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Deep Seeded Problems: A Look At Seed Bank Regulations

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Cover Page Footnote

Jasmine graduated from Seattle University School of Law and was the Research and Technical Editor of SJEL. Jasmine is deeply thankful to the staff of SJEL for their help throughout the publication process, and to the friends and family that support her dreams and inspire her daily.

Deep Seeded Problems: A Look At Seed Bank Regulations

Jasmine R. Patel[†]

ABSTRACT

This paper examines the importance of preserving plant biodiversity through the use of genetic seed vaults, and how effective global legal and regulatory plans aimed at such preservation are in comparison to approaches being undertaken in the United States. An example of such initiatives, the Svalbard Global Seed Vault in Norway, is meant to act as a global back up for other nation's seed vaults. However, Norway's laws do not allow for genetically modified organisms ("GMOs") to be imported, including seeds from genetically modified plants. The United States needs to make sure that domestic vaults are protected by proper regulations because its agricultural economy relies heavily on GMOs. This ensures the viability of seeds, which feed both the nation's economy and people. By taking advantage of established international initiatives such as the Convention on Biological Diversity and the International Treaty for Plant Genetic Resources for Food and Agriculture, the United States would obtain access to funds for seed conservation projects and networks of information from the international scientific community. This means the resources the United States would have to expend on these conservation efforts could be largely reduced, while simultaneously achieving increased food security and biodiversity conservation.

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INTRODUCTION

As people become more knowledgeable about the deterioration of the planet and its natural resources, greater efforts are being taken to protect them. Preserving biological crop diversity is an immediate necessity. The Kew Royal Botanic Gardens succinctly states that we live by “a simple but often overlooked truth: all our lives depend on plants.”¹

Biodiversity can be defined in many ways: for example, a component and measure of ecosystem health and function. It is the number and genetic richness of different individuals found within the population

¹ Kew Royal Botanical Gardens, *A Global Resource for Plant and Fungal Knowledge: Science Strategy 2015-2020*, at 8, <http://www.kew.org/sites/default/files/Kew%20Science%20Strategy%202015-2020%20Single%20pages.pdf>.

of a species, of populations found within a species range, of different species found within a natural community or ecosystem, and of different communities and ecosystems found within a region.²

When it comes to biodiversity conservation, there are two approaches that can be taken: *In Situ* and *Ex Situ*. *In Situ* conservation is “the conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings and, in case of domesticated or cultivated plant species, in the surroundings where they have developed their distinctive properties.”³ In comparison, *Ex Situ* conservation is “the conservation of plant genetic resources for food and agriculture outside of their natural habitat.”⁴ The types of *Ex Situ* collections include botanic gardens, micropropagation,⁵ nurseries, and seed banks; seed banks are the most cost-effective method of preserving germplasm for future use.⁶

One benefit of seeds banks is that they protect against natural and man-made disasters, both of which occur all too often in the current news. For example, in September of 2015, the Svalbard Global Seed Vault in the arctic mountainside of Norway was prompted to initiate its first seed withdrawal due to the Syrian war.⁷

With this first seed withdrawal, and the rate at which agricultural, economic, and humanitarian food crises are occurring,⁸ now is the ideal time for the United States to analyze its own seed banks and possibly duplicate seeds stored in anticipation for any future calamity. This need to conserve plant biodiversity should drive changes in domestic seed bank management and regulation. While seed banks are generally not the targets of war or terror attacks, some facilities are located in areas that have become conflict zones, such as Iraq, Afghanistan, Burundi, and Rwanda.⁹ Countries need to protect seed banks against man-made and natural disasters; the Philippine national gene bank was flooded in a typhoon, and then a couple years later caught on fire.¹⁰ These types of se-

² Cal. Pub. Res. Code § 12220(b) (West 2008)

³ *International Treaty for Plant Genetic Resources for Food and Agriculture*, FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS 2 (2009), <http://www.fao.org/3/a-i0510e.pdf>.

⁴ *Id.*

⁵ Micropropagation is a technique to create multiple copies of a plant that are genetically identical, done by taking tissue from the parent plant and growing it into plantlets in a laboratory. *Micropropagation*, OXFORD DICTIONARY OF ENGLISH 1118 (3rd ed. 2010).

⁶ Weisenberger et al., *Assessing Status, Capacity, and Needs for the Ex Situ Conservation of the Hawaiian Flora*, 68 PACIFIC SCIENCE X, 526 (2014).

⁷ *Syrian Researchers to Make First Seed Bank Withdrawal*, 350 SCIENCE X, 12 (1975).

⁸ Muhuddin Anwar, et al., *Adapting Agriculture to Climate Change: A Review*, 113 THEORETICAL AND APPLIED CLIMATOLOGY 225, 225 (2013).

⁹ Cary Fowler, *A ‘Doomsday’ Seed Vault to Protect the World’s Diversity*, 67 JOURNAL OF INTERNATIONAL AFFAIRS 2, 141 (2014).

¹⁰ *Id.*

curity concerns create a serious risk to the permanent loss of plant biodiversity.

It is time the United States takes part in seed preservation for international and national concerns. The United States agricultural industry is unique because it heavily relies on GMOs; the most effective protective measure would be to become a party of the Convention on Biological Diversity (“CBD”) and the International Treaty on Plant Genetic Resources for Food and Agriculture (“International Treaty”). Many international vaults, like the Svalbard Vault, do not accept GMOs for storage, so it is important for the United States to ensure another safeguard for seeds that feed the people and the economy.

Joining an established international seed conservation network allows the United States to decrease federal funding and resources needed to participate in another alternative. The Benefit Sharing Fund of the International Treaty has already created Seed Clubs to secure local seed systems and facilitate a sharing of information on seed development.¹¹ Article 9 of the International Treaty addresses possible measures that can be taken to make farmers more likely to contribute their plant genetic resources.¹² Additionally, the Nagoya Protocol to the CBD includes provisions on the Access to Benefit Sharing, which not only protects the world’s most vulnerable populations from resource exploitation, but can also be profitable for large agriculture and seed corporations because they have access to those resources in a fair and equitable way.¹³ These established networks already operate internationally, so a joining nation like the United States does not have to create similar programs from scratch.

This article will explore the international state of seed banks, the current situation in the United States, and make recommendations to better secure the United States’ plant genetic biodiversity. Part I will provide an overview of seed banks and their international networks. Part II will delve into the status and security concerns of seed banks in the United States. Part III will look at relevant portions of key international doctrines for plant genetic resource conservation. Part IV will address why the United States should not rely solely on the seed banks of other countries. Part V will convey the United States’ hesitation to join some of the international treaties and why those hesitations are unfounded. Ