malvinas War in 1982. (Judith M. Fretter, "A Review of International Conflict in the Antarctic," 2004, forthcoming publication.)

⁵⁹ Elliot, *Environmental Politics*, 31.

Belgium) now also exhibited strong calls to be involved in any process working towards an agreement over Antarctica's future.⁶⁰

The involvement of the scientific community has continued to have a major impact on the Antarctic region, and the regime governing it, beyond the IGY. Organizations such as Scientific Committee on Antarctic Research (SCAR), formed in October 1958 and itself an important precursor to the Antarctic Treaty, continue to provide technical advice, of both a scientific and policy directed nature, to nations involved in the Antarctic Treaty system to the present day.⁶¹

The Antarctic Treaty.

In May 1958, the twelve governments involved in the IGY met to begin discussions on a treaty for the management of the Antarctic.⁶² After an intense set of negotiations, the Antarctic Treaty was signed on 1 December 1959 and came into force on 23 June 1961.⁶³ The Treaty applies to the area south of 60° South, including all ice shelves, although it does not interfere with any states' rights to the high seas. Although the term "Antarctica" is referred to over forty times throughout, it is not defined in the Treaty.⁶⁴

The Antarctic Treaty was not particularly innovative, as many have claimed, for the most part involving formal codification of existing arrangements.⁶⁵ The primary source of conflict in the process revolved around territorial disputes, "the unstated objective [being] to find, and maintain, a successful compromise on the exercise of sovereign rights in order to protect the interests of all parties, claimant and non-claimant".⁶⁶ These were resolved in Article IV of the Treaty, in which, rather than seeking to find a compromise between claimants over sovereignty issues, all signatories agreed to leave the issue *unresolved*.⁶⁷ The competing goals of claimants and non-claimants were balanced; the former being assured that their acceptance of a Treaty that did not formally recognise

⁶⁰ *Ibid.*, 30.

⁶¹ Not only do such organizations continue to provide support to the current regime, the administrative legacy of SCAR and the coordination of communications, rescue, operations and weather forecasting through Antarctic Weather Central left by the IGY essentially gifted the international community with a model for the eventual Antarctic Treaty System. (see: Buck, *Global Commons*, 58-59.)

⁶² *Ibid.*, 59.

⁶³ *Ibid.*

⁶⁴ Elliot, *Environmental Politics*, 40

⁶⁵ *Ibid.*, 35.

⁶⁶ *Ibid.*, 36.

⁶⁷ Buck, *Global Commons*, 59.

their territorial claims could not be used as legal argument against future claims, while the latter were guaranteed freedom of access to all parts of the continent even if they did not accept the existing territorial claims. Of most importance, regardless of the acceptance of territorial claims, all parties were guaranteed influence over decision-making on future Antarctic issues.⁶⁸

The Treaty incorporates three key principles that form the basis for cooperation in Antarctica. These reflect how the political environment has evolved over the first half of the twentieth century, especially regarding the effects of the IGY. Firstly, existing territorial claims are put on hold. As discussed above, the Treaty neither recognises the claims that have been made, nor does it dispute their existence. It also prohibits any further claims on Antarctic territory while it remains in force, which it does indefinitely.⁶⁹ It does not solve the sovereignty problem; it simply puts it to one side.⁷⁰

Secondly, it states that the Antarctic shall be used for peaceful purposes only. All military activities on the ice are banned, barring logistical support for scientific operations,⁷¹ including the establishment of military bases, military manoeuvres and weapons testing.⁷² As well, nuclear explosions and the disposal of nuclear waste are also prohibited.⁷³

Finally, in a nod to the origins of the international cooperation that encouraged the Treaty's formation, the importance of scientific activities are recognised, alongside the importance of freedom for scientific investigation.⁷⁴ The governments of the member states are encouraged to share the knowledge gained from their scientific programmes, and their scientific personnel. They are also encouraged to develop 'cooperative working relationships' with international scientific organizations that have an interest in Antarctic issues.⁷⁵

⁶⁸ Elliot, *Environmental Politics*, 35.

⁶⁹ Gilbert, *Antarctic*, 4.

⁷⁰ Elliot, *Environmental Politics*, 36.

⁷¹ *Ibid.*, 37.

⁷² Gilbert, *Antarctic*, 4.

⁷³ Elliot, *Environmental Politics*, 37.

⁷⁴ Gilbert, *Antarctic*, 4.

⁷⁵ Elliot, *Environmental Politics*, 38.

Membership and Governance Issues.

Membership issues are dealt with under article XIII of the Treaty. They state that any member of the United Nations (UN) may accede to the Treaty, while any non-UN member may accede on invitation of the decision-making parties.⁷⁶ The membership system is a two-tier system that categorises Treaty Parties into Consultative (voting, or decision-making) Parties, and non-Consultative Parties.⁷⁷ Only the original twelve states involved in the IGY and those others who undertake substantial scientific research in the Antarctic have decision-making status: science providing the basis for political privilege.⁷⁸

There is a concern expressed in some quarters that although Antarctica is in many ways compartmentalised from other domestic political and economic concerns,⁷⁹ this does not mean that science conducted on the ice is any more immune to profit motives than that conducted elsewhere. As will be illustrated further on, these concerns are becoming highlighted by the growth of biological prospecting in the region, and how this new use of a new resource is coming into conflict with established concepts such as the sharing of scientific discoveries. However, this concern is also extended to issues of control over the region, with some suggestion that the “scientific colonization in Antarctica is metamorphosing into a new kind of neo-colonialism.”⁸⁰

Currently, there are thirty-eight Consultative Parties, the twelve original IGY states plus twenty-six others,⁸¹ out of a total of forty-five signatories to the Treaty who between them represent 80% of the world’s population.⁸² Parties meet regularly at Antarctic Treaty Consultative Meetings (ATCMs). In all, twenty-six ATCMs have been held since 1961, and more than two hundred decisions have been taken over this period.⁸³ All decisions, recommendations or amendments to the Treaty must be approved and adopted by all Consultative Parties.⁸⁴

⁷⁶ *Ibid.*, 38.

⁷⁷ Gilbert, *Antarctic*, 4.

⁷⁸ Elliot, *Environmental Politics*, 39.

⁷⁹ Sinha, “Sustainable Commons,” 2.

⁸⁰ *Ibid.*, 3.

⁸¹ Gareth Porter and Janet Welsh Brown, *Global Environmental Politics*, (Colorado and Oxford: Westview Press, 1996), 88.

⁸² Gilbert, *Antarctic*, 4.

⁸³ *Ibid.*

⁸⁴ Elliot, *Environmental Politics*, 39.

Parties to the Antarctic Treaty have managed to avoid UN encroachment, by “actively resisting all attempts to draw it in to the universal UN system and boycotting General Assembly voting on Antarctica,”⁸⁵ even though there are active relationships between certain UN agencies and the Treaty. They have also, for the most part, been opposed to the formation of a permanent, international secretariat for a number of reasons.⁸⁶ However, in 2001 at the 24th ATCM, the Parties agreed that due to the increasing complexity of the Antarctic Treaty System, an Antarctic Treaty Secretariat needed to be established. The new Secretariat will begin to perform its official functions once its Executive is appointed at the next ATCM in 2004.⁸⁷

The Antarctic Treaty System.

While the Antarctic Treaty dealt admirably with current and potential geopolitical disputes on the continent,⁸⁸ it contained two major omissions that have since become focal points for change in the regime.⁸⁹ Although the continent is believed to contain considerable mineral wealth,⁹⁰ no mention of resource exploitation was made primarily because of the contentious sovereignty issues that would arise over claims of ownership of these resources.⁹¹ Similarly, almost no reference was made to environmental concerns, except perhaps implicitly with regard to the exploitation of living resources, and the prohibition of nuclear testing and the dumping of nuclear waste. The period in which the Treaty was negotiated is a prime reason behind the lack of environmental concern, the 1950s not representing the heyday of the environmental movement.⁹²

These omissions have led to a series of separate, free standing international agreements being negotiated by the parties since 1961. These include the Agreed Measures for the Conservation of Fauna and Flora (1964); the Convention for the Conservation of Antarctic Seals (CCAS, 1972); the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR, 1980); and, the Protocol on Environmental Protection to the Antarctic Treaty (“The Protocol”, 1991).⁹³

⁸⁵ Vogler, *Global Commons*, 94.

⁸⁶ Buck, *Global Commons*, 64.

⁸⁷ Gilbert, *Antarctic*, 4.

⁸⁸ *Ibid.*, 5.

⁸⁹ Elliot, *Environmental Politics*, 41.

⁹⁰ Porter, *Global Environmental Politics*, 88.

⁹¹ Elliot, *Environmental Politics*, 41.

⁹² *Ibid.*

⁹³ Gilbert, *Antarctic*, 5.

Thus, what was originally a regime based on a single treaty focussed on geopolitical concerns, evolved over the course of forty years into the Antarctic Treaty System (ATS): the Antarctic Treaty acting as the parent regime from which the associated sub regimes have originated. While the different sub-regimes can be considered independently as each is focussed on a different issue area, the ‘grand regime’ shares many common goals, principles and norms under which decisions are made. This creates what has been described as the “Antarctic normscape”, in which decisions are made by Parties in the ATS with a sense of “mutual obligation and shared interest” by all.⁹⁴

These regimes can be considered interdependent, in that as they are all part of the same system, a change in credibility can affect the system as a whole. They can also be seen to overlap, with different issues falling under the aegis of several regimes at times.⁹⁵ The ATS is also influenced by external international agreements such as the Convention for the Regulation of Whaling (1946), the Convention on Biological Diversity (CBD, 1992), and the Convention on Climate Change (1992).⁹⁶ Although these linkages are often indirect,⁹⁷ these represent just a few of the various “common global policy instruments” that contain special provisions for the Antarctic region.⁹⁸

Future Challenges to the Antarctic Treaty System.

Although the ATS has successfully managed the Antarctic commons for almost fifty years, there remain some sources of political contention within the system, and some potential future threats.

⁹⁴ As described in Christopher C. Joyner, *Governing the Frozen Commons: The Antarctic Regime and Environmental Protection*, (Columbia: University of South Carolina Press, 1998), 102: “The Antarctic Treaty System is more than just the sum of the rights and duties of states as enumerated in a series of legal instruments. Viewed through the lens of legal agreements, the ATS appears mechanistic and purely functional, but the ATS regime connects states in deeper ways... Through [a] sustained shared experience, a certain sense of mutual obligation and shared interest arises among the participant governments. This mutual, collective obligation furnishes the normative cement that binds the Antarctic treaty System regime together. It creates in effect an Antarctic normscape for ATCP governments.”

⁹⁵ Dylan S. Burke, “Exploiting the Last Ocean: The effectiveness of the Convention on the Conservation of Antarctic Marine Living Resources, 1982-2000,” (PhD Dissertation, University of Canterbury, 2001), 9-10.

⁹⁶ Vera Laska, “Governing the Frozen Commons: The Antarctic Regime and Environmental Protection,” (book reviews), *International Journal on World Peace* v18 i2 (June 2001): 71.

⁹⁷ Burke, “Last Ocean,” 10.

⁹⁸ Sinha, “Sustainable Commons,” 2.

As the territorial claims were never resolved under the Antarctic Treaty, these remain a possible source of contention for the future.⁹⁹ The potential conflict surrounding sovereignty concerns will likely only come about if and when pressure is exerted on the system due to other concerns, such as economic resource extraction, questions surrounding rights and freedom of access, and the possibility of expanding the uses of the Antarctic region to more than just the scientific.¹⁰⁰

The potential problems associated with resource extraction have received a boost with the recent discovery of large oil and gas reserves on the continent.¹⁰¹ Issues surrounding mineral resource extraction are not new to the ATS, with the negotiation of what would have been the fourth agreement to be added to the ATS, the Convention on the Regulation of Antarctic Mineral Resource Activities (CRAMRA), having been completed in the 1980s. However, this agreement was not ratified, and is never likely to be,¹⁰² and can be seen as the rejection by the ATS Parties of the principle of managed resource exploitation.¹⁰³ This is underlined by the ratification of The Protocol in 1998, which includes an indefinite ban on all mineral resource extraction.¹⁰⁴ This ban is further enhanced by the Antarctic conditions themselves, as extraction of mineral and energy resources are rendered difficult due to the harsh environment,¹⁰⁵ although as technology improves, and if energy resources become scarcer in the future,¹⁰⁶ then this issue may have to be revisited.

While questions surrounding rights and freedom of access have the potential to cause conflict,¹⁰⁷ this in some ways is unlikely as the ATS does not appear to be as exclusionary as its two tier system of membership might at first suggest. Membership levels are rising, and the requirement to be actively engaged in scientific research in order to become a Consultative Party has been applied more stringently to developed nations who wish to gain consultative status, suggesting that there is a conscious effort to include more developing nations in the ATS. Also, traditional North/South concerns are not as large

⁹⁹ Fretter, "Antarctic," 8.

¹⁰⁰ *Ibid.*

¹⁰¹ Buck, *Global Commons*, 68.

¹⁰² Gilbert, *Antarctic*, 7.

¹⁰³ Vogler, John 1995. *Op cit* p 95

¹⁰⁴ Gilbert, *Antarctic*, 8.

¹⁰⁵ Buck, *Global Commons*, 68.

¹⁰⁶ Fretter, "Antarctic," 8.

¹⁰⁷ *Ibid.*

an issue as they might be, as certain developing nations, such as India, are already parties within the system, and so have status and access to lose if changes are made.¹⁰⁸

The burgeoning tourism industry represents an example of how the uses of Antarctica will potentially expand. However, once again, the Antarctic conditions reduce the potential issues associated with tourism, as it is restricted to the warmer months.¹⁰⁹ At the present time, this issue is being handled by the Consultative Parties without the formation of a new agreement.¹¹⁰

Another example of this expansion in Antarctic uses, impossible to foresee by the original Treaty parties, is the increasing amount of the scientific research conducted on the continent that is now aimed at identifying potentially useful genetic resources.¹¹¹ The issues raised by this biological prospecting have environmental,¹¹² legal and political dimensions, and are due for discussion at the next ACTM.¹¹³ Already the numbers of patents applied for or granted based on bioprospecting in Antarctica are “manifold”.¹¹⁴ Concerns have been raised about the clash between the commercial desires of those parties bioprospecting, and the legal requirements to share research data found in article III of the Treaty,¹¹⁵ threatening “the hallmarks of Antarctic scientific research, its transparency and cooperation.”¹¹⁶

The bioprospecting question highlights a further potential area for conflict in the ATS. Overlapping international conventions and regimes, such as the conflicting national and international zones governing the ocean and seabed, and concerns surrounding the control of the high seas and the exclusive economic zones,¹¹⁷ are causes for concern about the future of the ATS. Related specifically to bioprospecting, the United Nations

¹⁰⁸ Buck, *Global Commons*, 65.

¹⁰⁹ *Ibid.*, 68.

¹¹⁰ Burke, “Last Ocean,” 9.

¹¹¹ Future responses to the bioprospecting question in the ATS regime will be an invaluable source of information and evidence regarding the formation of a global commons for genetic resources. How such resources are dealt with in an existing global commons will be a valid avenue for later research. This idea could also be extended to questions surrounding genetic resources found in the other global commons, although the High Seas would most likely be the only other commons where this will be an issue.

¹¹² Sinha, “Sustainable Commons,” 4.

¹¹³ Lohan *et al.*, *Bioprospecting*, 5.

¹¹⁴ *Ibid.*, 7.

¹¹⁵ *Ibid.*, 11.

¹¹⁶ Alex Kirby, “Antarctica’s Resources ‘At Risk,’” *BBC News Online*, 1 February 2004, <<http://news.bbc.co.uk/1/hi/sci/tech/3444753.stm>> (3 February 2004).

¹¹⁷ Fretter, “Antarctic,” 8.

Convention on the Law of the Sea (UNCLOS), the CBD, the World Intellectual Property Organization (WIPO), and the International treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)¹¹⁸ are all international agreements or organizations that would have to be taken into consideration when the current ATS regime, or perhaps a new sub-regime, seeks to deal with this issue.

Antarctica as a Global Commons?

The ATS can be considered a global commons for a number of reasons. In the first instance, while the ATS is technically an international regime, with a clearly defined group of parties involved governing a clearly defined region, as membership is not based on the regional logic of other international regimes such as the Mediterranean Sea, it is considered by many a global commons.¹¹⁹ This claim is strengthened by the growing number of parties to the ATS, who now represent over 80% of the world's population. Another aspect of the Antarctic commons that makes it global is that what happens to this continent can influence the rest of the world. It is increasingly understood that there is a strong interconnection between Antarctica and global environmental change.¹²⁰ For example, the depletion of the ozone layer above the Antarctic concerns many southern states, while the possibility of the effects of global warming on the Antarctic ice shelf leading to catastrophic effects is also a possibility.¹²¹ Thus, developing an understanding about the Antarctic could be vital to future generations, and is most definitely 'in the interest of all mankind'.¹²²

Conclusions: Lessons to be learned from the Antarctic Treaty System.

Upon reviewing the above case study of the Antarctic global commons, this thesis proposes that there are seven main lessons that can be drawn from the Antarctic experience that are relevant to a potential genetic global commons.

Firstly, and primarily, the ATS illustrates superbly that sovereignty issues, or, in the case of genetic resources, ownership issues, *do not have to be fully resolved* in order for a governance regime to be successful. In fact, there is some suggestion that this is precisely

¹¹⁸ Lohan *et al*, *Bioprospecting*, 15.

¹¹⁹ Buck, *Global Commons*, 6.

¹²⁰ Vogler, *Global Commons*, 78.

¹²¹ Laska, "Frozen Commons," 71.

¹²² Fretter, "Antarctic," 8.

why the regime has proved the success it has.¹²³ While the lessons learned from article IV, “masterful in its vagueness”¹²⁴ regarding sovereignty issues, could be applied to genetic resources, a caveat immediately suggests itself. The ATS has never faced any real economic pressure from resource extraction issues, although as noted above this may change in the future, and so its vagueness in relation to sovereignty issues has never been fully tested. However, any regime governing genetic resources would be subject immediately to extreme economic pressure due to the growing importance of such resources. This may be a crucial stumbling block to the creation of a genetic commons: while the ATS has developed over a period of time when economic concerns have been relatively light, a potential genetic commons would have to develop in an already highly economically active sector and would have to take this into account.

The second lesson relates to the importance of history and the origins of a potential treaty. The origins of the Antarctic Treaty itself were strongly located within the scientific community and the IGY. This led to the desire for the continent to be kept for research purposes, and its demilitarisation and denuclearisation. While the ATS regime has evolved considerably since then, these goals still lie at the heart of the grand regime’s normscape, and continue to affect vital aspects of the system such as membership criteria. In relation to a potential genetic commons treaty, it is important to understand that any initial treaty has the ability to set the tone for any regimes that may follow. Because of this, it may be possible to break out of the current moulds for thinking and dealing with genetic resources that currently exist, generating a unique “genetic normscape” for dealing with issues of access to and ownership of genetic resources in the future.

This relates directly to the third lesson garnered from the Antarctic experience. The ATS is a regime that finds its origins external to the then-existing global fora, and has successfully remained separate from international entities such as the UN and the World Trade Organisation (WTO) until the present day. It is also an area that has managed to stay somewhat compartmentalised by national governments from other issues relevant to the times over the course of its existence. This suggests that a global genetic commons regime might be able to, similarly, carve out a niche on the world stage separate from existing fora in which genetic resource issues are negotiated. This is vital for the

¹²³ Buck, *Global Commons*, 60.

¹²⁴ *Ibid.*, 59.

formation of a new “genetic normscape”, as currently, depending on which international forum they are negotiated in or in which way governments seek to frame them, genetic resource issues can be considered as trade issues, environmental issues, agricultural or developmental issues. With multiple fora, conflicting framing and the concurrent existence of several debates regarding these resources, policy surrounding genetic resources can be “poorly coordinated, inconsistent, and even contradictory”.¹²⁵ A potentially new forum, targeted specifically at governing genetic resources, may be one way of moving past potential stalemates in this area. While this forum may not necessarily be focussed solely on the introduction of the common property paradigm into these debates, it is a possibility.

Even though the ATS regime operates outside of the UN or any other international institution, it still operates with close ties to such institutions. Agreements such as the Convention for the Regulation of Whaling and the CBD still impact upon the regime, and ATS Parties are encouraged to conduct research with external actors or organizations interested in Antarctic matters. This suggests that even though the creation of a genetic global commons could happen external to existing global institutions, this does not mean that it would evolve in a vacuum, nor that developments in these other fora would not have impacts upon any common property regimes developed.

Fourthly, the ATS demonstrates how a “global” regime may evolve without the need for all nations to be involved in it from the very beginning. While this suggests that a potential genetic global commons would not have to involve all members of the international community initially, part of the success of the ATS can be found in the expansion of the number of Parties over the years. Thus, an important aspect of a new genetic commons regime would be the inclusion of mechanisms for the accession of future members.

The fifth lesson leads from the fourth, in that even though the ATS does not contain the membership of all nations, it can be considered a global commons because what occurs within the boundaries of the Antarctic affects all nations. Similarly, the fate of the world’s population is tied in with the effective use of genetic resources in the future. While a global genetic commons might initially not obtain the membership of all nations, the

¹²⁵ Michel Petit *et al.*, *Why Governments Can’t Make Policy: The case of plant genetic resources in the international arena*, (Lima, Peru: International Potato Center (CIP), 2001), 6.

issues and the resources that would be dealt with are globally valuable from the very beginning.

A further lesson is the value of consensus to decision making within the ATS regime. There are suggestions that this is one of the main reasons why the regime has proven to be so stable over its lifetime. “All levels of institutional choice, from constitutional choice decisions about membership to collective choice decisions ...to operational choice rules on nuclear waste and sled dogs, are given full legitimacy by both regime participants and external actors.”¹²⁶ This need for consensus means that member governments become socialised to the regime as they attempt to pursue their own individual interests through ATS processes. They receive recognition for enhancing such processes, thus becoming motivated to strengthen compliance with the rules and norms found within the regime, which in turn leads to enhanced regime cohesion.¹²⁷

Finally, the boundaries of the Antarctic commons are clearly defined. Geographically, the boundaries of the resource domain that makes up this commons are clearly defined, and similarly strong definitions are given to the user pool, the Parties involved in the ATS. These two factors are also a reason for the regime’s long-term stability and coherence;¹²⁸ the final lesson to be taken from the ATS suggesting that clear definition of boundaries, contents and user pools are essential for coherence, stability and in some ways legitimacy of a potential global genetic commons regime.

The Applicability of a Global Genetic Commons to Genetic Resource Concerns.

At this point it is best to pause, recap, and clearly state why a global commons should be considered part of an appropriate response to conflict over the access to and control of genetic resources.

1. *Genetic resources are global resources.*

Their global nature is due to three main factors: human interaction with living materials, both in terms of the extensive history of conflict and movement surrounding these

¹²⁶ Buck, *Global Commons*, 67.

¹²⁷ Joyner, *Frozen Commons*, 101.

¹²⁸ Buck, *Global Commons*, 67.

resources, and their current international trade and inadvertent transport around the globe; advances in biotechnology that have led to the effective development of what is functionally a global gene pool; and, the acknowledgement that as no nation is genetically independent, all have to be concerned about the fate of global genetic resources.

2. *Ownership paradigms governing genetic resources are legitimated at the supranational level.*

Different ownership paradigms relating to genetic resources are legitimated (or not) through international agreements such as the CBD, TRIPs or the ITPGRFA negotiated in supranational fora such as UNCED, the WTO and the UNFAO, respectively.

The major problem with this approach is that as each forum negotiates from a different set of principles, agreements regarding genetic resources in one can conflict with agreements reached in another. For example, discussions in the WTO are conducted from the point of view of trade issues, whereas those conducted at the UNCED were concerned with sustainable development and environmental concerns, while the UNFAO is more concerned with purely agricultural issues surrounding such resources. Thus, current policy surrounding genetic resources can be “poorly coordinated, inconsistent, and even contradictory”.¹²⁹

3. *The currently resurgent common property paradigm is applicable to genetic resource concerns.*

While current national and international laws relating to genetic resources are tending towards private property due to the legacy of the TRIPs agreement, adherents to a resurgent common property paradigm are suggesting alternative methods of managing these resources. There are fears that privatisation will lead to inequitable access to innovation based on these resources,¹³⁰ leading to calls for the application of common property regimes that are more equitable, typically involving all resource users in important decisions and therefore more conducive to democratic concerns,¹³¹ in relation to genetic resources. These calls are represented by initiatives such as the TISGC.

¹²⁹ Petit *et al*, *Why Governments Can't Make Policy*, 6.

¹³⁰ Lee Ann Jackson, “Agricultural Biotechnology and the Privatization of Genetic Information: Implications for Innovation and Equity,” presented at *Constituting the Commons: Crafting Sustainable Commons in the New Millennium*, Bloomington, Indiana, USA, May 31-June 4,

<<http://www.dlc.dlib.indiana.edu/documents/dir0/00/00/05/71/index.html>> (10 February 2004): 15.

¹³¹ Swaney, “Democracy and common property,” 262.

Even when considering genetic resources in a global manner, this does not invalidate the application of the common property paradigm to them, as common property regimes do exist at this level in the form of the global commons such as the High Seas, the Atmosphere, Antarctica and Outer Space. Solutions to the problems that plague these commons, such as ozone depletion or global climate change, will necessarily find their solutions in co-management on a global scale.¹³² As genetic resources are global, the solutions for the concerns that plague them will also be found globally.

4. *Genetic resources can fit the global commons mould.*

As genetic resources can be thought of in terms of the genetic and biochemical information found within living materials, it can be argued that these living materials form the resource domain in which genetic resources are located. Hence, for many genetic resources, the resource domains in which they occur are functionally non-excludable. Thus, as their resource domain can be considered non-excludable, they can be considered within a global commons framework.

This does not apply to all genetic resources, which in itself highlights the fact that different genetic resources can be conceptualised in different ways, and thus have different property regimes applied to them legitimately. Not all genetic resources are created equal, so not all should be treated in the same manner: while private property works well for certain types of genetic resource, equally, a global common property regime could be an appropriate response to many others.

5. *The Antarctic Treaty System offers extremely relevant lessons for a future Global Genetic Commons.*

Even though it can be argued that genetic resources do fit the mould of the traditional global commons above, were they to form a global commons in their own right, this commons would be unique. As such, the example of Antarctica, itself a very different global commons regime when compared to the other three, provides excellent lessons that can be used when exploring how to develop a Global Genetic Commons.

¹³² Feeny *et al.*, "Tragedy of the Commons," 88.

Developing Ideas for a New Global Genetic Commons.

An important aspect of introducing the common property paradigm to genetic resources is the question of to what extent common property regimes will be extended to them. That is to say, while the TISGC calls for a commons covering “the Earth’s gene pool, in all of its biological forms and manifestations,”¹³³ does such a commons need to extend to *all* of the gene pool’s biological forms and manifestations? Or can some genetic resources fall into the category of common property resources, and some into the categories of private or public resources?

The quick answer to the first question is no: if a global common property regime were to be implemented for genetic resources, then this regime need not cover *all* genetic resources. As discussed in chapter III, different types of genetic resources are considered in different ways; not all genetic resources are created equal. For example, there is a distinct difference between how humans consider the use and control of *human* genetic resources as opposed to the use and control of *agricultural* genetic resources, which is different again from the way in which we determine how those resources used for *pharmaceutical* or *industrial* purposes are used or controlled. Similarly, as discussed above, different genetic resources have different levels of excludability with regard to their resource domains, the living materials in which they are found, and thus could be usefully considered under different property regimes. Therefore, it is fair to say that a Global Genetic Commons should be extended only to those genetic resources for which it was appropriate, even though this commons might pertain to only certain types of genetic resource, or even certain subsets of these types.

The idea that the common property paradigm might only be extended to a subset of genetic resources is by no means anathema to the resurgent common property movement. They claim that they do not seek to replace private or public property, but to redress the balance between these and common property. Part of this claim revolves around the concept of a synergy between the market and the commons, in which a functioning commons can help invigorate innovation and marketplace competition.¹³⁴

¹³³ FOET, “Treaty Support Letter,” *Foundation on Economic Trends*, 2002, <<http://www.foet.org/treatysupportletter.htm>> (14 April 2003).

¹³⁴ David Bollier, “Reclaiming the Commons: Why we need to protect our public resources from private encroachment,” *Boston Review*, 2002, <<http://www.bostonreview.mit.edu/BR27.3/bollier.html>> (5 August 2002).

The idea of there being different types of genetic resource, and that not all of these are created equal, leads to the conclusion that there should be different common property regimes for different resource types within the Global Genetic Commons. Each type should in effect be treated as a different resource, with its own set of ethics, morals, laws and, most importantly, property regime attached. Whether this division be based on a split between, for example, human, animal, plant or micro organism, or be based along the lines of the individual resource's use, such as pharmaceutical, industrial, agricultural or perhaps even spiritual, is the topic for another thesis. However, acknowledging this split, that different resources should be regarded differently, would hopefully render some of the present difficulties in genetic resource policy null by providing the ability to construct a similar global ethical baseline from which to negotiate genetic resource policy.

Thus, a Global Genetic Commons Treaty (GGCT) could act as the parent regime for future sub-regimes that pertain to specific instances of genetic resources. The original treaty itself could look to set the guidelines, to form the basis of a new genetic commons 'normscape', and to provide an initial baseline from which future discussions could take place. The regime and the sub-regimes it produces would thus form the Global Genetic Commons Treaty System (GGCTS), in a similar way to the Antarctic Treaty and the subsequent ATS.

Three further lessons from the ATS experience help inform ideas about a potential GGCTS. Firstly, in order for a commons such as this to be global, not all countries need necessarily be party to it when it is initiated, as long as there are clear membership guidelines for future accessions to such a treaty or system of treaties. Secondly, there is no need for the GGCTS to occur in an existing international forum. Indeed, formation outside such fora would undoubtedly be an advantage in some respects, giving the new treaty system the chance to generate its own genetic normscape away from existing framing biases. Thirdly, existing ownership issues need not be fully solved prior to the formation of such a treaty, as the treaty could take the resources beyond the question of public or private ownership, and help develop new ways of managing genetic resources.

The need to clearly define user pool and the boundaries of the common resource domain is of primary importance to creating a coherent regime. However, if the original goal of the GGCT is not to designate any specific genetic resources “common”, but to create a normscape for the negotiation of future sub-regimes, then this initial agreement will not require clearly defined boundaries of a specific common resource domain. It would, however, benefit from a clearly defined group of negotiating countries, consultative parties, who would set the ground rules for sub-regime negotiations.

Similarly, judging from the Antarctic experience and others¹³⁵ it would appear that consensus based approaches, whilst requiring “considerable time and patience” and not always being applicable to all concerns,¹³⁶ generate more stable regimes.¹³⁷ As such, a GGCT should contain a consensus style format for decision-making purposes, similar to the ATS.

Potential Problems Faced by a Global Genetic Commons Treaty.

There are many problems that the negotiation of a GGCT and the formation of a GGCTS would face. Two of these warrant closer inspection.

Economic Concerns.

Firstly, there would be several economic concerns connected with such an endeavour. Primarily there would be a need to show that such a commons was a viable option, a preferable alternative to public or private ownership of genetic resources, and not simply a return to the pre-CBD open-access system that allowed bioprospectors to take any genetic resource free of charge.¹³⁸ There would also be a need to determine whether governments would face a loss of income by placing genetic resources that were previously publicly owned into a common pool. However, current experiences suggest

¹³⁵ Michael Brown, “Emerging Coalitions and Sustainable Development in the Commons: Developing Frameworks and Tools for Negotiating Development Space in the New Millennium,” presented at *Constituting the Commons: Crafting Sustainable Commons in the New Millennium*, Bloomington, Indiana, USA, May 31-June 4, <<http://www.dlc.dlib.indiana.edu/documents/dir0/00/00/02/28/index.html>> (10February 2004).

¹³⁶ *Ibid.*, 10.

¹³⁷ Buck, *Global Commons*, 67.

¹³⁸ John R. Adair, “The Bioprospecting Question: Should the United States charge biotechnology companies for the commercial use of public wild genetic resources?” *Ecology Law Quarterly* v24 n1 (February 1997): 131.

that this potential loss of income would be minimal. There have been claims that “plant genetic resources are more valuable, economically, and practically, as a public good than as a commodity... As a commodity, they’re a flop.”¹³⁹ This is backed up by real world experiences of corporations such as Merck & Co, who terminated their famous bioprospecting contract¹⁴⁰ with the Costa Rican government in 1999 after a “relative lack of success” in finding any useful genetic resources.¹⁴¹ There is no question that genetic resources when considered as a whole are exceptionally valuable and important for future human endeavours, however, this overall value does not necessarily translate to individual genetic resources being valuable, and so efforts to try and tie value to individual samples have mostly met with little success.

A further problem would be that of financing a GGCT if it occurred outside of existing international fora. However, this is a problem faced by even those regimes that occur within existing fora, such as the Kyoto Protocol or the CBD, and there are suggestions that reforms to the global finance architecture are needed in order to support these global regimes.¹⁴²

A solution to each of the economic problems mentioned above might be to start a potential GGCTS at the level of sub-regimes in existing fora; a kind of bottom up, but still global approach to the creation of a genetic commons normscape that if proven successful could then be extended to a broader, grand regime.

Legitimacy Concerns.

Secondly, there could be concerns regarding the legitimacy of such a commons due to potentially limited initial membership numbers. Provided there is a robust accession process, as in the ATS regime, this should not be a problem. Also, regarding potential North-South issues, as with the Antarctic, previous common heritage of mankind

¹³⁹ Cary Fowler, “Sharing agriculture’s genetic bounty,” *Science* v297 i5579 (12 July 2002): 157.

¹⁴⁰ The Merck/INBio agreement was one of the flagship examples of the post CBD ability of governments to make bilateral agreements with corporations to control and make profit out of bioprospecting occurring within the borders of their nation. The agreement was signed in 1991, and INBio, a non-profit scientific government organization, agreed to supply 10,000 chemical samples from plants, animal sand soil in return for \$1 million. \$130,000 worth of scientific equipment, plus promises of royalties should any samples prove to be profitable. (Adair, “Bioprospecting,” 136.)

¹⁴¹ Mark Court, “Profiting from nature,” *The Dominion* 12 February 2002, 7.

¹⁴² Paul R. Epstein, “Common Pool Funds for Common Pool Resources: Creating a New Global Financial Architecture,” presented at *Constituting the Commons: Crafting Sustainable Commons in the New Millennium*, Bloomington, Indiana, USA, May 31-June 4, <<http://www.dlc.dlib.indiana.edu/documents/dir0/00/00/02/50/index.html>> (10 February 2004): 2-3.

approaches did not work, and private ownership of genetic resources is a concern for many. However, as the majority of genetic resources are found within the borders of developing nations, the offer of an alternative approach to managing them, one in which they would have the ability to help negotiate the sets of rules and norms that govern the overall regime, may prove to be attractive. As with the ATS, once developing nations have a stake in proceedings, this could help prevent the traditional North-South split over such issues and provide global stability and a sense of legitimacy to proceedings.

In her final conclusion to *The Global Commons*, Susan Buck talks of the possibility that we are witnessing a “Grotian moment.”¹⁴³ While she acknowledges that it is impossible to tell if this is the case until *after* such a moment has passed, one of the key factors she recognises as pointing in this direction is the increasing need for governments to view the world in a globalised manner. This has had two effects. Buck suggests that the recognition of the global nature of, especially, environmental concerns has meant that developing countries are gaining more influence in the design and implementation of international and global property regimes.¹⁴⁴ One of the reasons for this is that developing countries contain many of the natural resources that developed countries have long ago depleted or lack altogether; that the majority of genetic resources are found in these countries is fair demonstration of that. Thus, even though still powerful, developed nations can no longer make environmental decisions without the input of developing nations.

To be effective, a commons has to have a recognised community. Until now, the global commons were either made up of those resource domains to which all were members by default, or to Antarctica, where only a few nations are considered to be a part of the commons. However, another effect of the increasingly globalised view of the world that is held by not only governments, but individuals and communities as well, is that for the first time in history, a true sense of a global community is developing. Perhaps now is a time when commons such as a genetic commons could be developed in a truly global sense: a time when humanity as a whole can recognise the importance of preserving a

¹⁴³ From the Dutch scholar and humanist Hugo Grotius: “a time in which a fundamental change of circumstances [creates] the need for a different world structure and a different international law.” (Buck, *Global Commons*, 2.)

¹⁴⁴ *Ibid.*, 173.

resource of global importance, and seek to manage it in a manner involving the now global community.

Conclusions.

Conflict over the access to and ownership of genetic resources has been a permanent feature of human history, and looks certain to continue. However, due to their history, current technology, and the growing recognition of their importance and humanity's interdependence upon each other for them, these resources can now be considered global in their nature. This global nature has developed at a time where many governance structures are moving to the supranational levels, and understandings of a global community are emerging around the globe. It has also developed in a period when the common property paradigm has re-emerged as a powerful force in debates over how future environmental and resource concerns are to be resolved. This has led many to call for the creation of a global commons for genetic resources. This thesis would suggest that these calls are well founded and legitimate, and that to be successful at legitimating the common property paradigm in relation to genetic resources they must occur at the international level through supranational fora, whether these are new or existing.

A general outline has been developed above, based largely on experiences drawn from the ATS regime, which encompasses some suggestions about how such a global commons might function. What remains to be seen is how successful *actual* attempts to introduce the common property paradigm into the genetic resource debate have been. It is here that the next chapter will turn, investigating the outcomes of this thesis' starting point, the Treaty initiative to Share the Genetic Commons, and another common property treaty, the International Treaty for Plant Genetic Resources for Food and Agriculture. It will make comparisons between these two treaties to the suggestions made above, and seek to offer suggestions for the future direction of these efforts.

Chapter V

Case studies: Recent Steps Towards a Global Genetic Commons.

“We proclaim these truths to be universal and indivisible;

That the intrinsic value of the Earth’s gene pool, in all of its biological forms and manifestations, precedes its utility and commercial value, and therefore must be respected and safeguarded by all political, commercial and social institutions...”¹

“The Contracting Parties,

Convinced of the special nature of plant genetic resources for food and agriculture, their distinctive features and problems needing distinctive solutions;

Alarmed by the continuing erosion of these resources;

Cognizant that plant genetic resources for food and agriculture are a common concern of all countries, in that all countries depend very largely on plant genetic resources for food and agriculture that originated elsewhere...”²

Introduction.

Debate over whether the common property paradigm should extend to the access to and ownership of genetic resources, and how one might successfully go about doing this, is by no means a purely academic affair. Over the past decade, at least two treaties attempting to introduce this paradigm emerged on the international stage, to varying degrees of success: the Treaty Initiative to Share the Genetic Commons (TISGC), and the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA). While these treaties share some similarities, their differences are striking. An examination and comparison of these treaties offers vital lessons for future attempts to introduce this paradigm into the genetic resource debate.

This chapter compares these two treaties, in order to illustrate and draw lessons from these practical and genetic resource specific attempts to create global common property

¹ FOET, “The Treaty Initiative to Share the Genetic Commons,” *Foundation on Economic Trends*, 2002. <<http://www.foet.org/treaty.htm>> (14 April 2003). See Appendix I for a full copy of this treaty.

² UKABC, “International Treaty on Plant Genetic Resources for Food and Agriculture,” Preamble, *UK Agricultural Biodiversity Coalition*, <<http://www.ukabc.org/ITPGRRe.pdf>> (12 February 2004). See Appendix II for a full copy of this treaty.

regimes for the access to and ownership of genetic resources. The central aim of this chapter is to identify lessons and examples that can inform the potential Global Genetic Commons Treaty (GGCT) concept developed in the previous chapter.

The Treaty Initiative to Share the Genetic Commons.

The TISGC burst onto the international Non-Governmental Organization (NGO) scene in February 2002, with the proposal simultaneously unveiled at the United Nations (UN) preparatory meetings for the Johannesburg World Summit on Sustainable Development (WSSD, or Rio +10), and in Porto Alegre, Brazil, at the second World Social Forum (WSF).³ Eight months later, after failing to make it onto the agenda of the Rio +10 meetings themselves,⁴ the initiative virtually disappeared from the international stage.

At its height, the TISGC had the support of more than 325 NGOs around the world.⁵ Yet the initiative that claimed to offer a “positive” alternative for those groups who opposed the private ownership of life,⁶ and that supporters thought could “rally widespread public support across the entire political spectrum and among every major social constituency and interest group”,⁷ failed to generate enough momentum to carry it much further than its original September deadline. This section aims to investigate the aims, goals and aspirations of the TISGC’s authors and supporters; to describe the principles which underlie the initiative; to evaluate the initiative’s history; and, to suggest why it met with this overall lack of success.

³ Ben Lilliston, “NGOs support a treaty to establish the gene pool as a global commons” *Synthesis/Regeneration* (Spring 2002): 36. (Note: This article has been reprinted many times, generally without acknowledgement, in many different places, with various different edits. See, for example: UKABC, “Treaty launched at World Social Forum,” *UK Agricultural Biodiversity Coalition*, 1 February 2002, <http://www.ukabc.org/genetic_commons_treaty.htm#b> (12 February, 2004) and “NGOs Announce Support Global Commons Gene Pool,” *Organic Matters* i19 (February 2002): 5.)

⁴ Alexia Robinson, Director of Operations, Foundation on Economic Trends, interview by author, 21 November 2002, phone interview, University of Canterbury, New Zealand.

⁵ FOET, “RE: Update on the Treaty Initiative to Share the Genetic Commons,” *Foundation on Economic Trends*, 5 April 2002, <<http://www.foet.org/5-%20April.htm>> (12 February 2004).

⁶ *Ibid.*

⁷ FOET, “Treaty Initiative.”

In Their Own Words: The aims, goals and aspirations of the TISGC.

The central aim of the TISGC was “to establish a global regime to govern and regulate the use of biological resources.”⁸ This proposed global regime was not aimed at stopping traditional ownership of or trade in agricultural commodities or other biologically derived products, but rather at preventing the “genetic composition of living organisms... [becoming] the exclusive monopoly of countries or companies.”⁹ While the authors of the initiative hailed “the good intentions” of previous international agreements regulating biological resources, such as the Convention on Biological Diversity (CBD) and the International Undertaking on Plant Genetic Resources (IU), they declared opposition to *any* extension of intellectual property rights to *any* living thing or components thereof,¹⁰ a point of view not expressed in the two prior agreements.

Opposition to the ownership of biological materials through the use of intellectual property rights was by no means new, and had become widespread by the start of the new millennium. Biotech activists had been leading such opposition since the 1980s, and there were many NGOs involved in this debate at both the national and international levels. Examples of internationally prominent NGOs active at the time include the Rural Advancement Foundation international (RAFI, now the ETC Group) based in North America, Genetic Resources Action International (GRAIN) in Europe, South East Asian Regional Institute for Community Education (SEARICE) in the Philippines, and the Research Foundation for Science, Technology and Natural Resource Policy in India.¹¹ The TISGC, however, offered something new.

The treaty was the first globally coordinated campaign that sought to unite biotech activists and NGOs that were against this extension of intellectual property rights.¹² The treaty aimed to achieve this unitary front by providing supporters a positive goal: rather than simply being *against* the ownership of life, the TISGC proposed the establishment of

⁸ FOET, “Treaty Support Letter,” *Foundation on Economic Trends*, 2002.
<<http://www.foet.org/treatysupportletter.htm>> (14 April 2003).

⁹ FOET, “RE: Update.”

¹⁰ FOET, “Support Letter.”

¹¹ Jeroen van Wijk, “Plant Patenting Provision Reviewed in WTO,” *Biotechnology Development Monitor* n34 (1998): 6-9.

¹² Lilliston, “Global commons,” 36.

a global commons for “the Earth’s gene pool, in all its biological forms and manifestations”,¹³ allowing its supporters to argue *for* an alternative.¹⁴

By creating this global commons, the authors of the treaty hoped to achieve what they described as their “primary aim”, the halt of the North and corporations stealing¹⁵ the genetic inheritance of the South and indigenous communities.¹⁶

The TISGC: Underlying principles.

The three guiding principles that inspired the Treaty, as described by its authors, were:

1. The earth’s genetic endowment is a collective legacy and shared trust.
2. Every community and country has the right and responsibility, assisted if requested by the international community, to manage that portion of the earth’s genetic endowment that lies within its territory.
3. While communities and countries have sovereignty over the terms by which the genetic materials they hold in trust are shared with the world, that genetic information cannot be legitimately claimed as monopoly property in the marketplace. Selling exclusive bioprospecting rights or claiming genetic information as exclusive intellectual property is a violation of the spirit of biodiversity.¹⁷

An investigation of the documents surrounding the TISGC suggests that there were three main reasons behind the promotion of the initiative as an option for future biological resource management, and for the timing of this promotion, that stood alongside the stated guiding principles.

Firstly, ethical and moral concerns formed the basis of this opposition to intellectual property rights for biological materials. Language throughout the press releases and

¹³ FOET, “Support Letter.”

¹⁴ Robinson, interview by author.

¹⁵ Often termed biopiracy, evidence that supports this notion that the North is “stealing” the South’s genetic inheritance is based on general observations, such as the North’s reliance on genetic material from developing nations for their agricultural products (John R. Adair, “The Bioprospecting Question: Should the United States charge biotechnology companies for the commercial use of public wild genetic resources?” *Ecology Law Quarterly* v24 n1 (February 1997): 134), or that 75 percent of the 120 active compounds currently isolated from plants and used in modern medicine find their origins in traditional medicine systems and Third World knowledge (Vandana Shiva, *Biopiracy: The Plunder of Nature and Knowledge*, (Boston, Massachusetts: South End Press, 1997), 74); or on numerous specific examples such as the “Enola” bean and quinoa patents, both examples of US based individuals or organizations (successfully) laying claim to proprietary rights over plants that originated from South American countries (Fred Powlledge, “Patenting, Piracy, and the Global Commons,” *BioScience* v51 i4 (April 2001): 274).

¹⁶ FOET, “Support Letter.”

¹⁷ *Ibid.*

updates on the TISGC from the FOET website, the principle supporter of the treaty headed by Jeremy Rifkin, one of the prime authors of the treaty, is replete with references to “the sacred integrity of the earth’s genetic inheritance”,¹⁸ and the belief “that our evolutionary heritage is not a negotiable commodity.”¹⁹ The treaty supporters believed that the “earth’s gene pool is a collective legacy and a shared trust”, and as it existed “apriori to and independent of any contemporary political or commercial institution... it is therefore not reducible to monopolies in the hands of governments or companies.”²⁰

There were also many pragmatic reasons for the promotion of the TISGC. The treaty supporters felt that the principle of national sovereignty over genetic resources set up under the CBD, combined with the ability for governments to enter into bilateral agreements to exploit these resources with other governments, corporations or academic institutions, amounted to nothing more than setting up a system of “high-tech biocolonialism.”²¹ As the expertise needed to manipulate genetic resources resided in the North, but the majority of the resources needed were to be found in the South, Southern countries often complained that the “inventions” of the North were nothing more than “pirating of local genetic resources and the accumulated knowledge of how to use them.”²² The treaty was promoted as a way of returning to the basic principles of the CBD, “equitable sharing of the earth’s biological heritage”,²³ by removing the intellectual property ownership that provided the ability to monopolise these resources.

As well as trying to rectify this perceived North-South imbalance in the current system, the supporters also questioned the very legality of the extension of intellectual property rights to genetic resources.²⁴ Rifkin questioned whether genes, cells, tissues, organs or whole animals could ever be claimed as inventions, and therefore patented, engineered or not. He compared the discovery of genetic resources to the discovery of the chemical

¹⁸ FOET, “RE: Update.”

¹⁹ FOET, “Support Letter.”

²⁰ FOET, “RE: Update.”

²¹ FOET, “RE: Update.”

²² Jeremy Rifkin, “The price of life,” *Guardian Unlimited*, 15 November 2000, <<http://guardian.co.uk/Archive/Article/0,4273,4091302,00.html>> (30 August 2002).

²³ FOET, “Support Letter.”

²⁴ This subject, while hugely important to the future of genetic resource management, falls outside the scope of this particular thesis. As mentioned in chapter III, this can be considered part of the *content* of the debate, rather than the *structure*.

elements in the periodic table, and pointed out that these were not considered “inventions”, so why were genetic resources now?²⁵

The third reason behind the promotion of the initiative had to do with timing. Rifkin and others thought that the world was entering a transition period between what they considered the age of physics and chemistry to the age of biology, and as such it was important to fight for such a treaty now, while the ground rules for dealing with genetic resources were being decided.²⁶ Also, they believed that this new age meant that social conservatives and leftwing activists would find common ground in opposition to the ownership of life,²⁷ and so treaties such as the TISGC would gain widespread public support from all sides of the political continuum, both left and right.²⁸ The timing was also important, as the supporters wished to see the TISGC endorsed by the global community at the Rio +10 conference so as to “make it the centrepiece of future biodiversity efforts,” much as the CBD had been endorsed ten years prior at the original World Summit.²⁹

The History of the TISGC.

The TISGC found its genesis amongst concepts floating about various NGOs involved in protesting against the private ownership of genetic resources in the mid- to late-1990s. While initially it was Jeremy Rifkin (FOET)³⁰ and Pat Mooney (ETC group)³¹ who took

²⁵ Rifkin, “Price of life.”

²⁶ The need to contribute arguments and ideas such as the TISGC to the debate is arguable heightened by the continued evolution of the international intellectual property system, with the world moving ever closer to a single world patent system, as proposed by the World Intellectual property office (WIPO). (see: GRAIN, “WIPO Moves Towards “World” Patent System,” *Genetic Resource Action International*, July 2002, <<http://www.grain.org/publications/wipo-patent-2002-en.cfm>> (14 September 2002).)

²⁷ Jeremy Rifkin, “This is the age of biology,” *Guardian Unlimited*, 28 July 2001, <<http://www.guardian.co.uk/Archive/Article/0,4273,4229850,00.html>> (30 August 2002).

²⁸ FOET, “Support Letter.”

²⁹ Lilliston, “Global commons,” 36.

³⁰ No stranger to anti-biotech activism, Jeremy Rifkin is the author of sixteen books on the impact of scientific and technological changes on economics, and has been described as one 150 people in the US that have the most influence on shaping federal government policy. (see: FOET, “About Jeremy Rifkin,” *Foundation on Economic Trends*, 2001, <<http://www.foet.org/jermeyrifkin.htm>> (14 February, 2004).) He has mounted active opposition to those who favour the private ownership of genetic resources from the very beginning of the practice, filing an amicus brief against genetic engineering in the original *Chakrabarty v. Diamond* case in 1980. (see: Daniel J. Kevles, *A history of patenting life in the United States with comparative attention to Europe and Canada*, (Luxembourg: Office for Official Publications of the European Communities, 2002), 30-33.)

³¹ Pat Mooney has worked for more than thirty years with NGOs on international trade and development issues related to agriculture and biodiversity. He is the author of several books on the politics of biotechnology and biodiversity, and was one of the founders of the Rural Advancement Foundation International (RAFI), no known as the ETC Group. (see: ITDG, “Is Small Beautiful?” *Intermediate*

the concept and developed it further, by January 2001 they had begun working on the first draft with approximately twenty other NGOs. The results of these discussions were released as the first public draft in April 2001.³²

On its release in Porto Alegre in February 2002, the TISGC became the most prominent agenda item at the WSF, an event that mirrors the World Economic Forum as a protest against the current state of global trade,³³ and by the Forum's close it had the support of over 250 organizations from fifty countries.³⁴ Eighteen organizations, including groups from the US, Chile, Italy, Peru, the Philippines and Zimbabwe, formed an international committee devoted to creating a civil society process that would culminate in the presentation of the treaty to governments at Rio +10.³⁵

During the Forum for Food Sovereignty, held in Rome in June 2002, there was an open discussion on the TISGC, still in the process of being developed, looking at the pros and cons of such a treaty and attempting to gather yet more ideas and opinions on the concept.³⁶ However, at this point it was decided that it was too early to bring the treaty to the attention of legislators at the Rio +10 conference in September 2002, as organization had proved difficult, the goals were too ambitious and the supporters hoped to generate more support for the process in the future.³⁷

From here a meeting was planned in January or February 2003 to attempt to pull all the groups involved in the project together again, and decide the future direction of the initiative.³⁸ The TISGC was facing competition from other movements, it had failed to make its initial goal of presentation at Rio +10,³⁹ and from this time onwards it has disappeared from view. Whether or not it emerges in another form with a new group of supporters remains to be seen.

Technology Development Group, 2003, <http://www.itdg.org/html/whats_new/is_small_beautiful_mooney.htm> (14 February 2004).

³² Robinson, interview by author.

³³ Meghan Crimmins, "Activists propose halting biological patenting," *World Watch* v15 i3 (May 2002): 9.

³⁴ Lilliston, "Global commons," 36.

³⁵ *Ibid.*

³⁶ FOET, "Open Discussion on the Treaty Initiative to Share the Genetic Commons," *Foundation on Economic Trends*, 5 June 2002, <<http://www.foet.org/5-june.htm>> (14 February 2004).

³⁷ Robinson, interview by author.

³⁸ *Ibid.*

³⁹ Crimmins, "Biological patenting," 9.

Understanding the outcome of the TISGC.

It is difficult to say with any certainty why the TISGC had such a brief lifespan and then retreated into the shadows. However, upon review it is reasonable to suggest that one major issue faced by its supporters may have been the central cause of its demise: the need for consensus in the timeframe desired.

Chapter IV discussed how one of the prime features responsible for the Antarctic Treaty System's (ATS) stability and coherence was the consensual nature of *all* decision-making procedures regarding the regime. Similarly, the TISGC attempted to reach consensus among the groups involved as the initiative evolved. An example of this consensus seeking can be found in information sent to parties taking part in the treaty development process. The need for the treaty's text to be as brief as possible, and yet to convey the correct meaning to as many different peoples and cultures as possible, was highlighted. It was noted that many terms such as "commons", "sovereignty" and "community rights" convey different meanings in different cultures, and that it was especially important to "shed colonial and neo-liberal interpretations" of the words which were to be used.⁴⁰ Thus, one aspect of the necessary consensus for the initiative was along cultural-linguistic lines; the treaty had to be understood, accepted and supported by as many parties as possible, in all the regions, constituencies and cultures which such an initiative would affect. This was a tall order, given that such a treaty, aimed at *all* genetic resources, would affect *all* people the world over.

A second aspect of consensus that proved difficult was the marshalling of many hundreds of activist, NGO and governmental groups in support and development of the TISGC.⁴¹ At its height, the initiative boasted more than 325 supporting groups, each with their own agenda and angle on the genetic resource issue. As well as this need to organise and juggle competing visions, goals and aims, the groups involved met under the auspices of many different international fora over the course of the treaty's development: from the preparatory conferences for Rio +10, to the EU summit in Seville, to the World Food Summit in Rome, to the G8 summit in Toronto and Calgary.⁴² As discussed in chapter IV, often the fora in which they are debated define the

⁴⁰ FOET, "RE: Update."

⁴¹ Robinson, interview by author.

⁴² FOET, "RE: Update."

issues surrounding genetic resources.⁴³ Thus, with several hundred groups involved, and with discussions taking place in several different fora, the competing aims and competing frames in which the initiative was discussed no doubt enhanced the difficulties of consensus seeking.

A third aspect of difficulty surrounding consensus relates to the focus of the TISGC on *all* genetic resources. As discussed in chapters III and IV, not all genetic resources are created equal and at no time have all been treated as such. This lumping together of all such resources under one frame of reference, the TISGC, is possibly the most difficult part of the treaty to comprehend.⁴⁴ This is not to say that such an approach is impossible or wrong: for example the CBD and TRIPs both extend different ownership paradigms to *all* genetic resources and the TISGC may have been able to do the same. However, it is difficult to conceptually consider all genetic resources in a single manner, and this lack of clarity, or at least the difficulty of practical application, may have been one of the reasons why the treaty did not progress on to the legislators at Rio +10.

The difficulties faced in reaching consensus were in no way insurmountable, given enough time. However, with the TISGC being launched officially in February, and with scant eight months between this launch and the proposed presentation of the initiative to the assembled governments at the Rio +10 conference, time was scarce. The need to assemble support, draft a treaty initiative acceptable to all involved, work through the cross-cultural and linguistic conceptual difficulties and ambiguities faced by such a global project, and to work this to a point of being acceptable to the wider global community, all within eight months, was most probably the primary cause for the failure of the Treaty Initiative to Share the Genetic Commons to successfully accomplish its goals and aims.

The TISGC: Conclusions.

⁴³ Michel Petit *et al.*, *Why Governments Can't Make Policy: The case of plant genetic resources in the international arena*, (Lima, Peru: International Potato Center (CIP), 2001), 6.

⁴⁴ It is important to note that this is one of the reasons this thesis itself has proven so difficult to research and write in a meaningful fashion. While the aims and goals of the TISGC might be ethically and morally concise, they are hard to directly relate to the real world, where different genetic resources have been treated in different fashions throughout history and around the globe. Existing policy and agreements surrounding genetic resources are generally predicated on different types of this resource, for example, human resources, pharmaceutical resources, agricultural resources or industrial resources.

Whether or not the TISGC was simply another “utopian statement”,⁴⁵ more about laying out an alternative and making the authors feel better than about any solid political action, it did accomplish one of its aims: to encourage debate and discussion about the possibility of a global genetic commons.⁴⁶

While a further possibility for the failure of the TISGC to accomplish its goals may have simply been that the left-right political coalition predicted by the likes of Rifkin has not materialised, its failure may point to a more basic problem: as it was based on a very specific set of ethical and moral beliefs about whether the ownership of life should be allowed, if this system of beliefs failed to be accepted or to energise support for the treaty, then its future was not bright.

So does this mean that the concept of a global commons for genetic resources is a tragedy waiting to happen? Not by any means. The success of the second treaty investigated in this chapter suggests that an ethical or moral basis for the TISGC is not the only way to approach a global genetic commons. The International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) represents a much more pragmatic, and successful, attempt to introduce the common property paradigm into the genetic resource debate.

The International Treaty on Plant Genetic Resources for Food and Agriculture.

On 3 November 2001, at the United Nations Food and Agriculture Organization (UNFAO) conference in Rome, 116 nations voted in favour of adoption of the International Treaty on Plant Genetic Resources for Food and Agriculture.⁴⁷ This treaty was a renegotiation of the existing International Undertaking on Plant Genetic Resources

⁴⁵ Cary Fowler, “Re: A political science thesis,” 17 August 2003, personal email (18 August 2003).

⁴⁶ Apart from the more than 325 groups and organizations who supported the treaty initiative in many different fora, examples of this debate and discussion can be found in the likes of this very thesis, and also in the support by such established organizations such as the European Greens, who passed a resolution in support of the treaty initiative and called for its support by all European Parliaments at their third congress. (see: “Parliamentary Question Prepared For The Green Party,” *The Italian Anti-Vivisection Scientific Committee*, 2001, <<http://www.antivivisezione.it/Parliamentary%20Question.html>> (16 February 2004).)

⁴⁷ Ali Mekonaur, “A Global Instrument on Agrobiodiversity: The International Treaty on Plant Genetic Resources for Food and Agriculture,” *FAO Legal Papers Online* n24 (January 2002): 2, <<http://fao.org/Legal/prs-ol/lpo24.pdf>> (10 February 2004).

for Food and Agriculture,⁴⁸ and is regarded as having “the potential to become the principal international legal instrument governing transfers of crop genetic materials.”⁴⁹ According to some commentators, it also has the potential to go further and become “a prime example of responsible global governance.”⁵⁰

The treaty, signed after more than seven years of negotiations and twenty years of UN debate over the rules governing genetic resources, has now been ratified by thirty-four countries and signed by a further fifty-nine.⁵¹ It is but months away from reaching the mark of forty ratifications that would see it come into force.⁵²

The following section seeks to uncover why the ITPGRFA was more successful than the TISGC in being accepted by the international community as a means of regulating the access to and ownership of genetic resources. While both seek to introduce the common property paradigm into the genetic resource debate, only one has been successful to this point. The differences between them, and a comparison to the ideas presented in chapter IV regarding a potential global genetic commons treaty, are a useful means of understanding how common property ideas can be more successfully advanced in relation to genetic resources.

The ITPGRFA: Goals and underlying principles.

“The Contracting Parties,

Convinced of the special nature of plant genetic resources for food and agriculture, their distinctive features and problems needing distinctive solutions;

Alarmed by the continuing erosion of these resources;

Cognizant that plant genetic resources for food and agriculture are a common concern of all countries, in that all countries depend very largely

⁴⁸ Geoffrey Tansey, “Food for Thought: Intellectual Property Rights, food, and biodiversity,” *Harvard International Review* v24 i1 (Spring 2002): 55.

⁴⁹ Cary Fowler, “Sharing agriculture’s genetic bounty,” *Science* v297 i5579 (12 July 2002): 157.

⁵⁰ Patrick Mulvany, “International Seed Treaty: a model for governance of genetic resources,” *UK Agricultural Biodiversity Coalition*, <http://www.r0.unctad.org/trade_env/test1/meetings/plants/INTERNATIONAL%20SEED%20TREATY.doc> (12 February 2004).

⁵¹ UNFAO, “International Treaty on Plant Genetic Resources for Food and Agriculture,” *United Nations Food and Agriculture Organization*, <<http://www.fao.org/Legal/TREATIES/033s-e.htm>> (12 February 2004).

⁵² UKABC, “International Seed Treaty – International treaty on Plant Genetic Resources for Food and Agriculture – CSO pages,” *UK Agricultural Biodiversity Coalition*, <<http://www.ukabc.org/iu2.htm>> (12 February 2004).

on plant genetic resources for food and agriculture that originated elsewhere...”⁵³

So begins the first treaty of the new millennium. The need for the ITPGRFA stemmed from the recognition that these genetic resources have special needs that were no longer sufficiently maintained by the existing international agreement that pertained to them, the IU. The IU originated from the idea that germ plasm relating to food and agriculture was the common heritage of humankind that had to be shared for everyone’s benefit.⁵⁴ The renegotiation of this agreement was acknowledgement that the international policy environment in which it was originally negotiated had radically altered since 1983.

In the intervening decades, the international community has all but accepted the use of Intellectual Property Rights (IPRs) in relation to these genetic resources,⁵⁵ while also signing into existence the Convention on Biological Diversity (CBD), aimed at the conservation of biological diversity, its sustainable use, and the fair and equitable sharing of the benefits arising from this use.⁵⁶ The CBD seeks to achieve this by giving individual states sovereignty over their own portion of the planet’s biological diversity, and allowing them to exploit it as they would any naturally occurring resource. In return countries were to work towards these three goals, predicating access to their genetic resources through prior informed consent of the governments involved, and a series of bilateral deals.

Thus, the ITPGRFA was negotiated in a new global policy environment, located at the crossroads between agriculture, commerce, and the environment, and as such, one of its aims is to promote a synergy between these three areas.⁵⁷ The end result of these negotiations is a treaty that primarily seeks to ensure “the conservation and sustainable use of plant genetic resources for food and agriculture and the fair and equitable sharing of the benefits arising out of their use, in harmony with the Convention on Biological Diversity, for sustainable agriculture and food security.”⁵⁸

⁵³ UKABC, “International Treaty,” Preamble.

⁵⁴ Tansey, “Food for Thought,” 55.

⁵⁵ Cary Fowler, “The Status of Public and Proprietary Germplasm and Information: An Assessment of Recent Developments at FAO,” *IP Strategy Today* n7 (2003): 3, <<http://www.biodevelopments.org/ip/ipst7.pdf>> (15 November 2003).

⁵⁶ Tansey, “Food for Thought,” 55.

⁵⁷ UKABC, “International Treaty,” Preamble.

⁵⁸ *Ibid.*, Article 1.1.

The shift in the global system of genetic resource management brought about by the CBD, from the “common heritage of humankind” to a system premised on national sovereignty, triggered work on the ITPGRFA. This need was enhanced due to text within the Final Act of the CBD itself that designated issues surrounding access to *ex situ* collections not acquired in accordance with the CBD and Farmer’s Rights as outstanding matters to be dealt with under the auspices of the UNFAO and the IU.⁵⁹

During the course of the 1990s, the need was further compounded as it became apparent that the “resource-mining, winner takes all” mentality promoted by the CBD as the means of achieving its goals did not suit plant genetic resources for food and agriculture, spread about the globe as they had been over the course of the preceding five hundred years.⁶⁰ It was suggested that this mentality was actually detrimental to crop breeding and enhancement efforts, as countries now believed that their potentially useful genetic resources equated to “current (and substantial) monetary value”, and therefore routinely denied access to those who would put these resources to good use, convinced that they are “sitting on genetic goldmines.”⁶¹ Unfortunately, for the countries and the crop breeders involved, the value of a single sample is difficult to determine, especially prior to its collection, and is undoubtedly not worth as much as the sellers have been led to believe.

Plant genetic resources, it seems, are more valuable as a public good than as a commodity.⁶² It had become apparent that the special nature of plant genetic resources for food and agriculture meant that their exchange was usually invaluable only over time and in large quantities, and that the benefits of this exchange accrued to whole societies, not one individual, organization, or single sector. Therefore, predicating such exchange by tying payments for or benefits to any single sector, as per the CBD and its bilateral agreements between governments and industry, academic or other government groups, was not a valid approach, and a new way had to be found: the ITPGRFA.⁶³

The Law of the Seed.

⁵⁹ Mekonaur, “Agrobiodiversity,” 3.

⁶⁰ Tansey, “Food for Thought,” 55.

⁶¹ Fowler, “Genetic bounty,” 157.

⁶² *Ibid.*

⁶³ ETC Group, “The Law of the Seed!” *ETC Group Translator* v3 n1 (December 2001): 6.

After more than seven years of often acrimonious debate, the world has found itself with a treaty governing the conservation and exchange of germplasm for plant genetic resources related to food and agriculture. This “Law of the Seed”, as it has been dubbed by some, was negotiated by a diverse group of nations with a diverse set of interests: some countries sought to protect their own commercial interests, some to strike bilateral deals, and some to support farmers’ rights and address concerns of food security and agricultural biodiversity.⁶⁴ The end result can be seen as a compromise between these competing concerns; a compromise that is open to interpretation by each of the members, and one that will continue to evolve in the future.

The treaty reaffirms the principle of the sovereign rights of states over their plant genetic resources and the need for them to be conserved and used in a sustainable manner,⁶⁵ so keeping in harmony with the CBD. From this similar starting point, however, it looks to create a multilateral international system that allows contracting parties to automatically access the genetic resources of specified crops controlled by all other parties,⁶⁶ rather than predicating this access on bilateral agreements between governments and organizations who wish to gain access to the resources. While the treaty purports to encompass all plant genetic resources for food and agriculture, at the adoption of the treaty, Annex I specified only sixty-four food crops that fall under the banner of “facilitated access”, and therefore are part of the multilateral system.⁶⁷

However, this list of crops amounts to approximately 80-90% of the crops most vital to world food security,⁶⁸ including maize, wheat, potatoes, bananas and chickpeas.⁶⁹ Unfortunately, political considerations from many countries meant that while niche crops such as strawberries and asparagus are included on the list, major crops such as soybeans, groundnuts and sugarcane are excluded,⁷⁰ as are most vegetables, fruits and tropical forages.⁷¹

⁶⁴ GRAIN and Kalpavriksh, “The International Treaty on Plant Genetic Resources: A challenge for Asia,” *Genetic Resources Action international*, February 2002, <<http://www.grain.org/publications/it-asia-feb2002-en.cfm>> (12 February 2004).

⁶⁵ Mekonaur, “Agrobiodiversity,” 5.

⁶⁶ Fowler, “Genetic bounty,” 157.

⁶⁷ ETC Group, “Seed!” 7.

⁶⁸ *Ibid.*

⁶⁹ UKABC, “International Treaty,” Annex I.

⁷⁰ ETC Group, “Seed!” 7.

⁷¹ Fowler, “Genetic bounty,” 157.

The nations who become party to this treaty are in effect exercising their sovereignty by giving up sovereignty over the specified plant genetic resources and establishing a multilateral system of access to them.⁷² The plant genetic resources that are available to the Contracting Parties are those that are on this list and “that are under the management and control of the Contracting Parties and in the public domain”.⁷³ Governments are also expected to encourage other persons within their jurisdiction who may hold rights to the specified genetic resources to place these in the public domain, and thus in the common pool.⁷⁴ In return, the treaty provides that the recipients of these genetic resources will “not claim any intellectual property or other rights that limit facilitated access to plant genetic resources for food and agriculture, or their genetic parts or components, in the form received from the Multilateral System.”⁷⁵ So while the governments involved have opted to effectively place these plant genetic resources in all other Contracting Parties public domains, in return it is agreed that no one will be able to remove them from this domain through the use of IPRs or similar rights.

Therefore, individual countries lose the possibility, established under the CBD, to enter into bilateral agreements regarding the use of the specified plant genetic resources, losing the chance to profit from any direct benefits that would ordinarily go to the country of origin for the use of such resources.⁷⁶ The benefits that accrue from their use are shared in a fair and equitable manner through the Multilateral System, with any money raised going towards “conservation and breeding programs, primarily in developing countries”.⁷⁷ Here the importance of the phrase from Article 12.3 “in the form received” can be seen. The Treaty does not seek to prevent IPRs from being applied to any plant genetic resource for food and agriculture, but simply to prevent those that would commercialise such crops from stopping others accessing the original resources that lie within the common pool in the future. When a party obtains a commercial profit from genetic resources accessed from this common pool, they will be obliged under a standard, although yet to be finalised, Material Transfer Agreement (MTA) to pay

⁷² UKABC, “International Treaty,” Article 10.2.

⁷³ *Ibid.*, Article 11.2.

⁷⁴ UKABC, “International Treaty,” Article 11.4.

⁷⁵ *Ibid.*, Article 12.3.

⁷⁶ Mekonaur, “Agrobiodiversity,” 7.

⁷⁷ Fowler, “Genetic bounty,” 157.

royalties into an international fund “to be used by the Governing Body of the Treaty as part of its funding strategy for benefit sharing.”⁷⁸

This desire to protect the availability of the common pool of genetic resources, but at the same time tap the potential monetary benefits of commercialisation of products derived from such resources in a way that shares the benefits fairly and equitably, is the Treaty’s biggest “conceptual break-through”;⁷⁹ arguably the most important step forward any agreement has taken towards the original stated goals of the CBD.⁸⁰

Membership and Decision-making.

The decision-making process in the ITPGRFA is based on consensus between all Contracting Parties. As per Article 19.2, “All decisions of the Governing Body shall be taken by consensus unless by consensus another method of arriving at a decision on certain measures is reached, except that consensus shall always be required in relation to Articles 23 and 24.” Furthermore, regarding amendments to the treaty in Article 23.3, “All amendments to this Treaty shall only be made by consensus of the Contracting Parties present at the session of the Governing Body.” Any additional crops or annexes that are parties wish to add also fall under the need to be agreed upon by all Contracting Parties.⁸¹

Some commentators express fears that the consensus method of decision-making in the treaty is cumbersome, and has the potential to “constrain the ‘evolutionary’ potential of the treaty itself.”⁸² However, if the experience of the ATS is anything to go by, what the Treaty lacks in rapid evolutionary potential may well be made up for in its coherence and long-term stability.

⁷⁸ Mekonaur, “Agrobiodiversity,” 7.

⁷⁹ *Ibid.*

⁸⁰ This intersection between IPRs and the Multilateral System of benefit sharing is a perfect example of how the Treaty operates in a global policy environment. Should there be any concerns over the balance between those supporting IPRs and those supporting benefit sharing and farmers’ rights, the Governing Body of the Treaty is to work with such international organizations as the WTO and WIPO to discuss and address these concerns. Should this not succeed, Contracting Parties could seek resolution through the International Court of Justice. Thus, the ITPGRFA is a perfect example of the globalisation of governance of genetic resources, and how this governance is part of an overall globalisation of governance in many areas. (see: ETC Group, “Seed!” 4.)

⁸¹ UKABC, “International Treaty,” Article 24.

⁸² Fowler, “Genetic bounty,” 157, and ETC Group, “Seed!” 8.

Membership to the Treaty is open to all members of the UNFAO, and any states that are not members of the UNFAO but are members of the UN, or any members of any of its specialised agencies or of the International Atomic Energy Agency.⁸³ At its adoption, 116 states voted in favour of the treaty, two abstained, the US and Japan, and no country voted in opposition.⁸⁴ The US initially abstained, as it feared that Article 12.3 would prevent what it considered legitimate patenting of genes isolated and purified from plant seeds,⁸⁵ but barely one year later the US delegation had a reversal in their position and agreed to sign, becoming the 76th country to do so.⁸⁶ At the present time, ninety-three countries have signed the treaty, and of these thirty-four have either ratified, accepted, approved or acceded to the Treaty.⁸⁷ The Treaty comes into force ninety days after the fortieth country has either ratified, accepted, approved or acceded to the Treaty.⁸⁸

As the Governing Body is made up of all Contracting Parties, the first forty states to become so will form the initial Governing Body. This encourages ratification, as at its first meetings, this Body will have to deal with a set of outstanding issues not solved in the original Treaty text such as the role of IPRs in the system, the relationship with the WTO, and the international recognition of Farmers' Rights.⁸⁹ Most importantly, at its first meeting the Governing Body will determine the level, form and manner of the financial payments made under the terms of the MTA by parties accessing the genetic resources found in the common pool.⁹⁰ Thus, the first forty states to ratify the Treaty have a prime opportunity to shape its future before the number of Contracting Parties climbs, and before the ability to make decisions or changes in the consensus-oriented environment becomes too constrained for their purposes.

As it stands, countries as diverse as Algeria, Honduras, Myanmar, India and Canada have ratified.⁹¹ The initial meetings, and the future direction of the Treaty's evolution, will be very interesting indeed to observe.

⁸³ UNFAO, "International Treaty."

⁸⁴ ETC Group, "Seed!" 3.

⁸⁵ Daniel Charles, "Seed treaty signed: U.S., Japan abstain," *Science* v294 i5545 (9 November 2001): 1263.

⁸⁶ AP, "In reversal, United States signs U.N. treaty on plant genes," *ABC News Online*, 6 November 2002, <http://www.abcnews.go.com/wire/World/ap20021106_2442.html> (7 November 2002).

⁸⁷ UNFAO, "International Treaty."

⁸⁸ UKABC, "International Treaty," Article 28.

⁸⁹ Mulvany, "Seed Treaty."

⁹⁰ Mekonaur, "Agrobiodiversity," 7.

⁹¹ UNFAO, "International Treaty."

Concerns and Opportunities.

In addition to the concerns expressed over the consensus based nature of the decision-making process, there were three other major issues that commentators highlighted as potential concerns.

The first, closely linked to the consensus worries, is related to the composition of the croplist in Annex I of the Treaty. While the crops designated in the list allegedly make up 80-90% of the crops most vital to world food security, this number can be misleading, and depends largely upon where you are in the world. The croplist is in fact very deficient for poor farmers in many parts of the world such as South Asia, the Middle East or Sub-Saharan Africa;⁹² the very groups that such an agreement would hope to help the most. This was a concern also highlighted by the US and the EU negotiators at the time the Treaty was adopted.⁹³ The major concern associated with this paucity is that with the need for consensus, the future accession of any of these vital crops to the Treaty's annexes will be a difficult affair.

The other two major concerns are related to the handling of Farmers' Rights, and the financial mechanisms relating to benefit sharing through the Multilateral System. Both have ended in unsatisfactory positions, with Farmers' Rights being given far less weight than the negotiations initially promised, and with the financial mechanisms being left in a somewhat incomplete state.⁹⁴ Both of these concerns have been passed to the incoming Governing Body to deal with.

However, while there are concerns about what has been omitted or poorly considered from the Treaty, many of these same critics also see the potential within the ITPGRFA. For some, it is viewed as a "platform" treaty:⁹⁵ it has a strong legal foundation, and with good decisions and guidance in the future it can become a very powerful convention for the conservation and use of plant genetic resources for food and agriculture. Others see its potential as a model for the good governance of all genetic resources, and furthermore, a "prime example of responsible global governance".⁹⁶ Thus, while it offers

⁹² ETC Group, "Seed!" 7.

⁹³ Charles, D. 2001. *Op cit*, and AP. 2002. *Op cit*

⁹⁴ ETC Group, "Seed!" 3 and 6, and GRAIN and Kalpavriksh. 2002. *Op cit*

⁹⁵ ETC Group, "Seed!" 2.

⁹⁶ Mulvany, "Seed Treaty."

much needed regulation to the transfer of vital plant genetic resources, it offers more than just that: the ITPGRFA offers a glimpse of a new way of governing global resources.

The ITPGRFA: Conclusions.

The ITPGRFA in many ways bears close resemblance to the Antarctic Treaty discussed in chapter IV. As with the AT, the ITPGRFA takes sovereignty claims, acknowledges them, then places them to one side in order to achieve its central goals. Countries who become Contracting Parties effectively renounce their rights to sovereignty, established under the CBD, over plant genetic resources that fall within the bounds of the Treaty in exchange for access to all others' plant genetic resources. There are some who claim this approach has worked in Antarctica only because the economic impetus that would undermine such an agreement does not yet exist. This is very similar to some of the reasoning behind the ITPGRFA: as the economic impetus for claiming sovereignty over such resources is much less than the benefits gained from having access to other country's resources, the treaty stands a strong chance of succeeding in the future.

As well, the ITPGRFA is good example of how important the origins and history of an agreement are to its success; while it was negotiated in an existing global forum, unlike the AT, it is a good demonstration of how a global treaty can be set up so as not to involve all nations initially, yet to contain mechanisms to expand this membership over time; plant genetic resources for food and agriculture are vital for all people everywhere, just as the importance of the Antarctic region extends to all humans; decision making is consensual in nature; and, it has clearly defined boundaries for both the resources governed by the agreement and the membership of the agreement.

The International Treaty on Plant Genetic Resources for Food and Agriculture has effectively created a global genetic commons of plant genetic resources for food and agriculture. Its future success or failure could provide significant insight into further attempts to create such global common domains.

The TISGC and the ITPGRFA: A comparison.

While the TISGC and the ITPGRFA share many similarities, it is their differences that are striking and which help to shed light on the relative success and failure of these two international agreements. It is important to remember that the TISGC never made it past the conceptual stage and so was never introduced to the world community or international legislators, nonetheless we may learn significant lessons from the similarities and differences in the processes leading up to both treaties' success or failure.

Similarities.

1. Dates of origin and initiation.

The similar timeframes under which the treaties progressed suggest they were formed in response to a similar set of stimuli. Thus demonstrating that in relation to these issues at least, the period from the 1990s onwards has been a significant one in terms of the notion of applying common property regimes to genetic resources.

- The TISGC finds its ultimate origins in the work of bioactivists who opposed any form of ownership of life during the 1970s and 1980s as the issue gained prominence with cases such as *Diamond v Chakrabarty*, while the ITPGRFA can be traced back to the growing understanding of the need for agricultural biodiversity and the global interdependence of such plant genetic resources in the 1970s.
- The ITPGRFA began formal negotiations in 1994, while the origins of the TISGC have been placed during the mid to late 1990s, in the concepts and ideas floating amongst NGOs over this period.
- The ITPGRFA was adopted in November 2001. Scarcely three months later, the TISGC was unveiled onto the world stage, with the original goal to have it adopted at the Rio +10 conference eight months later.

2. Points of origin.

Both treaties claim their origins in the concepts, goals and ideals of the CBD and the IU. Both outline their own desires to stay true to the ideals of these international agreements that went before, while claiming to offer a more appropriate response to the concerns that the original treaties set out to address. In effect, both can be viewed as responses to

the evolving international policy environment surrounding the ownership of genetic resources.

3. Global level agreement.

Both treaties sought to apply the common property paradigm to genetic resources at the global level. While the TISGC movement could be considered an “international grassroots” movement, an attempt to become the source of international popular democratic pressure against the ownership of life,⁹⁷ and ITPGRFA was an agreement negotiated primarily by national government delegations, both processes were aimed at enshrining the concept of common property at the global level.

4. Working within existing international frameworks.

The TISGC authors and supporters aimed to introduce the treaty to the world stage proper during the Rio +10 conference in September 2002, explicitly aiming to use the international framework set in place by the first World Summit on Sustainable Development at which the CBD was originally signed to legitimise their attempts at crafting a new approach to governing genetic resources. Similarly, the ITPGRFA was negotiated under the auspices of the UNFAO and designed to replace an existing international agreement, the IU.

Differences.

1. Philosophical underpinnings.

- The TISGC heavily emphasised its strong moral opposition to any ownership of any living materials or components thereof, couching its justifications in this rhetoric and placing its potential support base among opponents to IPRs for living materials at either end of the political continuum.
- The ITPGRFA took a more pragmatic approach, acknowledging the necessity for agricultural biodiversity to be sustained, and the need for

⁹⁷ Vandana Shiva, “Community Rights, People’s Sovereignty and Treaties to Reclaim the Genetic and Water Commons,” *Synthesis/Regeneration* 29 (Fall 2002): 48.

ease of exchange of the genetic resources that form the basis of this biodiversity. The need to protect and develop crops for the future formed the basic philosophical underpinning, while the arguments for the treaty stemmed from the belief that creating a common pool of such resources would be the surest way to ensure the world's food supplies.

2. *Timeframes.*

- While the ideas for the TISGC had been discussed by NGOs since the mid 1990s, it was not until April 2001 that a first draft was finalised, and then not until February 2002 that it was unveiled on the international NGO stage. The timeframe between this unveiling and the Rio +10 conference, at which its supporters hoped to install it as the centrepiece for future genetic resource governance, was barely eight months, and proved insufficient to successfully negotiate a finalised treaty initiative.
- The ITPGRFA's own negotiation lasted over seven years, and agreement was reached almost two decades after debate had begun in earnest with the negotiation of its forerunner, the IU.

3. *Reliance on Timing.*

- The TISGC was "pushed" by its supporters as a means of more equitably governing genetic resources, seeking to change the international policy environment for genetic resources from its outset. However, the success of this push required people to agree with their philosophical underpinnings and the timing to be correct. While the authors and supporters felt that this was the case as new political alliances would be forged over this issue, its overall lack of success suggests that this belief was mistaken or perhaps that their timing was not correct.
- The ITPGRFA was "pulled" by events that changed the international policy environment for genetic resources. Its predecessor, the IU, had been rendered less useful due to these changes, and this new set of negotiations was in effect mandated by the CBD as a means of tidying up some of the issues that the negotiators at the World Summit in Rio were

unable to finalise. Thus, rather than trying to change the times, the ITPGRFA was a product of its times.

4. *Consensus issues.*

- The TISGC sought to find consensus across cultural-linguistic lines and among hundreds of supporting groups to no avail. The supporters sought to create a treaty that could be understood, accepted and supported by as many parties as possible, in all the regions, constituencies and cultures that such an initiative would affect. This proved next to impossible given the timeframe they were working to, and the breadth of the initiative's aims.
- While the ITPGRFA also aimed for consensus, and all future decisions have to be taken in this manner, the negotiators also were able to create a treaty that allowed different groups to interpret sections in different ways.⁹⁸ This is a common feature of complicated international treaties such as Trade Related Aspects of Intellectual Property Rights or the Antarctic Treaty, and is described by some negotiators as “constructive ambiguity”,⁹⁹ which allows negotiations to move past a point of potential impasse by allowing flexibility in later interpretations by, for example, not defining all the terms contained within a treaty. As described in article regarding WTO dispute resolution processes, constructive ambiguity “does not necessarily represent a failure”, as “it encourages nations to resolve disputes without resorting to third party adjudication”, and “affords states an amount of flexibility to deal with sensitive issues.”¹⁰⁰
- The concept of “constructive ambiguity” is one that is also used in relation to diplomatic treaties. It is from this area that a criticism of such ambiguity arises: that while it can make it possible for adversaries to work together in the short term and to move past initial road blocks by helping

⁹⁸ A good example of this is Article 12.3, in which the included phrases “parts and components” and “in the form received” represent two caveats inserted by opposing groups, the former against IPRs and the second for this form of control, that allows flexibility in interpreting the treaty, in turn leaving room for plant breeders to use resources from the common pool and still claim IPRs on the newly created plants, even though to some parties this might not read as such. In this way the treaty was able to be negotiated past a large block; allowing each side language that would potentially support their claims if disputes arose in the future. (see: ETC Group, “Seed!” 4.)

⁹⁹ Tansey, “Food for Thought,” 55.

¹⁰⁰ Peter Lindsay, “The Ambiguity of GATT Article XXI: Subtle success or rampant failure?” *Duke Law Journal*, v52 i6 (April 2003): 1279.

to build trust between parties, there is a concern that this ambiguity can lead to future conflict.¹⁰¹ Some suggest that there reaches a point where “ambiguity hinders rather than facilitates trust,”¹⁰² and the ITPGRFA will no doubt have to solve some of these ambiguities in order to move forward in the future.

5. *Boundaries.*

- The TISGC was aimed at preventing the ownership of *all* genetic resources in a treaty that would affect *all* people the world over.
- The ITPGRFA has very clearly defined boundaries for both its membership and the resources it governs. This also ties in with the point above regarding the relative ease of consensus formed for this treaty: the parties were dealing specifically with plant genetic resources for food and agriculture.

6. *Actors.*

- Initially authored by NGOs, the TISGC was promoted by a group of eighteen international NGOs, and largely supported and advanced by NGOs the world over. In some respects this could be described as an “international grassroots” movement that sought to generate international public support before introducing the concept to the international stage proper for national governments to negotiate.
- While the negotiations for the ITPGRFA did involve input from various NGOs throughout its evolution, this is a treaty that was largely negotiated by national delegations and eventually signed by these delegations. While the agreement was made at the supranational level and creates what is effectively a global common pool of plant genetic resources, it is still located within the discourse of sovereignty and of states’ pre-eminence in the global system.

¹⁰¹ Michael J. Jordan, “UN moves closer to Iraq inspections,” *The Christian Science Monitor*, 23 October 2002, <<http://www.csmonitor.com/2002/1023/p07s01-wogi.html>. (27 March 2004).

¹⁰² David Stevens, “Unease and Ambiguity,” *Corrymeela Online*, 20 June 2003, <http://www.corrymeela.org/Articles/unease_and_ambiguity.html> (27 March 2004).

7. *International Fora.*

- The TISGC's supporters held negotiations in many different international fora. As discussed in chapter IV, the nature of discussions held regarding genetic resources tends to change depending on forum or policy angle in which they are being discussed. Thus, one of the potential problems faced by the TISGC was that this multiple fora approach would have disrupted discussions.
- The ITPGRFA was conceived, negotiated and adopted in one single, dedicated international forum: the UNFAO. As it was specifically focussed on plant genetic resources for food and agriculture, the framing issues that can beset concerns surrounding genetic resources were not necessarily present.

8. *Intellectual Property Rights.*

- The TISGC was conceived in direct opposition to the use of IPRs to confer ownership over living materials and was offered as an alternative to this ownership paradigm.
- The ITPGRFA was conceived of alongside an international system of IPRs for living materials, and indeed plans on exploiting this system in the future to help with the conservation and sustainable use of plant genetic resources while keeping the materials that fall within its own pool of resources IPR-free.

9. *Current status.*

- The TISGC is currently not to be found. It has disappeared from the international stage, and it would appear that its support has all but dried up.
- The ITPGRFA is currently six ratifications away from entering into force, and should do so by the end of 2004. At this point it will begin to evolve and change again, as the initial Governing Body begins to deal with issues left out of the original negotiating process.

Conclusions.

The comparison between the Treaty Initiative to Share the Genetic Commons and the International Treaty on Plant Genetic Resources for Food and Agriculture offers further insights for future attempts to introduce the common property paradigm to genetic resources. While both have similar points of origin and sought to introduce a commons for genetic resources at the global level, the differences between the two allow significant lessons to be drawn regarding the successful application of a common property regime to genetic resources. These are lessons that are both practical and genetic resource specific. Thus, when added to our overall understanding of how a successfully designed global commons might look, as discussed in chapter IV, the combination of these two sets of conclusions should provide a powerful illustration of how a global commons may be extended to genetic resources in the future.

This synthesis is taken up in the concluding chapter, which seeks to uncover the overall lessons that can be obtained from this thesis, and to offer suggestions for future research paths that may contribute to the overall debate in the area of common property and the control of and access to genetic resources.

Chapter VI

Conclusions: Forging a New Global Commons.

“And anyway, the secret is not as important as the paths that led me to it. Each person has to walk those paths himself.”

Introduction.

This thesis has investigated the validity of employing a global commons regime as a means of solving current and future conflict over access to and ownership of genetic resources. It has discovered that while many discussions involving common property resource regimes relate to “past or passing systems”,² there is a growing common property movement that seeks to protect the commons that remain, and to reintroduce the concept of common property into wider debates about future management of resources, both tangible and intangible in nature. This movement looks to challenge the modern, conventional wisdom that the range of ownership paradigms lies solely along a perceived public/private continuum, and that common property regimes are somehow inherently tragic. It looks to reintroduce the concept of common property alongside public and private approaches to governance issues, not seeking to replace either, but to offer a viable alternative in increasingly complex debates.

Calls by groups such as supporters of the Treaty Initiative to Share the Genetic Commons, which would see genetic resources governed under a global common property regime, thus form part of an overall rise in support for this approach to resource management. In the instance of genetic resources, it would appear that such calls are well founded.

In many past cases, traditional common property regimes have been undermined by technological changes to the way in which the resources they governed were exploited.³ However, in the case of genetic resources today, we find that while technological change has indeed altered the way in which these resources are exploited, it has done so in a way

¹ Jorge Luis Borges, “The Ethnographer,” in *Collected Fictions*, trans. Andrew Hurley (USA: Viking, 1998), 335.

² Gill Shepherd, “The Reality of the Commons: Answering Hardin From Somalia,” *Social Forestry Network*, Network Paper 6d, (May 1988), 10.

³ *Ibid.*

that has allowed us to conceptualise them for the first time in a truly global manner, and therefore in such a way that is conducive to governance via a global common property regime. These changes mean that genetic resources today can be viewed at once as both ancient in the extreme, and yet incredibly new in terms of the recognition of their genetic nature. Their historical movements, and the conflict that has surrounded these movements, have helped render many genetic resources global in their reach, and the many regions of the world genetically interdependent upon each other. This interdependence is highlighted by the growing recognition of the need to conserve biodiversity to protect the future of genetic resources the world over: that the future of humanity depends on the successful preservation of our most basic resource.

Concurrent to the recognition of genetic resources as one of the truly global resources has been the rise of global governance regimes in all areas of human activity. The closing decades of the twentieth century have seen governance of issues such as international trade, environmental degradation, and population and food concerns increasingly addressed at the supranational level through international fora. Governance of genetic resources has been at the centre of this shift, with agreements such as the Convention on Biological Diversity and Trade Related Aspects of Intellectual Property Rights redefining at the global level the way in which humanity deals with genetic resources: legitimising new ways in which such resources can be owned and managed.

Thus, the present debate over the access to and ownership of genetic resources is occurring at the nexus of the historical forces and technological advances that have shaped their current nature; the growing recognition of the importance of conservation of genetic resources for all nations; the globalisation of governance in many areas of human endeavour; and the resurgence of the belief that common property regimes do have something to offer for the future. The creation of a global genetic commons is a valid possibility for future attempts to solve issues surrounding the access to and ownership of genetic resources, and there has never been a time more suited to advancing such a suggestion as now.

Towards a Global Genetic Commons Treaty.

In chapter IV this thesis looked to develop a description of what components a potential Global Genetic Commons Treaty (GGCT) might need to contain in order to be successful, drawing on experiences gained from the existing global commons: the atmosphere, the oceans, outer space, and Antarctica. Chapter V saw an examination of two attempts to extend the common property paradigm to genetic resources, the Treaty Initiative to Share the Genetic Commons (TISGC) and the International Treaty on Plant Genetic resources for Food and Agriculture (ITGRFA), and investigated why one managed to succeed where the other failed. Based on the suggestions made in chapter IV, and the lessons gained from the experiences discussed in chapter V, this thesis suggests that there are eight key points that should be considered in relation to developing a global genetic commons.

1. Now is the hour...

As suggested by the earlier investigations into genetic resources and common property, and backed up by the timing of both the above attempts at introducing the concept of common property into the genetic resource debate, the time is ripe for the advancement of the common property paradigm into the broader genetic resource debate.

2. Resource domain boundary issues.

The GGCT described in chapter IV argued that a successful global commons treaty would not have to cover all genetic resources in order to be successful, and furthermore, that employing different treaties to govern different types of genetic resources would be a more effective approach than trying to craft one overarching treaty to govern all these resources. The experience of the TISGC and the ITPGRFA suggests that this is indeed the case: where the TISGC might have suffered due to an exceptionally broad resource domain that sought to encompass *all* genetic resources, the ITPGRFA focussed on creating a resource domain with clear boundaries that contained only those genetic resources specified in the treaty, a list only containing plants that are valuable to food and agriculture. In order to be successful, future attempts must also employ clearly defined resource domain boundaries.

3. *Actor boundary issues.*

Lessons taken from the Antarctic Treaty experience suggest that a treaty can be considered “global” even if not all countries are initially involved, especially when it concerns a resource or resource domain that is vital for humanity as a whole, such as genetic resources or Antarctica. This would appear to play out in the ITPGRFA experience, where not all countries were involved in the negotiation of the treaty, and an even smaller number will be involved when the treaty is initially ratified. The initial governing body, formed by the first forty to ratify, will have a great opportunity to stamp their own ideas on the future direction of the treaty. As with the Antarctic Treaty System, there are guidelines included in this agreement for future accession to the treaty’s terms and conditions.

As such, future attempts do not need to aim to encompass all countries from the outset: as long as the user pool is clearly defined, and there are clearly defined ways and methods for those who wish to accede to follow, the agreement does not need to contain all states to be considered global. However, with the advance of globalisation and the concurrent trends in the globalisation of governance, the global community of the future may be realised to such an extent that a treaty that encompasses all does become possible.

4. *The need for international fora.*

While the potential GGCT described at the end of chapter IV suggested that there was no need to employ an existing international forum to successfully negotiate such a treaty, experiences from the TISGC and the ITPGRFA suggest otherwise. The success of the ITPGRFA was more than likely predicated on the almost twenty years of experience the delegates had in negotiating agreements in the area of plant genetic resources for food and agriculture. However, it may be that what is required is a *constant* international forum *devoted* solely to these negotiations, rather than attempting to insert another agenda into an existing forum. Thus, whether using an existing forum, or a new one created for the purpose of negotiating global commons agreements involving genetic resources, the primary goal of such a forum must be the successful negotiation of a commons treaty.

5. *The importance of existing ownership claims.*

While this thesis proposed that one of the benefits of a GGCT might be that current ownership disputes could be put aside, as with the Antarctic Treaty, and the focus of genetic resource policy could move beyond such debates, this may not be the case, nor even necessary. The clearly defined boundaries of the resource domain listed in the ITPGRFA, solely containing plant genetic resources “that are under the management and control of the Contracting Parties and in the public domain” [Article 11.2], and the apparent need for clearly defined boundaries, suggests that perhaps definite ownership *is* required to have been decided upon before allowing these resources to be part of a commons.

That being said, perhaps future efforts to negotiate access and ownership claims over certain genetic resources will be resolved more easily if a commons is an option. By adding to the list of options available to policy makers, getting away from the public or private property dichotomy, perhaps more innovative and appropriate mechanisms will be developed to govern genetic resources.

6. *The evolution of a genetic resource policy normscape.*

Both the Antarctic Treaty System and the relative success and failure of the TISGC and the ITPGRFA aptly illustrate the importance and power of the origins and philosophical underpinnings of a potential GGCT. In the case of Antarctica, the origins of the initial Treaty in the scientific community have affected the evolution of the entire Treaty System over the past fifty years; affecting the way in which decisions are made, the norms which are adhered to throughout the whole Treaty System, and even the way in which entry into the Treaty System is legitimated by demonstration of scientific concerns. In the case of the two recent genetic resource treaty attempts, the more successful ITPGRFA had its origins in twenty years of debate over how plant genetic resources for food and agriculture should be governed, and looked to work alongside existing genetic resource governance systems. On the other hand, the TISGC sought to change the way in which genetic resources are governed as a whole, working against current arrangements rather than with them.

For a GGCT to be successful, what could be termed a “genetic normscape” needs to be developed around issues of common genetic resource governance. Fortunately, in the case of genetic resources, there is already a sizeable heritage from which to draw. International agreements such as the CBD or TRIPs, not to mention the International Undertaking and its successor the ITPGRFA, and activist movements such as the TISGC all provide historical inputs for the generation of such a normscape. This normscape would be vital as it would define the origins and indeed the future of any attempts to institute a global genetic commons.

7. *The need for consensus.*

The long-term success of the Antarctic Treaty System, the success of the ITPGRFA negotiations, and the attempts at consensus by the supporters of the TISGC, all point to the idea that consensus is essential in both the initial development of a treaty and its long-term success. The timeframes involved also suggest that while reaching such a consensus is vital to a treaty’s success, it is a time consuming affair.

8. *Developing the economic infrastructure.*

As noted in chapter IV, economic concerns are central to any endeavour that would see genetic resources considered in global commons terms. In the Antarctic experience, many observers have attributed much of the Treaty’s success to the lack of economic pressure due to the extreme conditions faced by those who would exploit resources on the continent. However, with the discovery of genetic resources arising from bioprospecting, and the advance of technology allowing exploitation of these resources even in the Antarctic setting, economic pressures will begin to mount.

In the case of genetic resources the economic pressures are already there, with the rapid expansion of the biotechnology industry over the past two decades and concurrent advances in biotechnology placing these resources in the economic spotlight. Any new treaty attempting to regulate access to and ownership of these resources would have to be negotiated within this environment.

The success of the Antarctic Treaty System in a future where the resources contained in and around this continent are able to be exploited, and the success of the ITPGRFA’s

attempts to co-opt these economic pressures into a central mechanism underpinning the economic success of the treaty from the initial outset, will be central in understanding how future commons treaties might advance in this area of economic concern.

Limitations and Further Research.

The primary limitation of this thesis is that it attempts to test the validity of a global genetic commons regime in a purely qualitative manner. This is due to the nature of the ideas and treaties that have formed a part of this study: even the “successful” ITPGRFA has yet to be ratified, and so has yet to prove itself on the world stage, or to produce any data regarding its operation. Therefore, an avenue for valuable future research will be to take the concepts and ideas described within this thesis and subject them to quantitative tests as the data becomes available.

To further enhance both the qualitative aspects of this study, and the potential resulting quantitative research, a larger pool of examples will need to be gathered. While this thesis has focussed on two global attempts at genetic common property regimes, an expansion of this pool of examples would help inform the theory and debate in this area. Either the re-emergence of the TISGC, or perhaps other initiatives from the world’s NGO community or from existing fora such as the UNFAO, would form the basis of such an expansion. However, it would also be invaluable to discover examples of genetic common property regimes at the local, national or regional levels.

Additional research in this area could encompass a study of how different types of common property regime might be implemented at the global level in the creation of a genetic global commons. That is, a study that would investigate the actual bundle of rights that would be associated with genetic resources that fall within a new global commons. An example would be an investigation into the possibility of a global patent pool for genetic resources and/or biotechnology more generally. Another example would be an investigation into the possibility of the formation of an open source biotech community, similar in many ways to the open source computer programming community that now exists worldwide: perhaps a more “organic” approach than top down legislating from supranational fora via national governments. A further example could be research into whether compulsory licensing is a more appropriate way of dealing with issues of

access to and ownership of genetic resources while still operating within a private property framework. While all three of these regime types are already being discussed, researched and hotly debated the world over in relation to biotechnology and genetic resources, an interesting new angle would be the combination of this thesis' research and these debates: attempting to take such discussions and apply them to the concept of a global common property regime for genetic resources.

A more general research area in relation to genetic resources that would be of value to any future research efforts, would be the formation of a genetic resource conflict database. There are many anecdotal stories that surround this debate, some of which have almost become metaphors for the various ideas, concepts or "truths" that populate the debate as a whole. Examples of these might be the story of the Indian Neem tree, the American John Moore's spleen, or the Canadian Percy Schmeiser's court fight against Monsanto. However, of value would be the creation of a catalogue of genetic conflict from which authors and researchers could draw; a catalogue that would go beyond merely describing the conflict and perhaps look to uncover what it is that is being fought over in each of the instances, helping to form a more general sense of what it is that causes such conflict. Without such a set of data, it is difficult to know if a proposed solution to genetic conflict such as a global commons would be appropriate for the hugely varying instances of existing conflicts.

Conclusions.

This thesis has attempted to synthesise the many different areas of theory, discussion, debate and conflict surrounding genetic resources into a theory of a new global commons. The debate that surrounds the ownership of life is vast; and one that will continue to grow in importance as this resource is increasingly exploited.

While it is impossible to know what the future holds for the governance of genetic resources, they will always be counted among the most important of humanity's assets. As such, future conflict over them is assured. Their global nature and the current period of globalisation add to ensure that such conflict is likely to occur on the international stage now and in the future, most likely along the traditional North-South, developed-developing fault-lines. Amongst the proposals for how we should move beyond such

conflicts, preserve these resources, and allow their fair and equitable use, has emerged the call for the implementation of a global genetic commons. This concept is not only valid, but is likely to be employed in the future by those seeking to bridge the gaps between conflicting parties over concerns of access to and ownership of genetic resources.

The first international treaty of the new millennium was the first step down the path towards a global genetic commons: it will not be the last. One day in the future, the aims of the Treaty Initiative to Share the Genetic Commons will be realised, and a true global genetic commons will be forged.

Bibliography.

actionbioscience.org. "Biotechnology and the Green Revolution: Interview with Norman Borlaug, PhD." *actionbioscience.org*, 2003.

<<http://www.actionbioscience.org/biotech/borlaug.html>> (3 January 2004).

Acharya, Gopilal. "Biodiversity Act to benefit Bhutanese farmers." *Kuensel Online*, 12 August 2003.

<<http://www.kuenselonline.com/article.php?sid=3151>> (13 August 2003).

Adair, John R. "The Bioprospecting Question: Should the United States charge biotechnology companies for the commercial use of public wild genetic resources?" *Ecology Law Quarterly* v24 n1 (February 1997): 131-171.

AP. "In reversal, United States signs U.N. treaty on plant genes." *ABC News Online*, 6 November 2002.

<http://www.abcnews.go.com/wire/World/ap20021106_2442.html> (7 November 2002).

Aristotle. *Politics*. Translated by Ernest Barker. New York: Oxford University Press, 1995.

Baden, John, and Douglas S. Noonan, eds. *Managing the Commons*. Bloomington and Indianapolis: Indiana University Press, 1998.

BBC. "GM firm sues Canadian farmer." *BBC News Online*, 6 June 2000.

<<http://news.bbc.co.uk/1/hi/world/americas/779265.stm>> (January 28 2004).

Bessen, James, and Eric Maskin. "Sequential Innovation, Patents, and Imitation." *Massachusetts Institute of Technology and Harvard University, Department of Economics*, Working Paper 00-01, January 2000.

<http://papers.ssrn.com/paper.taf?abstract_id=206189> (14 April 2003).

BIOETHAI. "Thai People's Movements Mobilise To Protect Jasmine Rice." *BIOETHAI Information Release*, 26 April 1998.

<<http://www.poptel.org.uk/panap/archives/la-thais.htm>> (2 September 2002).

BIOETHAI. "Open Letter from Thai Farmers to the United States Government Regarding American Intellectual Property Claims to Jasmine Rice." *BIOETHAI Information Release*, 1999.

<<http://www.poptel.org.uk/panap/archives/la-thai.htm>> (31 March 2002).

Bollier, David. "Reclaiming the Commons: Why we need to protect our public resources from private encroachment." *Boston Review*, 2002.

<<http://www.bostonreview.mit.edu/BR27.3/bollier.html>> (5 August 2002).

Bollier, David. "Rediscovery Of The Commons." *TomPaine.com*, 25 July 2002.

<<http://www.tompaine.com/feature.cfm/ID/6016>> (26 July 2002).

Borges, Jorge Luis. "The Ethnographer." In *Collected Fictions*. Translated by Andrew Hurley. USA: Viking, 1998.

Borlaug, Norman E. "The Green Revolution Revisited and The Road Ahead." Presented at *The Special 30th Anniversary Lecture*, The Norwegian Nobel Institute, Oslo, 8 September 2000.

<<http://www.nobel.se/peace/articles/borlaug>> (21 March 2004).

Bright, Chris. *Life Out of Bounds: Bioinvasion in a borderless world*. New York and London: W.W. Norton and Company, 1998.

Brokaw, H. P. *Wildlife and America*. Washington D.C.: Council on Environmental Quality, 1978.

Brown, Lester R. "Feeding Nine Billion." In *State of the World 1999: A Worldwatch Institute Report on Progress Toward a Sustainable Society*. Edited by Linda Starke. New York and London: W.W. Norton and Company, 1999.

Brown, Michael. "Emerging Coalitions and Sustainable Development in the Commons: Developing Frameworks and Tools for Negotiating Development Space in the New Millennium." Presented at *Constituting the Commons: Crafting Sustainable Commons in the New Millennium*, Bloomington, Indiana, USA, May 31-June 4.

<<http://www.dlc.dlib.indiana.edu/documents/dir0/00/00/02/28/index.html>> (10 February 2004).

Buck, Susan J. *The Global Commons: An Introduction*. Washington DC: Island Press, 1998.

Bugge, Axel. "Smugglers steal 38 million animals from Brazil's forests." *Planet Ark*, 14 November 2001.

<<http://www.planetark.com/avantgo/dailynewsstory.cfm?newsid=13298>> (4 February 2004).

Burke, Dylan S. "Exploiting the Last Ocean: The effectiveness of the Convention on the Conservation of Antarctic Marine Living Resources, 1982-2000." PhD Dissertation, University of Canterbury, 2001.

CBD. "Article 2. Use of Terms." *Convention on Biological Diversity*, 6 December 2003. <<http://www.biodiv.org/convention/articles.asp?lg=0&a=cbd-02>> (16 September 2003).

Changyawa, Porpot. "Experts may register rice as trademark." *Bangkok Post Online*, 27 November 2001.

<http://scoop.bangkokpost.co.th/bkkpost/2001/november2001/bp20011127/news/27nov2001_news23.html> (2 September 2002).

Charles, Daniel. "Seed treaty signed: U.S., Japan abstain." *Science* v294 i5545 (9 November 2001): 1263.

Chester, Charles C. "Controversy over Yellowstone's biological resources." *Environment* v38 n8 (October 1996): 10-17.

Cook, Curtis. *Patents, Profits and Power: How intellectual property rules the global economy*. London: Kogan Page, 2002.

Correa, Carlos M. "Traditional Knowledge and Intellectual Property: Issues and options surrounding the protection of traditional knowledge." *The Quaker United Nations Office*, November 2001.

<<http://www.geneva.quono.info/pdf/tkmono1.pdf>> (21 March 2004).

Court, Mark. "Profiting from nature." *The Dominion* 12 February 2002, 7.

Crimmins, Meghan. "Activists propose halting biological patenting." *World Watch* v15 i3 (May 2002): 9.

Daerr, Elizabeth G. "Yellowstone to Receive Royalties." *National Parks* (Jul 2000): 12.

Daly, Herman E., and Kenneth N. Townsend, eds. *Valuing the Earth: Economics, Ecology, Ethics*. Cambridge, London: The Massachusetts Institute of Technology Press, 1993.

Dew, Kevin, and Ruth Fitzgerald, eds. *Challenging Science: Science and Society Issues in New Zealand*. Palmerston North, New Zealand: Dunmore Press, Forthcoming.

Doremus, Holly. "Nature, knowledge and profit: the Yellowstone bioprospecting controversy and the core purpose of America's national parks." *Ecology Law Quarterly* v26 i3 (August 1999): 401-488.

Dutfield, Graham. "The Public and Private Domains: Intellectual property Rights in traditional Ecological Knowledge." *OIPRC Electronic Journal of Intellectual property Rights*, March 1999.

<<http://www.oiprc.ox.ac.uk/EJWP0399.html>> (30 January 2002).

Edmonds Institute v. Babbitt, Civil Action 98-561 (RCL), United States District Court for the District of Columbia, 2000.

Elliot, Lorraine M. *International Environmental Politics: Protecting the Antarctic*. London: St. Martin's Press, 1994.

Epstein, Paul R. "Common Pool Funds for Common Pool Resources: Creating a New Global Financial Architecture." Presented at *Constituting the Commons: Crafting Sustainable Commons in the New Millennium*, Bloomington, Indiana, USA, May 31-June 4.

<<http://www.dlc.dlib.indiana.edu/documents/dir0/00/00/02/50/index.html>> (10 February 2004).

ETC Group. "The Law of the Seed!" *ETC Group Translator* v3 n1 (December 2001): 6.

ETC Group. "Terminator Technology – Five Years Later." *ETC Group Communiqué* i79 (2003).

Everett, Margaret. "The Social Life of Genes: Privacy, property and the new genetics." *Social Science and Medicine* 56 (2003): 53-65.

Feeny, David, Firket Berkes, Bonnie J. McClay, and James M. Acheson. "The Tragedy of the Commons: Twenty-Two Years Later." In *Managing the Commons*. Edited by John Baden and Douglas S. Noonan. Bloomington and Indianapolis: Indiana University Press, 1998.

- FOET. "About Jeremy Rifkin." *Foundation on Economic Trends*, 2001.
<<http://www.foet.org/jermeyrifkin.htm>> (14 February, 2004).
- FOET. "RE: Update on the Treaty Initiative to Share the Genetic Commons." *Foundation on Economic Trends*, 5 April 2002.
<<http://www.foet.org/5-%20April.htm>> (12 February 2004).
- FOET. "The Treaty Initiative to Share the Genetic Commons." *Foundation on Economic Trends*, 2002.
<<http://www.foet.org/treaty.htm>> (14 April 2003).
- FOET. "Treaty Support Letter." *Foundation on Economic Trends*, 2002.
<<http://www.foet.org/treatysupportletter.htm>> (14 April 2003).
- FOET. "Open Discussion on the Treaty Initiative to Share the Genetic Commons." *Foundation on Economic Trends*, 5 June 2002.
<<http://www.foet.org/5-june.htm>> (14 February 2004).
- Fowler, Cary. "Re: A political science thesis." 17 August 2003, personal email (18 August 2003).
- Fowler, Cary. "Sharing agriculture's genetic bounty." *Science* v297 i5579 (12 July 2002): 157.
- Fowler, Cary. "The Status of Public and Proprietary Germplasm and Information: An Assessment of Recent Developments at FAO." *IP Strategy Today* n7 (2003): 3.
<<http://www.biodevelopments.org/ip/ipst7.pdf>> (15 November 2003).
- Fretter, Judith M. "A Review of International Conflict in the Antarctic." 2004. Forthcoming publication.
- "GE cow research to go ahead." *Nzzoom.com: the homepage for New Zealanders*, 25 May 2001.
<http://onenews.nzoom.com/onenews_detail/0,1227,41329-1-7,00.html> (6 February 2004).
- Gilbert, Neil. "Lecture Handout: Antarctica and Environmental Management." *Antarctica New Zealand*, December 2003.
- Gordon, H. Scott. "The Economic Theory of a Common-Property Resource: The Fishery." *Journal of Political Economy* 62 (April 1954): 124-142.
- Gore Jr, Al. *Earth in the Balance: Ecology and the human spirit*. New York, USA: Plume, 1993.
- GRAIN. "WIPO Moves Towards "World" Patent System." *Genetic Resource Action International*, July 2002.
<<http://www.grain.org/publications/wipo-patent-2002-en.cfm>> (14 September 2002).
- GRAIN and Kalpavriksh. "The International Treaty on Plant Genetic Resources: A challenge for Asia." *Genetic Resources Action international*, February 2002.
<<http://www.grain.org/publications/it-asia-feb2002-en.cfm>> (12 February 2004).

Hardin, Garret. "The Tragedy of the Commons." In *Valuing the Earth: Economics, Ecology, Ethics*. Edited by Herman E. Daly and Kenneth N. Townsend. Cambridge, London: The Massachusetts Institute of Technology Press, 1993.

Hardin, Garret. "Political Requirements for Preserving our Common Heritage." In *Wildlife and America*. Edited by H. P. Brokaw. Washington D.C.: Council on Environmental Quality, 1978.

Heinemann, Jack A. "Challenges to Regulating the Industrial Gene: Views inspired by the New Zealand experience." in *Challenging Science: Science and Society Issues in New Zealand*. Edited by Kevin Dew and Ruth Fitzgerald. Palmerston North, New Zealand: Dunmore Press, Forthcoming.

Hess, Charlotte, and Elinor Ostrom. "Artifacts, Facilities, and Content: Information as a Common-Pool Resource." Presented at *Conference on the Public Domain*, Duke University Law School, Durham, NC, November 9-11, 2001.
<<http://dlc.dlib.indiana.edu/documents/dir0/00/00/04/87/index.html>> (10 February 2004).

Hirsch, Tim. "Seed battle heads to supreme court." *BBC News Online*, 1 August 2003.
<<http://news.bbc.co.uk/1/hi/sci/tech/3116713.stm>> (28 January 2004).

Ho, Mae-Wan. *Genetic Engineering: Dream or Nightmare?* Dublin, Ireland: Gateway, 1998.

Hobbelink, Henk. *Biotechnology and the Future of World Agriculture*. London and New Jersey: Zed Books Ltd, 1991.

Hong, Sungook. "Unfaithful Offspring? Technologies and their trajectories." *Perspectives on Science* v6 i3 (Fall 1998): 259-287.

IFPRI. "Green Revolution: Curse or Blessing?" *International Food Policy Research Institute*, 2002.
<<http://www.ifpri.org/pubs/ib/ib11.pdf>> (21 March 2004).

"Intellectual Property: Patently Problematic." *The Economist* (14 September 2002): 67-68.

ITDG. "Is Small Beautiful?" *Intermediate Technology Development Group*, 2003.
<http://www.itdg.org/html/whats_new/is_small_beautiful_mooney.htm> (14 February 2004).

Jackson, Lee Ann. "Agricultural Biotechnology and the Privatization of Genetic Information: Implications for Innovation and Equity." Presented at *Constituting the Commons: Crafting Sustainable Commons in the New Millennium*, Bloomington, Indiana, USA, May 31-June 4.
<<http://www.dlc.dlib.indiana.edu/documents/dir0/00/00/05/71/index.html>> (10 February 2004).

Johnson, Martha, ed. *Lore: Capturing Traditional Environmental Knowledge*. Ottawa: IDRC, 1992.

Johnson, Martha. "Research on Traditional Environmental Knowledge: Its Development and Its Role." In *Lore: Capturing Traditional Environmental Knowledge*. Edited by Martha Johnson. Ottawa: IDRC, 1992.

Jordan, Michael J. "UN moves closer to Iraq inspections." *The Christian Science Monitor*, 23 October 2002.
<<http://www.csmonitor.com/2002/1023/p07s01-wogi.html>. (27 March 2004).

Joyner, Christopher C. *Governing the Frozen Commons: The Antarctic Regime and Environmental Protection*. Columbia: University of South Carolina Press, 1998.

Kaul, Inge, Isabelle Grunberg and Marc A. Stern. "Defining Global Public Goods." In *Global Public Goods: International Cooperation in the 21st Century*. Edited by Inge Kaul, Isabelle Grunberg and Marc A. Stern. New York, Oxford: Oxford University Press, 1999.

Kaul, Inge, Isabelle Grunberg and Marc A. Stern, eds. *Global Public Goods: International Cooperation in the 21st Century*. New York, Oxford: Oxford University Press, 1999.

Kay, Lily. *The Molecular Vision of Life: Caltech, the Rockefeller Foundation, and the Rise of the New Biology*. New York: Oxford University Press, 1993.

Keller, Evelyn Fox. *The Century of the Gene*. Cambridge, Massachusetts and London, England: Harvard University Press, 2000.

Kevles, Daniel J. *A history of patenting life in the United States with comparative attention to Europe and Canada*. Luxembourg: Office for Official Publications of the European Communities, 2002.

Kimpel, Paul. "Gourmet-Style Thai Jasmine Rice May Be Future U.S. Crop." *University of Florida News*, 11 September 2001.
<<http://www.napa.ufl.edu/2001news/jasmine.htm>> (2 September 2002).

Kirby, Alex. "Antarctica's Resources 'At Risk'." *BBC News Online*, 1 February 2004.
<<http://news.bbc.co.uk/1/hi/sci/tech/3444753.stm>> (3 February 2004).

Kloppenbergr Jr., Jack Ralph. *First the Seed: The political economy of plant biotechnology, 1492-2000*. New York: Cambridge University Press, 1988.

La Montagne, John R. "Biotechnology and research: promise and problems." *The Lancet* v358 i9294 (17 November 2001): 1723.

Laska, Vera. "Governing the Frozen Commons: The Antarctic Regime and Environmental Protection," (book reviews). *International Journal on World Peace* v18 i2 (June 2001): 70-72.

Lehman, Hon. Bruce. "Making the World Safe for Biotech Patents." A discussion paper prepared for the *International Intellectual Property Institute*. Boston, Massachusetts, 26 June 2002.

Lessig, Lawrence. *The Future of Ideas: The Fate of the Commons in a Connected World*. New York: Random House, 2001.

Lilliston, Ben. "NGOs support a treaty to establish the gene pool as a global commons." *Synthesis/Regeneration* (Spring 2002): 36-37.

Lilliston, Ben. "Stop Biopiracy – Drop Basmati Patent." *Synthesis/Regeneration* (Winter 2001): 44.

Lindsay, Peter. "The Ambiguity of GATT Article XXI: Subtle success or rampant failure?" *Duke Law Journal*, v52 i6 (April 2003): 1277-1313.

Lohan, Dagmar, and Sam Johnston. *The International Regime for Bioprospecting: Existing Policies and Emerging Issues for Antarctica*. Tokyo: United Nations University Institute of Advanced Studies, 2003.

MAF. "New Zealand's First Interpol Conference: Wildlife Smuggling." *Ministry of Agriculture and Forestry, New Zealand*, 2003.
<<http://www.maf.govt.nz/mafnet/press/131003interpol.htm>> (4 February 2004).

Magnus, David, Arthur Caplan and Glenn McGee, eds. *Who Owns Life?* New York: Prometheus Books, 2002.

Marukatat, Saritdet. "Bush told about rice concerns: US leader sounds out position on Burma." *Bangkok Post Online*, 16 December 2001.
<http://scoop.bangkokpost.co.th/bkkpost/2001/December2001/bp20011216/news/16dec2001_news23.html> (2 September 2002).

Mason, Jennifer. *Qualitative Researching*. 2nd edition. London, Thousand Oaks, New Delhi: SAGE Publications, 2002.

Mathur, Ajeet. "Who Owns Traditional Knowledge?" *Indian Council for Research on International Economic Relations*, Working Paper No. 96, January 2003.
<<http://icrier.res.in/pdf/WP96-AjeetMathur.doc>> (21 March 2004).

May, Christopher. *A Global Political Economy of Intellectual Property Rights: The new enclosures?* London and New York: Routledge, 2000.

Mayet, Mariam. "Securing Sustainable Livelihoods: Imperatives underpinning the development of an appropriate regime to protect community rights to biodiversity." Freelance environmental lawyer, based in Johannesburg South Africa.
mmayet@global.co.za.

McAfee, Kathleen. "Neoliberalism on the molecular scale: Economic and genetic reductionism in biotechnology battles." *Geoforum* 34 (2003): 203-219.

McCormick, John. *The Global Environmental Movement: Reclaiming Paradise*. London: Belhaven Press, 1989.

MED. *Bioprospecting in New Zealand: Discussing the options*. Wellington, New Zealand: Ministry for Economic Development, November 2002.

- Mekonaur, Ali. "A Global Instrument on Agrobiodiversity: The International Treaty on Plant Genetic Resources for Food and Agriculture." *FAO Legal Papers Online* n24 (January 2002): 2.
<<http://fao.org/Legal/prs-ol/lpo24.pdf>> (10 February 2004).
- Merson, John. "Bio-prospecting or Bio-piracy: Intellectual Property Rights and Biodiversity in a Colonial Context." *Osiris* (2001): 282-296.
- Mooney, Pat. "The law of the seed." *Development Dialogue* i1-2 (1983): 1-172.
- Mooney, Pat. "John Moore's body." *New Internationalist* i217 (March 1991).
<<http://www.newint.org/issue217/body.htm>> (14 October 2002).
- Mudiwa, Morris. "Global Commons: The Case of Indigenous Knowledge, Intellectual Property Rights and Biodiversity." Presented at *The Commons in an Age of Globalisation*, the Ninth Conference of the International Association for the Study of Common Property, Victoria Falls, Zimbabwe, 17-21 June 2002.
<<http://dlc.dlib.indiana.edu/documents/dir0/00/00/08/80/index.html>> (10 February 2004).
- Mulvany, Patrick. "International Seed Treaty: a model for governance of genetic resources." *UK Agricultural Biodiversity Coalition*.
<http://www.r0.unctad.org/trade_env/test1/meetings/plants/INTERNATIONAL%20SEED%20TREATY.doc> (12 February 2004).
- Munzer, Stephen R. "An Uneasy Case Against Property Rights in Body Parts." *Social Philosophy and Policy* v11 n2 (Summer 1994): 259-286.
- National Research Council Convocation on Genetic Engineering of Plants*. Washington D.C.: National Academy Press, 1984.
- "NGOs Announce Support Global Commons Gene Pool." *Organic Matters* i19 (February 2002): 5.
- Ossorio, Pilar N. "Property Rights and Human Bodies." In *Who Owns Life?* Edited by David Magnus, Arthur Caplan and Glenn McGee. New York: Prometheus Books, 2002.
- Ostrom, Elinor. *Governing the Commons: The evolution of institutions for collective action*. New York, Port Chester, Melbourne, Sydney: Cambridge University Press, 1990.
- "Parliamentary Question Prepared For The Green Party." *The Italian Anti-Vivisection Scientific Committee*, 2001.
<<http://www.antivivisezione.it/Parlamentary%20Question.html>> (16 February 2004).
- Pauling, Jonathan S. D. "The Politics of Food: Urban agriculture as a Radical Green alternative to the political economy of agriculture." MA thesis, University of Canterbury, 2001.
- Petit, Michel, Cary Fowler, Wanda Collins, Carlos Correa, and Carl-Gustaf Thornström. *Why Governments Can't Make Policy: The case of plant genetic resources in the international arena*. Lima, Peru: International Potato Center (CIP), 2001.

- Pollack, Andrew. "Bioprospecting Deal Gains in Yellowstone." *New York Times Online*, 25 April 2000.
<<http://www.nytimes.com/library/national/science/042500sci-enviro-biotech.html>> (12 September 2002).
- Pollack, Andrew. "Judge Halts Yellowstone Royalty Agreement With Biotechnology Company." *GENTECH archive*, 26 March 1999.
<<http://www.gene.ch/gentech/1999/Mar-Apr/msg00092.html>> (12 September 2002).
- Porter, Gareth, and Brown, Janet Welsh. *Global Environmental Politics*. Colorado and Oxford: Westview Press, 1996.
- Posey, Darrell A. "Protecting indigenous peoples' rights to biodiversity." *Environment* v38 n8 (October 1996): 6-28.
- Powledge, Fred. "Patenting, Piracy, and the Global Commons." *BioScience* v51 i4 (April 2001): 273-277.
- Rajesh, Noel. "And now, Thai Jasmine rice." *India Together*, August 2002.
<http://www.Indiatogether.org/agriculture/articles/noel_jasmine.htm> (1 September 2002).
- Robinson, Alexia, Director of Operations, Foundation on Economic Trends. Interview by author, 21 November 2002. Phone interview, University of Canterbury, New Zealand.
- Rifkin, Jeremy. *The Biotech Century: Harnessing the gene and remaking the world*. New York: Jeremy P. Tarcher/Putnam, 1998.
- Rifkin, Jeremy. "The price of life." *Guardian Unlimited*, 15 November 2000.
<<http://guardian.co.uk/Archive/Article/0,4273,4091302,00.html>> (30 August 2002).
- Rifkin, Jeremy. "This is the age of biology." *Guardian Unlimited*, 28 July 2001.
<<http://www.guardian.co.uk/Archive/Article/0,4273,4229850,00.html>> (30 August 2002).
- Rowe, Jonathan. "The promise of the commons." *Earth Island Journal* v17 i3 (Autumn 2002): 28-30.
- Ruff, Anne Marie. "US research may well be a boon." *Bangkok Post Online*, 31 October, 2001.
<http://scoop.bangkokpost.co.th/bkkpost/2001/september2001/bp20011031/news/31oct2001_news32.html> (18 March 2002).
- Samabuddhi, Kultida. "Mass rally to oppose US rice venture." *Bangkok Post Online*, 4 November 2001.
<http://scoop.bangkokpost.co.th/bkkpost/2001/november2001/bp20011104/news/04nov2001_news04.html> (2 September 2002).
- Samabuddhi, Kultida. "US patent likely for new strains of fragrant Pathum Thani rice." *Bangkok Post Online*, 14 January 2004.

<http://www.bangkokpost.com/140104_news/14Jan2004_news23.html> (17 January 2004).

Samuelson, Pamela. "Shamans, Software, and Spleens: Law and the Construction of the Information Society," (book reviews). *Michigan Law Review* v94 n6 (May 1996): 2029-2057.

Sanchez, Vicente, and Calestous Juma, eds. *Biodiplomacy: Genetic Resources and International Relations*. Nairobi: African Centre for Technology Studies, 1994.

Sanchez, Vicente. "The Convention on Biological Diversity: Negotiation and contents." In *Biodiplomacy: Genetic Resources and International Relations*. Edited by Vicente Sanchez and Calestous Juma. Nairobi: African Centre for Technology Studies, 1994.

Scholte, Jan Aart. *Globalization: A critical introduction*. New York, USA: Palgrave, 2000.

Shand, Hope. "Patenting the planet." *Multinational Monitor* v15 n6 (June 1994): 9-13.

Shepherd, Gill. "The Reality of the Commons: Answering Hardin From Somalia." *Social Forestry Network*, Network Paper 6d, (May 1988).

Shiva, Vandana. *The Violence of the Green Revolution: Third world agriculture, ecology, and politics*. London; Atlantic Highlands, N.J., USA: Zed Books, 1991.

Shiva, Vandana. *Biopiracy: The Plunder of Nature and Knowledge*. Boston, Massachusetts: South End Press, 1997.

Shiva, Vandana. *Protect or Plunder? Understanding Intellectual Property Rights*. London and New York: Zed Books Ltd., 1998.

Shiva, Vandana. "Community Rights, People's Sovereignty and Treaties to Reclaim the Genetic and Water Commons." *Synthesis/Regeneration* 29 (Fall 2002): 47-48.

Shulman, Seth. "Toward Sharing the Genome." *Technology Review* (September/October 2000): 60-67.

Sinha, Prabhas C. "Towards Crafting Sustainable Commons, Third World, and the Antarctica Model." Presented at *Constituting the Commons: Crafting Sustainable Commons in the New Millennium*, Bloomington, Indiana, USA, May 31-June 4, 2000.

<<http://dlc.dlib.indiana.edu/documents/dir0/00/00/03/50/index.html>> (10 February 2004).

"Smuggling of NZ orchids reported to be on the rise." *Fairfax New Zealand Limited*, 20 January 2004.

<<http://www.stuff.co.nz/stuff/print/0,1478,2788681a10,00.html>> (20 January 2004).

Starke, Linda, ed. *State of the World 1999: A Worldwatch Institute Report on Progress Toward a Sustainable Society*. New York and London: W.W. Norton and Company, 1999.

- Stevens, David. "Unease and Ambiguity." *Corrymeela Online*, 20 June 2003.
<http://www.corrymeela.org/Articles/unease_and_ambiguity.html> (27 March 2004).
- Swaney, James A. "Are democracy and common property possible on our small earth?" *Journal of Economic Issues*, v37 i2, (June 2003): 261-291.
- Tansey, Geoffrey. "Food for Thought: Intellectual Property Rights, food, and biodiversity." *Harvard International Review* v24 i1 (Spring 2002): 54-59.
- "The Birth of Biotech." *Technology Review (Cambridge, Massachusetts)* v103 i4 (July 2000): 120.
- Timmermans, Karin. "Intellectual property rights and traditional medicine: policy dilemmas at the interface." *Social Science and Medicine* 57 (2003): 745-756.
- Tuxill, John. "The Biodiversity That People Made." *World Watch* v13 n3 (May/June 2000): 25-35.
- UKABC. "International Seed Treaty – International treaty on Plant Genetic Resources for Food and Agriculture – CSO pages." *UK Agricultural Biodiversity Coalition*.
<<http://www.ukabc.org/iu2.htm>> (12 February 2004).
- UKABC. "International Treaty on Plant Genetic Resources for Food and Agriculture." *UK Agricultural Biodiversity Coalition*.
<<http://www.ukabc.org/IIPGRe.pdf>> (12 February 2004).
- UKABC. "Treaty launched at World Social Forum." *UK Agricultural Biodiversity Coalition*, 1 February 2002.
<http://www.ukabc.org/genetic_commons_treaty.htm#b> (12 February, 2004).
- UNESCO. "Universal Declaration on the Human Genome and Human Rights." *United Nations Educational, Scientific and Cultural Organisation*, 1997.
<http://www.unesco.org/shs/human_rights/hrbc.htm> (4 January 2004).
- UNFAO. "International Treaty on Plant Genetic Resources for Food and Agriculture." *United Nations Food and Agriculture Organization*.
<<http://www.fao.org/Legal/TREATIES/033s-e.htm>> (12 February 2004).
- van Wijk, Jeroen. "Plant Patenting Provision Reviewed in WTO." *Biotechnology Development Monitor* n34 (1998): 6-9.
- Vogler, John. *The Global Commons: A Regime Analysis*. Chichester, New York, Brisbane, Toronto, Singapore: John Wiley & Sons, 1995.
- WCED. *Our Common Future*. Oxford and New York: Oxford University Press, 1987.
- Westcott, Chris. "Thai Jasmine Rice and the Threat of the US Biotech Industry." *Global Exchange*, 18 December 2001.
<<http://www.globalexchange.org/wto/rice121801.html>> (31 March, 2002).

Wijkman, Per Magnus. "Managing the Global Commons." *International Organization* v36 n3 (1982): 511-536.

Wilson, Jack. "Patenting Organisms: Intellectual Property Law Meets Biology." In *Who Owns Life?* Edited by David Magnus, Arthur Caplan and Glenn McGee. New York: Prometheus Books, 2002.

"World-wide plant traffickers arrested." *Joint Media Release: Senator the Hon. Robert Hill and Senator the Hon. Christopher Ellison*. E159/01, 24 July 2001.
<<http://www.deh.gov.au/minister/env/2001/mr24jul01.html>> (4 February 2004).

WRI. "Questions and Answers About 'Bioprospecting'." *World Resources Institute*, 2003.
<<http://www.wri.org/biodiv/bp-facts.html>> (28 May 2003).

WWF-UK. "Stop the illegal wildlife trade." *World Wildlife Fund Online*.
<<http://www.wwf.org.uk/wildlifetrade/trade.asp>> (4 February 2004).

Appendices

Appendix 1

THE TREATY INITIATIVE TO SHARE THE GENETIC COMMONS

We proclaim these truths to be universal and indivisible;

That the intrinsic value of the Earth's gene pool, in all of its biological forms and manifestations, precedes its utility and commercial value, and therefore must be respected and safeguarded by all political, commercial and social institutions,

That the Earth's gene pool, in all of its biological forms and manifestations, exists in nature and, therefore, must not be claimed as intellectual property even if purified and synthesized in the laboratory,

That the global gene pool, in all of its biological forms and manifestations, is a shared legacy and, therefore, a collective responsibility,

And,

Whereas, our increasing knowledge of biology confers a special obligation to serve as a steward on behalf of the preservation and well being of our species as well as all of our other fellow creatures,

Therefore, the nations of the world declare the Earth's gene pool, in all of its biological forms and manifestations, to be a global commons, to be protected and nurtured by all peoples and further declare that genes and the products they code for, in their natural, purified or synthesized form as well as chromosomes, cells, tissue, organs and organisms, including cloned, transgenic and chimeric organisms, will not be allowed to be claimed as commercially negotiable genetic information or intellectual property by governments, commercial enterprises, other institutions or individuals.

The Parties to the treaty - to include signatory nation states and Indigenous Peoples - further agree to administer the gene pool as a trust. The signatories acknowledge the sovereign right and responsibility of every nation and homeland to oversee the biological resources within their borders and determine how they are managed and shared. However, because the gene pool, in all of its biological forms and manifestations, is a global commons, it cannot be sold by any institution or individual as genetic information. Nor can any institution or individual, in turn, lay claim to the genetic information as intellectual property.

Appendices

Appendix II

INTERNATIONAL TREATY ON PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE

PREAMBLE

The Contracting Parties,

Convinced of the special nature of plant genetic resources for food and agriculture, their distinctive features and problems needing distinctive solutions;

Alarmed by the continuing erosion of these resources;

Cognizant that plant genetic resources for food and agriculture are a common concern of all countries, in that all countries depend very largely on plant genetic resources for food and agriculture that originated elsewhere;

Acknowledging that the conservation, exploration, collection, characterization, evaluation and documentation of plant genetic resources for food and agriculture are essential in meeting the goals of the Rome Declaration on World Food Security and the World Food Summit Plan of Action and for sustainable agricultural development for this and future generations, and that the capacity of developing countries and countries with economies in transition to undertake such tasks needs urgently to be reinforced;

Noting that the Global Plan of Action for the Conservation and Sustainable Use of Plant Genetic Resources for Food and Agriculture is an internationally agreed framework for such activities;

Acknowledging further that plant genetic resources for food and agriculture are the raw material indispensable for crop genetic improvement, whether by means of farmers' selection, classical plant breeding or modern biotechnologies, and are essential in adapting to unpredictable environmental changes and future human needs;

Affirming that the past, present and future contributions of farmers in all regions of the world, particularly those in centres of origin and diversity, in conserving, improving and making available these resources, is the basis of Farmers' Rights;

Affirming also that the rights recognized in this Treaty to save, use, exchange and sell farm-saved seed and other propagating material, and to participate in decision-making regarding, and in the fair and equitable sharing of the benefits arising from, the use of plant genetic resources for food and agriculture, are fundamental to the realization of Farmers' Rights, as well as the promotion of Farmers' Rights at national and international levels; *Recognizing* that this Treaty and other international agreements relevant to this Treaty should be mutually supportive with a view to sustainable agriculture and food security;

Affirming that nothing in this Treaty shall be interpreted as implying in any way a change in the rights and obligations of the Contracting Parties under other international agreements;

Understanding that the above recital is not intended to create a hierarchy between this Treaty and other international agreements;

Aware that questions regarding the management of plant genetic resources for food and agriculture are at the meeting point between agriculture, the environment and commerce, and convinced that there should be synergy among these sectors;

Aware of their responsibility to past and future generations to conserve the World's diversity of plant genetic resources for food and agriculture;

Recognizing that, in the exercise of their sovereign rights over their plant genetic resources for food and agriculture, states may mutually benefit from the creation of an effective multilateral system for facilitated access to a negotiated selection of these resources and for the fair and equitable sharing of the benefits arising from their use; and

Desiring to conclude an international agreement within the framework of the Food and Agriculture Organization of the United Nations, hereinafter referred to as FAO, under Article XIV of the FAO Constitution;

Have agreed as follows:

PART I – INTRODUCTION

Article 1 – Objectives

1.1 The objectives of this Treaty are the conservation and sustainable use of plant genetic resources for food and agriculture and the fair and equitable sharing of the benefits arising out of their use, in harmony with the Convention on Biological Diversity, for sustainable agriculture and food security.

1.2 These objectives will be attained by closely linking this Treaty to the Food and Agriculture Organization of the United Nations and to the Convention on Biological Diversity.

Article 2 – Use of terms

For the purpose of this Treaty, the following terms shall have the meanings hereunder assigned to them. These definitions are not intended to cover trade in commodities:

“*In situ* conservation” means the conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings and, in the case of domesticated or cultivated plant species, in the surroundings where they have developed their distinctive properties.

“*Ex situ* conservation” means the conservation of plant genetic resources for food and agriculture outside their natural habitat.

“Plant genetic resources for food and agriculture” means any genetic material of plant origin of actual or potential value for food and agriculture.

“Genetic material” means any material of plant origin, including reproductive and vegetative propagating material, containing functional units of heredity.

“Variety” means a plant grouping, within a single botanical taxon of the lowest known rank, defined by the reproducible expression of its distinguishing and other genetic characteristics.

“*Ex situ* collection” means a collection of plant genetic resources for food and agriculture maintained outside their natural habitat.

“Centre of origin” means a geographical area where a plant species, either domesticated or wild, first developed its distinctive properties.

“Centre of crop diversity” means a geographic area containing a high level of genetic diversity for crop species in *in situ* conditions.

Article 3 – Scope

This Treaty relates to plant genetic resources for food and agriculture.

PART II - GENERAL PROVISIONS

Article 4 - General Obligations

Each Contracting Party shall ensure the conformity of its laws, regulations and procedures with its obligations as provided in this Treaty.

Article 5 – Conservation, Exploration, Collection, Characterization, Evaluation and Documentation of Plant Genetic Resources for Food and Agriculture

5.1 Each Contracting Party shall, subject to national legislation, and in cooperation with other Contracting Parties where appropriate, promote an integrated approach to the exploration, conservation and sustainable use of plant genetic resources for food and agriculture and shall in particular, as appropriate:

- (a) Survey and inventory plant genetic resources for food and agriculture, taking into account the status and degree of variation in existing populations, including those that are of potential use and, as feasible, assess any threats to them;
- (b) Promote the collection of plant genetic resources for food and agriculture and relevant associated information on those plant genetic resources that are under threat or are of potential use;
- (c) Promote or support, as appropriate, farmers and local communities' efforts to manage and conserve on-farm their plant genetic resources for food and agriculture;
- (d) Promote *in situ* conservation of wild crop relatives and wild plants for food production, including in protected areas, by supporting, *inter alia*, the efforts of indigenous and local communities;
- (e) Cooperate to promote the development of an efficient and sustainable system of *ex situ* conservation, giving due attention to the need for adequate documentation, characterization, regeneration and evaluation, and promote the development and transfer of appropriate technologies for this purpose with a view to improving the sustainable use of plant genetic resources for food and agriculture;
- (f) Monitor the maintenance of the viability, degree of variation, and the genetic integrity of collections of plant genetic resources for food and agriculture.

5.2 The Contracting Parties shall, as appropriate, take steps to minimize or, if possible, eliminate threats to plant genetic resources for food and agriculture.

Article 6 – Sustainable Use of Plant Genetic Resources

6.1 The Contracting Parties shall develop and maintain appropriate policy and legal measures that promote the sustainable use of plant genetic resources for food and agriculture.

6.2 The sustainable use of plant genetic resources for food and agriculture may include such measures as:

- (a) pursuing fair agricultural policies that promote, as appropriate, the development and maintenance of diverse farming systems that enhance the sustainable use of agricultural biological diversity and other natural resources;
- (b) strengthening research which enhances and conserves biological diversity by maximizing intra- and inter-specific variation for the benefit of farmers, especially those who generate and use their own varieties and apply ecological principles in maintaining soil fertility and in combating diseases, weeds and pests;
- (c) promoting, as appropriate, plant breeding efforts which, with the participation of farmers, particularly in developing countries, strengthen the capacity to develop

- varieties particularly adapted to social, economic and ecological conditions, including in marginal areas;
- (d) broadening the genetic base of crops and increasing the range of genetic diversity available to farmers;
 - (e) promoting, as appropriate, the expanded use of local and locally adapted crops, varieties and underutilized species;
 - (f) supporting, as appropriate, the wider use of diversity of varieties and species in on-farm management, conservation and sustainable use of crops and creating strong links to plant breeding and agricultural development in order to reduce crop vulnerability and genetic erosion, and promote increased world food production compatible with sustainable development; and
 - (g) reviewing, and, as appropriate, adjusting breeding strategies and regulations concerning variety release and seed distribution.

Article 7 – National Commitments and International Cooperation

7.1 Each Contracting Party shall, as appropriate, integrate into its agriculture and rural development policies and programmes, activities referred to in Articles 5 and 6, and cooperate with other Contracting Parties, directly or through FAO and other relevant international organizations, in the conservation and sustainable use of plant genetic resources for food and agriculture.

7.2 International cooperation shall, in particular, be directed to:

- (a) establishing or strengthening the capabilities of developing countries and countries with economies in transition with respect to conservation and sustainable use of plant genetic resources for food and agriculture;
- (b) enhancing international activities to promote conservation, evaluation, documentation, genetic enhancement, plant breeding, seed multiplication; and sharing, providing access to, and exchanging, in conformity with Part IV, plant genetic resources for food and agriculture and appropriate information and technology;
- (c) maintaining and strengthening the institutional arrangements provided for in Part V; and
- (d) implement the funding strategy of Article 18.

Article 8 – Technical Assistance

The Contracting Parties agree to promote the provision of technical assistance to Contracting Parties, especially those that are developing countries or countries with economies in transition, either bilaterally or through the appropriate international organizations, with the objective of facilitating the implementation of this Treaty.

PART III - FARMERS' RIGHTS

Article 9 – Farmers' Rights

9.1 The Contracting Parties recognize the enormous contribution that the local and indigenous communities and farmers of all regions of the world, particularly those in the centres of origin and crop diversity, have made and will continue to make for the conservation and development of plant genetic resources which constitute the basis of food and agriculture production throughout the world.

9.2 The Contracting Parties agree that the responsibility for realizing Farmers' Rights, as they relate to plant genetic resources for food and agriculture, rests with national governments. In accordance with their needs and priorities, each Contracting Party should, as appropriate, and subject to its national legislation, take measures to protect and promote Farmers' Rights, including:

- (a) protection of traditional knowledge relevant to plant genetic resources for food and agriculture;
- (b) the right to equitably participate in sharing benefits arising from the utilization of plant genetic resources for food and agriculture; and
- (c) the right to participate in making decisions, at the national level, on matters related to the conservation and sustainable use of plant genetic resources for food and agriculture.

9.3 Nothing in this Article shall be interpreted to limit any rights that farmers have to save, use, exchange and sell farm-saved seed/propagating material, subject to national law and as appropriate.

PART IV - THE MULTILATERAL SYSTEM OF ACCESS AND BENEFIT-SHARING

Article 10 – Multilateral System of Access and Benefit-sharing

10.1 In their relationships with other States, the Contracting Parties recognize the sovereign rights of States over their own plant genetic resources for food and agriculture, including that the authority to determine access to those resources rests with national governments and is subject to national legislation.

10.2 In the exercise of their sovereign rights, the Contracting Parties agree to establish a multilateral system, which is efficient, effective, and transparent, both to facilitate access to plant genetic resources for food and agriculture, and to share, in a fair and equitable way, the benefits arising from the utilization of these resources, on a complementary and mutually reinforcing basis.

Article 11 – Coverage of the Multilateral System

11.1 In furtherance of the objectives of conservation and sustainable use of plant genetic resources for food and agriculture and the fair and equitable sharing of benefits arising out of their use, as stated in Article 1, the Multilateral System shall cover the plant genetic resources for food and agriculture listed in Annex I, established according to criteria of food security and interdependence.

11.2 The Multilateral System, as identified in Article 11.1, shall include all plant genetic resources for food and agriculture listed in Annex I that are under the management and control of the Contracting Parties and in the public domain. With a view to achieving the fullest possible coverage of the Multilateral System, the Contracting Parties invite all other holders of the plant genetic resources for food and agriculture listed in Annex I to include these plant genetic resources for food and agriculture in the Multilateral System.

11.3 Contracting Parties also agree to take appropriate measures to encourage natural and legal persons within their jurisdiction who hold plant genetic resources for food and agriculture listed in Annex I to include such plant genetic resources for food and agriculture in the Multilateral System.

11.4 Within two years of the entry into force of the Treaty, the Governing Body shall assess the progress in including the plant genetic resources for food and agriculture referred to in paragraph 11.3 in the Multilateral System. Following this assessment, the Governing Body shall decide whether access shall continue to be facilitated to those natural and legal persons referred to in paragraph 11.3 that have not included these plant genetic resources for food and agriculture in the Multilateral System, or take such other measures as it deems appropriate.

11.5 The Multilateral System shall also include the plant genetic resources for food and agriculture listed in Annex I and held in the *ex situ* collections of the International Agricultural Research Centres of the Consultative Group on International Agricultural Research (CGIAR), as provided in Article 15.1a, and in other international institutions, in accordance with Article 15.5.

Article 12 – Facilitated access to plant genetic resources for food and agriculture within the Multilateral System

12.1 The Contracting Parties agree that facilitated access to plant genetic resources for food and agriculture under the Multilateral System, as defined in Article 11, shall be in accordance with the provisions of this Treaty.

12.2 The Contracting Parties agree to take the necessary legal or other appropriate measures to provide such access to other Contracting Parties through the Multilateral System. To this effect, such access shall also be provided to legal and natural persons under the jurisdiction of any Contracting Party, subject to the provisions of Article 11.4.

12.3 Such access shall be provided in accordance with the conditions below:

- (a) 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. In the case of multiple-use crops (food and non-food), their importance for food security should be the determinant for their inclusion in the Multilateral System and availability for facilitated access.
- (b) Access shall be accorded expeditiously, without the need to track individual accessions and free of charge, or, when a fee is charged, it shall not exceed the minimal cost involved;
- (c) All available passport data and, subject to applicable law, any other associated available non-confidential descriptive information, shall be made available with the plant genetic resources for food and agriculture provided;
- (d) Recipients shall not claim any intellectual property or other rights that limit the facilitated access to the plant genetic resources for food and agriculture, or their genetic parts or components, in the form received from the Multilateral System;
- (e) Access to plant genetic resources for food and agriculture under development, including material being developed by farmers, shall be at the discretion of its developer, during the period of its development;
- (f) Access to plant genetic resources for food and agriculture protected by intellectual and other property rights shall be consistent with relevant international agreements, and with relevant national laws;
- (g) Plant genetic resources for food and agriculture accessed under the Multilateral System and conserved shall continue to be made available to the Multilateral System by the recipients of those plant genetic resources for food and agriculture, under the terms of this Treaty; and
- (h) Without prejudice to the other provisions under this Article, the Contracting Parties agree that access to plant genetic resources for food and agriculture found in *in situ* conditions will be provided according to national legislation or, in the absence of such legislation, in accordance with such standards as may be set by the Governing Body.

12.4 To this effect, facilitated access, in accordance with Articles 12.2 and 12.3 above, shall be provided pursuant to a standard material transfer agreement (MTA), which shall be adopted by the Governing Body and contain the provisions of Articles 12.3a, d and g, as well as the benefitsharing provisions set forth in Article 13.2d(ii) and other relevant provisions of this Treaty, and the provision that the recipient of the plant genetic resources for food and agriculture shall require that the conditions of the MTA shall apply to the transfer of plant genetic resources for food and agriculture to another person or entity, as well as to any subsequent transfers of those plant genetic resources for food and agriculture.

12.5 Contracting Parties shall ensure that an opportunity to seek recourse is available, consistent with applicable jurisdictional requirements, under their legal systems, in case of

contractual disputes arising under such MTAs, recognizing that obligations arising under such MTAs rest exclusively with the parties to those MTAs.

12.6 In emergency disaster situations, the Contracting Parties agree to provide facilitated access to appropriate plant genetic resources for food and agriculture in the Multilateral System for the purpose of contributing to the re-establishment of agricultural systems, in cooperation with disaster relief co-ordinators.

Article 13 - Benefit-sharing in the Multilateral System

13.1 The Contracting Parties recognize that facilitated access to plant genetic resources for food and agriculture which are included in the Multilateral System constitutes itself a major benefit of the Multilateral System and agree that benefits accruing therefrom shall be shared fairly and equitably in accordance with the provisions of this Article.

13.2 The Contracting Parties agree that benefits arising from the use, including commercial, of plant genetic resources for food and agriculture under the Multilateral System shall be shared fairly and equitably through the following mechanisms: the exchange of information, access to and transfer of technology, capacity-building, and the sharing of the benefits arising from commercialization, taking into account the priority activity areas in the rolling Global Plan of Action, under the guidance of the Governing Body:

(a) Exchange of information:

The Contracting Parties agree to make available information which shall, *inter alia* encompass catalogues and inventories, information on technologies, results of technical, scientific and socio-economic research, including characterization, evaluation and utilization, regarding those plant genetic resources for food and agriculture under the Multilateral System. Such information shall be made available, where non-confidential, subject to applicable law and in accordance with national capabilities. Such information shall be made available to all Contracting Parties to this Treaty through the information system, provided for in Article 17.

(b) Access to and transfer of technology

(i) The Contracting Parties undertake to provide and/or facilitate access to technologies for the conservation, characterization, evaluation and use of plant genetic resources for food and agriculture which are under the Multilateral System. Recognizing that some technologies can only be transferred through genetic material, the Contracting Parties shall provide and/or facilitate access to such technologies and genetic material which is under the Multilateral System and to improved varieties and genetic material developed through the use of plant genetic resources for food and agriculture under the Multilateral System, in conformity with the provisions of Article 12. Access to these technologies, improved varieties and genetic material shall be provided and/or facilitated, while respecting applicable property rights and access laws, and in accordance with national capabilities.

- (ii) Access to and transfer of technology to countries, especially to developing countries and countries with economies in transition, shall be carried out through a set of measures, such as the establishment and maintenance of, and participation in, crop-based thematic groups on utilization of plant genetic resources for food and agriculture, all types of partnership in research and development and in commercial joint ventures relating to the material received, human resource development, and effective access to research facilities.
- (iii) Access to and transfer of technology as referred to in (i) and (ii) above, including that protected by intellectual property rights, to developing countries that are Contracting Parties, in particular least developed countries, and countries with economies in transition, shall be provided and/or facilitated under fair and most favourable terms, in particular in the case of technologies for use in conservation as well as technologies for the benefit of farmers in developing countries, especially in least developed countries, and countries with economies in transition, including on concessional and preferential terms where mutually agreed, *inter alia*, through partnerships in research and development under the Multilateral System. Such access and transfer shall be provided on terms which recognize and are consistent with the adequate and effective protection of intellectual property rights.

(c) Capacity-building

Taking into account the needs of developing countries and countries with economies in transition, as expressed through the priority they accord to building capacity in plant genetic resources for food and agriculture in their plans and programmes, when in place, in respect of those plant genetic resources for food and agriculture covered by the Multilateral System, the Contracting Parties agree to give priority to (i) establishing and/or strengthening programmes for scientific and technical education and training in conservation and sustainable use of plant genetic resources for food and agriculture, (ii) developing and strengthening facilities for conservation and sustainable use of plant genetic resources for food and agriculture, in particular in developing countries, and countries with economies in transition, and (iii) carrying out scientific research preferably, and where possible, in developing countries and countries with economies in transition, in cooperation with institutions of such countries, and developing capacity for such research in fields where they are needed.

(d) Sharing of monetary and other benefits of commercialization

- (i) The Contracting Parties agree, under the Multilateral System, to take measures in order to achieve commercial benefit-sharing, through the involvement of the private and public sectors in activities identified under this Article, through partnerships and collaboration, including with the private sector in developing countries and countries with economies in transition, in research and technology development;

- (ii) The Contracting Parties agree that the standard Material Transfer Agreement referred to in Article 12.4 shall include a requirement that a recipient who commercializes a product that is a plant genetic resource for food and agriculture and that incorporates material accessed from the Multilateral System, shall pay to the mechanism referred to in Article 19.3f, an equitable share of the benefits arising from the commercialization of that product, except whenever such a product is available without restriction to others for further research and breeding, in which case the recipient who commercializes shall be encouraged to make such payment.

The Governing Body shall, at its first meeting, determine the level, form and manner of the payment, in line with commercial practice. The Governing Body may decide to establish different levels of payment for various categories of recipients who commercialize such products; it may also decide on the need to exempt from such payments small farmers in developing countries and in countries with economies in transition. The Governing Body may, from time to time, review the levels of payment with a view to achieving fair and equitable sharing of benefits, and it may also assess, within a period of five years from the entry into force of this Treaty, whether the mandatory payment requirement in the MTA shall apply also in cases where such commercialized products are available without restriction to others for further research and breeding.

13.3 The Contracting Parties agree that benefits arising from the use of plant genetic resources for food and agriculture that are shared under the Multilateral System should flow primarily, directly and indirectly, to farmers in all countries, especially in developing countries, and countries with economies in transition, who conserve and sustainably utilize plant genetic resources for food and agriculture.

13.4 The Governing Body shall, at its first meeting, consider relevant policy and criteria for specific assistance under the agreed funding strategy established under Article 18 for the conservation of plant genetic resources for food and agriculture in developing countries, and countries with economies in transition whose contribution to the diversity of plant genetic resources for food and agriculture in the Multilateral System is significant and/or which have special needs.

13.5 The Contracting Parties recognize that the ability to fully implement the Global Plan of Action, in particular of developing countries and countries with economies in transition, will depend largely upon the effective implementation of this Article and of the funding strategy as provided in Article 18.

13.6 The Contracting Parties shall consider modalities of a strategy of voluntary benefitsharing contributions whereby Food Processing Industries that benefit from plant genetic resources for food and agriculture shall contribute to the Multilateral System.

PART V - SUPPORTING COMPONENTS

Article 14 – Global Plan of Action

Recognizing that the rolling Global Plan of Action for the Conservation and Sustainable Use of Plant Genetic Resources for Food and Agriculture is important to this Treaty, Contracting Parties should promote its effective implementation, including through national actions and, as appropriate, international cooperation to provide a coherent framework, *inter alia*, for capacitybuilding, technology transfer and exchange of information, taking into account the provisions of Article 13.

Article 15 - Ex Situ Collections of Plant Genetic Resources for Food and Agriculture held by the International Agricultural Research Centres of the Consultative Group on International Agricultural Research and other International Institutions

15.1 The Contracting Parties recognize the importance to this Treaty of the *ex situ* collections of plant genetic resources for food and agriculture held in trust by the International Agricultural Research Centres (IARCs) of the Consultative Group on International Agricultural Research (CGIAR). The Contracting Parties call upon the IARCs to sign agreements with the Governing Body with regard to such *ex situ* collections, in accordance with the following terms and conditions:

- (a) Plant genetic resources for food and agriculture listed in Annex I of this Treaty and held by the IARCs shall be made available in accordance with the provisions set out in Part IV of this Treaty.
- (b) Plant genetic resources for food and agriculture other than those listed in Annex I of this Treaty and collected before its entry into force that are held by IARCs shall be made available in accordance with the provisions of the MTA currently in use pursuant to agreements between the IARCs and the FAO. This MTA shall be amended by the Governing Body no later than its second regular session, in consultation with the IARCs, in accordance with the relevant provisions of this Treaty, especially Articles 12 and 13, and under the following conditions:
 - (i) The IARCs shall periodically inform the Governing Body about the MTAs entered into, according to a schedule to be established by the Governing Body;
 - (ii) The Contracting Parties in whose territory the plant genetic resources for food and agriculture were collected from *in situ* conditions shall be provided with samples of such plant genetic resources for food and agriculture on demand, without any MTA;
 - (iii) Benefits arising under the above MTA that accrue to the mechanism mentioned in Article 19.3f shall be applied, in particular, to the conservation and sustainable use of the plant genetic resources for food and agriculture in question, particularly in national and regional programmes in developing countries and countries with economies in

transition, especially in centres of diversity and the least developed countries; and

- (iv) The IARCs shall take appropriate measures, in accordance with their capacity, to maintain effective compliance with the conditions of the MTAs, and shall promptly inform the Governing Body of cases of non-compliance.
- (c) IARCs recognize the authority of the Governing Body to provide policy guidance relating to *ex situ* collections held by them and subject to the provisions of this Treaty.
- (d) The scientific and technical facilities in which such *ex situ* collections are conserved shall remain under the authority of the IARCs, which undertake to manage and administer these *ex situ* collections in accordance with internationally accepted standards, in particular the Genebank Standards as endorsed by the FAO Commission on Genetic Resources for Food and Agriculture.
- (e) Upon request by an IARC, the Secretary shall endeavour to provide appropriate technical support.
- (f) The Secretary shall have, at any time, right of access to the facilities, as well as right to inspect all activities performed therein directly related to the conservation and exchange of the material covered by this Article.
- (g) If the orderly maintenance of these *ex situ* collections held by IARCs is impeded or threatened by whatever event, including *force majeure*, the Secretary, with the approval of the host country, shall assist in its evacuation or transfer, to the extent possible.

15.2 The Contracting Parties agree to provide facilitated access to plant genetic resources for food and agriculture in Annex I under the Multilateral System to IARCs of the CGIAR that have signed agreements with the Governing Body in accordance with this Treaty. Such Centres shall be included in a list held by the Secretary to be made available to the Contracting Parties on request.

15.3 The material other than that listed in Annex I, which is received and conserved by IARCs after the coming into force of this Treaty, shall be available for access on terms consistent with those mutually agreed between the IARCs that receive the material and the country of origin of such resources or the country that has acquired those resources in accordance with the Convention on Biological Diversity or other applicable law.

15.4 The Contracting Parties are encouraged to provide IARCs that have signed agreements with the Governing Body with access, on mutually agreed terms, to plant genetic resources for food and agriculture not listed in Annex I that are important to the programmes and activities of the IARCs.

15.5 The Governing Body will also seek to establish agreements for the purposes stated in this Article with other relevant international institutions.

Article 16 – International Plant Genetic Resources Networks

16.1 Existing cooperation in international plant genetic resources for food and agriculture networks will be encouraged or developed on the basis of existing arrangements and consistent with the terms of this Treaty, so as to achieve as complete coverage as possible of plant genetic resources for food and agriculture.

16.2 The Contracting Parties will encourage, as appropriate, all relevant institutions, including governmental, private, non-governmental, research, breeding and other institutions, to participate in the international networks.

Article 17 – The Global Information System on Plant Genetic Resources for Food and Agriculture

17.1 The Contracting Parties shall cooperate to develop and strengthen a global information system to facilitate the exchange of information, based on existing information systems, on scientific, technical and environmental matters related to plant genetic resources for food and agriculture, with the expectation that such exchange of information will contribute to the sharing of benefits by making information on plant genetic resources for food and agriculture available to all Contracting Parties. In developing the Global Information System, cooperation will be sought with the Clearing House Mechanism of the Convention on Biological Diversity.

17.2 Based on notification by the Contracting Parties, early warning should be provided about hazards that threaten the efficient maintenance of plant genetic resources for food and agriculture, with a view to safeguarding the material.

17.3 The Contracting Parties shall cooperate with the Commission on Genetic Resources for Food and Agriculture of the FAO in its periodic reassessment of the state of the world's plant genetic resources for food and agriculture in order to facilitate the updating of the rolling Global Plan of Action referred to in Article 14.

PART VI - FINANCIAL PROVISIONS

Article 18 – Financial Resources

18.1 The Contracting Parties undertake to implement a funding strategy for the implementation of this Treaty in accordance with the provisions of this Article.

18.2 The objectives of the funding strategy shall be to enhance the availability, transparency, efficiency and effectiveness of the provision of financial resources to implement activities under this Treaty.

18.3 In order to mobilize funding for priority activities, plans and programmes, in particular in developing countries and countries with economies in transition, and taking the Global Plan of Action into account, the Governing Body shall periodically establish a target for such funding.

18.4 Pursuant to this funding strategy:

- (a) The Contracting Parties shall take the necessary and appropriate measures within the Governing Bodies of relevant international mechanisms, funds and bodies to ensure due priority and attention to the effective allocation of predictable and agreed resources for the implementation of plans and programmes under this Treaty.
- (b) The extent to which Contracting Parties that are developing countries and Contracting Parties with economies in transition will effectively implement their commitments under this Treaty will depend on the effective allocation, particularly by the developed country Parties, of the resources referred to in this Article. Contracting Parties that are developing countries and Contracting Parties with economies in transition will accord due priority in their own plans and programmes to building capacity in plant genetic resources for food and agriculture.
- (c) The Contracting Parties that are developed countries also provide, and Contracting Parties that are developing countries and Contracting Parties with economies in transition avail themselves of, financial resources for the implementation of this Treaty through bilateral and regional and multilateral channels. Such channels shall include the mechanism referred to in Article 19.3f.
- (d) Each Contracting Party agrees to undertake, and provide financial resources for national activities for the conservation and sustainable use of plant genetic resources for food and agriculture in accordance with its national capabilities and financial resources. The financial resources provided shall not be used to ends inconsistent with this Treaty, in particular in areas related to international trade in commodities. ;
- (e) The Contracting Parties agree that the financial benefits arising from Article 13.2d are part of the funding strategy.
- (f) Voluntary contributions may also be provided by Contracting Parties, the private sector, taking into account the provisions of Article 13, non-governmental organisations and other sources. The Contracting Parties agree that the Governing Body shall consider modalities of a strategy to promote such contributions;

18.5 The Contracting Parties agree that priority will be given to the implementation of agreed plans and programmes for farmers in developing countries, especially in least developed countries, and in countries with economies in transition, who conserve and sustainably utilize plant genetic resources for food and agriculture.

PART VII - INSTITUTIONAL PROVISIONS

Article 19 – Governing Body

19.1 A Governing Body for this Treaty is hereby established, composed of all Contracting Parties.

19.2 All decisions of the Governing Body shall be taken by consensus unless by consensus another method of arriving at a decision on certain measures is reached, except that consensus shall always be required in relation to Articles 23 and 24.

19.3 The functions of the Governing Body shall be to promote the full implementation of this Treaty, keeping in view its objectives, and, in particular, to:

- (a) provide policy direction and guidance to monitor, and adopt such recommendations as necessary for the implementation of this Treaty and, in particular, for the operation of the Multilateral System;
- (b) adopt plans and programmes for the implementation of this Treaty;
- (c) adopt, at its first session, and periodically review the funding strategy for the implementation of this Treaty, in accordance with the provisions of Article 18;
- (d) adopt the budget of this Treaty;
- (e) consider and establish subject to the availability of necessary funds such subsidiary bodies as may be necessary, and their respective mandates and composition;
- (f) establish, as needed, an appropriate mechanism, such as a Trust Account, for receiving and utilizing financial resources that will accrue to it for purposes of implementing this Treaty;
- (g) establish and maintain cooperation with other relevant international organizations and treatybodies, including in particular the Conference of the Parties to the Convention on Biological Diversity, on matters covered by this Treaty, including their participation in the funding strategy;
- (h) consider and adopt, as required, amendments to this Treaty, in accordance with the provisions of Article 23;
- (i) consider and adopt, as required, amendments to annexes to this Treaty, in accordance with the provisions of Article 24;
- (j) consider modalities of a strategy to encourage voluntary contributions, in particular, with reference to Articles 13 and 18;
- (k) perform such other functions as may be necessary for the fulfilment of the objectives of this Treaty;

- (l) take note of relevant decisions of the Conference of the Parties to the Convention on Biological Diversity and other relevant international organizations and treaty bodies;
- (m) inform, as appropriate, the Conference of the Parties to the Convention on Biological Diversity and other relevant international organizations and treaty bodies of matters regarding the implementation of this Treaty; and
- (n) approve the terms of agreements with the IARCs and other international institutions under Article 15, and review and amend the MTA in Article 15.

19.4 Subject to Article 19.6, each Contracting Party shall have one vote and may be represented at sessions of the Governing Body by a single delegate who may be accompanied by an alternate, and by experts and advisers. Alternates, experts and advisers may take part in the proceedings of the Governing Body but may not vote, except in the case of their being duly authorized to substitute for the delegate.

19.5 The United Nations, its specialized agencies and the International Atomic Energy Agency, as well as any State not a Contracting Party to this Treaty, may be represented as observers at sessions of the Governing Body. Any other body or agency, whether governmental or non-governmental, qualified in fields relating to conservation and sustainable use of plant genetic resources for food and agriculture, which has informed the Secretary of its wish to be represented as an observer at a session of the Governing Body, may be admitted unless at least one third of the Contracting Parties present object. The admission and participation of observers shall be subject to the Rules of Procedure adopted by the Governing Body.

19.6 A Member Organization of FAO that is a Contracting Party and the member states of that Member Organization that are Contracting Parties shall exercise their membership rights and fulfil their membership obligations in accordance, *mutatis mutandis*, with the Constitution and General Rules of FAO.

19.7 The Governing Body shall adopt and amend, as required, its own Rules of Procedure and financial rules which shall not be inconsistent with this Treaty.

19.8 The presence of delegates representing a majority of the Contracting Parties shall be necessary to constitute a quorum at any session of the Governing Body.

19.9 The Governing Body shall hold regular sessions at least once every two years. These sessions should, as far as possible, be held back-to-back with the regular sessions of the Commission on Genetic Resources for Food and Agriculture.

19.10 Special Sessions of the Governing Body shall be held at such other times as may be deemed necessary by the Governing Body, or at the written request of any Contracting Party, provided that this request is supported by at least one third of the Contracting Parties.

19.11 The Governing Body shall elect its Chairperson and Vice-Chairpersons (collectively referred to as “the Bureau”), in conformity with its Rules of Procedure.

Article 20 – Secretary

20.1 The Secretary of the Governing Body shall be appointed by the Director-General of FAO, with the approval of the Governing Body. The Secretary shall be assisted by such staff as may be required.

20.2 The Secretary shall perform the following functions:

- (a) arrange for and provide administrative support for sessions of the Governing Body and for any subsidiary bodies as may be established;
- (b) assist the Governing Body in carrying out its functions, including the performance of specific tasks that the Governing Body may decide to assign to it;
- (c) report on its activities to the Governing Body.

20.3 The Secretary shall communicate to all Contracting Parties and to the Director-General:

- (a) decisions of the Governing Body within sixty days of adoption;
- (b) information received from Contracting Parties in accordance with the provisions of this Treaty.

20.4 The Secretary shall provide documentation in the six languages of the United Nations for sessions of the Governing Body.

20.5 The Secretary shall cooperate with other organizations and treaty bodies, including in particular the Secretariat of the Convention on Biological Diversity, in achieving the objectives of this Treaty.

Article 21 – Compliance

The Governing Body shall, at its first meeting, consider and approve cooperative and effective procedures and operational mechanisms to promote compliance with the provisions of this Treaty and to address issues of non-compliance. These procedures and mechanisms shall include monitoring, and offering advice or assistance, including legal advice or legal assistance, when needed, in particular to developing countries and countries with economies in transition.

Article 22 – Settlement of Disputes

22.1 In the event of a dispute between Contracting Parties concerning the interpretation or application of this Treaty, the parties concerned shall seek solutions by negotiation.

22.2 If the parties concerned cannot reach agreement by negotiation, they may jointly seek the good offices of, or request mediation by, a third party.

22.3 When ratifying, accepting, approving or acceding to this Treaty, or at any time thereafter, a Contracting Party may declare in writing to the Depositary that for a dispute not resolved in accordance with Article 22.1 or Article 22.2 above, it accepts one or both of the following means of dispute settlement as compulsory:

- (a) Arbitration in accordance with the procedure laid down in Part 1 of Annex II to this Treaty;
- (b) Submission of the dispute to the International Court of Justice.

22.4 If the parties to the dispute have not, in accordance with Article 22.3 above, accepted the same or any procedure, the dispute shall be submitted to conciliation in accordance with Part 2 of Annex II to this Treaty unless the parties otherwise agree.

Article 23 – Amendments of the Treaty

23.1 Amendments to this Treaty may be proposed by any Contracting Party.

23.2 Amendments to this Treaty shall be adopted at a session of the Governing Body. The text of any proposed amendment shall be communicated to Contracting Parties by the Secretary at least six months before the session at which it is proposed for adoption.

23.3 All amendments to this Treaty shall only be made by consensus of the Contracting Parties present at the session of the Governing Body.

23.4 Any amendment adopted by the Governing Body shall come into force among Contracting Parties having ratified, accepted or approved it on the ninetieth day after the deposit of instruments of ratification, acceptance or approval by two-thirds of the Contracting Parties. Thereafter the amendment shall enter into force for any other Contracting Party on the ninetieth day after that Contracting Party deposits its instrument of ratification, acceptance or approval of the amendment.

23.5 For the purpose of this Article, an instrument deposited by a Member Organization of FAO shall not be counted as additional to those deposited by member states of such an organization.

Article 24 – Annexes

24.1 The annexes to this Treaty shall form an integral part of this Treaty and a reference to this Treaty shall constitute at the same time a reference to any annexes thereto.

24.2 The provisions of Article 23 regarding amendments to this Treaty shall apply to the amendment of annexes.

Article 25 – Signature

This Treaty shall be open for signature at the FAO from 3 November 2001 to 4 November 2002 by all Members of FAO and any States that are not Members of FAO

but are Members of the United Nations, or any of its specialized agencies or of the International Atomic Energy Agency.

Article 26 – Ratification, Acceptance or Approval

This Treaty shall be subject to ratification, acceptance or approval by the Members and non-Members of FAO referred to in Article 25. Instruments of ratification, acceptance, or approval shall be deposited with the Depositary.

Article 27 – Accession

This Treaty shall be open for accession by all Members of FAO and any States that are not Members of FAO but are Members of the United Nations, or any of its specialized agencies or of the International Atomic Energy Agency from the date on which the Treaty is closed for signature. Instruments of accession shall be deposited with the Depositary.

Article 28 – Entry into force

28.1 Subject to the provisions of Article 29.2, this Treaty shall enter into force on the ninetieth day after the deposit of the fortieth instrument of ratification, acceptance, approval or accession, provided that at least twenty instruments of ratification, acceptance, approval or accession have been deposited by Members of FAO.

28.2 For each Member of FAO and any State that is not a Member of FAO but is a Member of the United Nations, or any of its specialized agencies or of the International Atomic Energy Agency that ratifies, accepts, approves or accedes to this Treaty after the deposit, in accordance with Article 28.1, of the fortieth instrument of ratification, acceptance, approval or accession, the Treaty shall enter into force on the ninetieth day following the deposit of its instrument of ratification, acceptance, approval or accession.

Article 29 – Member Organizations of FAO

29.1 When a Member Organization of FAO deposits an instrument of ratification, acceptance, approval or accession for this Treaty, the Member Organization shall, in accordance with the provisions of Article II.7 of the FAO Constitution, notify any change regarding its distribution of competence to its declaration of competence submitted under Article II.5 of the FAO Constitution as may be necessary in light of its acceptance of this Treaty. Any Contracting Party to this Treaty may, at any time, request a Member Organization of FAO that is a Contracting Party to this Treaty to provide information as to which, as between the Member Organization and its member states, is responsible for the implementation of any particular matter covered by this Treaty. The Member Organization shall provide this information within a reasonable time.

29.2 Instruments of ratification, acceptance, approval, accession or withdrawal, deposited by a Member Organization of FAO, shall not be counted as additional to those deposited by its Member States.

Article 30 – Reservations

No reservations may be made to this Treaty.

Article 31 – Non-Parties

The Contracting Parties shall encourage any Member of FAO or other State, not a Contracting Party to this Treaty, to accept this Treaty.

Article 32 – Withdrawals

32.1 Any Contracting Party may at any time after two years from the date on which this Treaty has entered into force for it, notify the Depositary in writing of its withdrawal from this Treaty. The Depositary shall at once inform all Contracting Parties.

32.2 Withdrawal shall take effect one year from the date of receipt of the notification.

Article 33 – Termination

33.1 This Treaty shall be automatically terminated if and when, as the result of withdrawals, the number of Contracting Parties drops below forty, unless the remaining Contracting Parties unanimously decide otherwise.

33.2 The Depositary shall inform all remaining Contracting Parties when the number of Contracting Parties has dropped to forty.

33.3 In the event of termination the disposition of assets shall be governed by the financial rules to be adopted by the Governing Body.

Article 34 – Depositary

The Director-General of FAO shall be the Depositary of this Treaty.

Article 35 – Authentic Texts

The Arabic, Chinese, English, French, Russian and Spanish texts of this Treaty are equally authentic.

ANNEX I

LIST OF CROPS COVERED UNDER THE MULTILATERAL SYSTEM

Food crops

Crop	Genus	Observations
Breadfruit	<i>Artocarpus</i>	Breadfruit only.
Asparagus	<i>Asparagus</i>	
Oat	<i>Avena</i>	
Beet	<i>Beta</i>	
Brassica complex	<i>Brassica</i> et al.	Genera included are: <i>Brassica</i> , <i>Armoracia</i> , <i>arbarea</i> , <i>Camelina</i> , <i>Crambe</i> , <i>Diplotaxis</i> , <i>Eruca</i> , <i>Isatis</i> , <i>Lepidium</i> , <i>Raphanobrassica</i> , <i>Raphanus</i> , <i>Rorippa</i> , and <i>Sinapis</i> . This comprises oilseed and vegetable crops such as cabbage, rapeseed, mustard, cress, rocket, radish, and turnip. The species <i>Lepidium meyenii</i> (maca) is excluded.
Pigeon Pea	<i>Cajanus</i>	
Chickpea	<i>Cicer</i>	
Citrus	<i>Citrus</i>	Genera <i>Poncirus</i> and <i>Fortunella</i> are included as root stock.
Coconut	<i>Cocos</i>	
Major aroids tannia.	<i>Colocasia</i> , <i>Xanthosoma</i>	Major aroids include taro, cocoyam, dasheen and
Carrot	<i>Daucus</i>	
Yams	<i>Dioscorea</i>	
Finger Millet	<i>Eleusine</i>	
Strawberry	<i>Fragaria</i>	
Sunflower	<i>Helianthus</i>	
Barley	<i>Hordeum</i>	
Sweet Potato	<i>Ipomoea</i>	
Grass pea	<i>Lathyrus</i>	
Lentil	<i>Lens</i>	
Apple	<i>Malus</i>	
Cassava	<i>Manihot</i>	<i>Manihot esculenta</i> only.
Banana / Plantain	<i>Musa</i>	Except <i>Musa textilis</i> .
Rice	<i>Oryza</i>	
Pearl Millet	<i>Pennisetum</i>	
Beans	<i>Phaseolus</i>	Except <i>Phaseolus polyanthus</i> .
Pea	<i>Pisum</i>	
Rye	<i>Secale</i>	
Potato	<i>Solanum</i>	Section <i>tuberosa</i> included, except <i>Solanum phureja</i> .
Eggplant	<i>Solanum</i>	Section <i>melongena</i> included.
Sorghum	<i>Sorghum</i>	
Triticale	<i>Triticosecale</i>	
Wheat	<i>Triticum</i> et al.	Including <i>Agropyron</i> , <i>Elymus</i> , and <i>Secale</i> .

Faba Bean/Vetch	<i>Vicia</i>	
Cowpea et al.	<i>Vigna</i>	
Maize	<i>Zea</i>	Excluding <i>Zea perennis</i> , <i>Zea diploperennis</i> , and <i>Zea luxurians</i> .

Forages

Genera	Species
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LEGUME FORAGES

<i>Astragalus</i>	<i>chinensis, cicer, arenarius</i>
<i>Canavalia</i>	<i>ensiformis</i>
<i>Coronilla</i>	<i>varia</i>
<i>Hedysarum</i>	<i>coronarium</i>
<i>Lathyrus</i>	<i>cicera, ciliolatus, hirsutus, ochrus, odoratus, sativus</i>
<i>Lespedeza</i>	<i>cuneata, striata, stipulacea</i>
<i>Lotus</i>	<i>corniculatus, subbiflorus, uliginosus</i>
<i>Lupinus</i>	<i>albus, angustifolius, luteus</i>
<i>Medicago</i>	<i>arborea, falcata, sativa, scutellata, rigidula, truncatula</i>
<i>Melilotus</i>	<i>albus, officinalis</i>
<i>Onobrychis</i>	<i>vicifolia</i>
<i>Ornithopus</i>	<i>sativus</i>
<i>Prosopis</i>	<i>affinis, alba, chilensis, nigra, pallida</i>
<i>Pueraria</i>	<i>phaseoloides</i>
<i>Trifolium</i>	<i>alexandrinum, alpestre, ambiguum, angustifolium, arvense, agrocicerum, hybridum, incarnatum, pratense, repens, resupinatum, rueppellianum, semipilosum, subterraneum, vesiculosum</i>

GRASS FORAGES

<i>Andropogon</i>	<i>gayanus</i>
<i>Agropyron</i>	<i>cristatum, desertorum</i>
<i>Agrostis</i>	<i>stolonifera, tenuis</i>
<i>Alopecurus</i>	<i>pratensis</i>
<i>Arrhenatherum</i>	<i>elatius</i>
<i>Dactylis</i>	<i>glomerata</i>
<i>Festuca</i>	<i>arundinacea, gigantea, heterophylla, ovina, pratensis, rubra</i>
<i>Lolium</i>	<i>hybridum, multiflorum, perenne, rigidum, temulentum</i>
<i>Phalaris</i>	<i>aquatica, arundinacea</i>
<i>Phleum</i>	<i>pratense</i>
<i>Poa</i>	<i>alpina, annua, pratensis</i>
<i>Tripsacum</i>	<i>laxum</i>

OTHER FORAGES

<i>Atriplex</i>	<i>halimus, nummularia</i>
<i>Salsola</i>	<i>vermiculata</i>

ANNEX II

Part 1

ARBITRATION

Article 1

The claimant party shall notify the Secretary that the parties to the dispute are referring it to arbitration pursuant to Article 22. The notification shall state the subject-matter of arbitration and include, in particular, the articles of this Treaty, the interpretation or application of which are at issue. If the parties to the dispute do not agree on the subject matter of the dispute before the President of the tribunal is designated, the arbitral tribunal shall determine the subject matter. The Secretary shall forward the information thus received to all Contracting Parties to this Treaty.

Article 2

1. In disputes between two parties to the dispute, the arbitral tribunal shall consist of three members. Each of the parties to the dispute shall appoint an arbitrator and the two arbitrators so appointed shall designate by common agreement the third arbitrator who shall be the President of the tribunal. The latter shall not be a national of one of the parties to the dispute, nor have his or her usual place of residence in the territory of one of these parties to the dispute, nor be employed by any of them, nor have dealt with the case in any other capacity.
2. In disputes between more than two Contracting Parties, parties to the dispute with the same interest shall appoint one arbitrator jointly by agreement.
3. Any vacancy shall be filled in the manner prescribed for the initial appointment.

Article 3

1. If the President of the arbitral tribunal has not been designated within two months of the appointment of the second arbitrator, the Director-General of FAO shall, at the request of a party to the dispute, designate the President within a further two-month period.
2. If one of the parties to the dispute does not appoint an arbitrator within two months of receipt of the request, the other party may inform the Director-General of FAO who shall make the designation within a further two-month period.

Article 4

The arbitral tribunal shall render its decisions in accordance with the provisions of this Treaty and international law.

Article 5

Unless the parties to the dispute otherwise agree, the arbitral tribunal shall determine its own rules of procedure.

Article 6

The arbitral tribunal may, at the request of one of the parties to the dispute, recommend essential interim measures of protection.

Article 7

The parties to the dispute shall facilitate the work of the arbitral tribunal and, in particular, using all means at their disposal, shall:

- (a) Provide it with all relevant documents, information and facilities; and
- (b) Enable it, when necessary, to call witnesses or experts and receive their evidence.

Article 8

The parties to the dispute and the arbitrators are under an obligation to protect the confidentiality of any information they receive in confidence during the proceedings of the arbitral tribunal.

Article 9

Unless the arbitral tribunal determines otherwise because of the particular circumstances of the case, the costs of the tribunal shall be borne by the parties to the dispute in equal shares. The tribunal shall keep a record of all its costs, and shall furnish a final statement thereof to the parties to the dispute.

Article 10

Any Contracting Party that has an interest of a legal nature in the subject-matter of the dispute which may be affected by the decision in the case, may intervene in the proceedings with the consent of the tribunal.

Article 11

The tribunal may hear and determine counterclaims arising directly out of the subject-matter of the dispute.

Article 12

Decisions both on procedure and substance of the arbitral tribunal shall be taken by a majority vote of its members.

Article 13

If one of the parties to the dispute does not appear before the arbitral tribunal or fails to defend its case, the other party may request the tribunal to continue the proceedings and to make its award. Absence of a party to the dispute or a failure of a party to the dispute to defend its case shall not constitute a bar to the proceedings. Before rendering its final decision, the arbitral tribunal must satisfy itself that the claim is well founded in fact and law.

Article 14

The tribunal shall render its final decision within five months of the date on which it is fully constituted unless it finds it necessary to extend the time-limit for a period which should not exceed five more months.

Article 15

The final decision of the arbitral tribunal shall be confined to the subject-matter of the dispute and shall state the reasons on which it is based. It shall contain the names of the members who have participated and the date of the final decision. Any member of the tribunal may attach a separate or dissenting opinion to the final decision.

Article 16

The award shall be binding on the parties to the dispute. It shall be without appeal unless the parties to the dispute have agreed in advance to an appellate procedure.

Article 17

Any controversy which may arise between the parties to the dispute as regards the interpretation or manner of implementation of the final decision may be submitted by either party to the dispute for decision to the arbitral tribunal which rendered it.

Part 2

CONCILIATION

Article 1

A conciliation commission shall be created upon the request of one of the parties to the dispute. The commission shall, unless the parties to the dispute otherwise agree, be composed of five members, two appointed by each party concerned and a President chosen jointly by those members.

Article 2

In disputes between more than two Contracting Parties, parties to the dispute with the same interest shall appoint their members of the commission jointly by agreement. Where two or more parties to the dispute have separate interests or there is a disagreement as to whether they are of the same interest, they shall appoint their members separately.

Article 3

If any appointments by the parties to the dispute are not made within two months of the date of the request to create a conciliation commission, the Director-General of FAO shall, if asked to do so by the party to the dispute that made the request, make those appointments within a further two-month period.

Article 4

If a President of the conciliation commission has not been chosen within two months of the last of the members of the commission being appointed, the Director-General of FAO shall, if asked to do so by a party to the dispute, designate a President within a further two-month period.

Article 5

The conciliation commission shall take its decisions by majority vote of its members. It shall, unless the parties to the dispute otherwise agree, determine its own procedure. It shall render a proposal for resolution of the dispute, which the parties shall consider in good faith.

Article 6

A disagreement as to whether the conciliation commission has competence shall be decided by the commission.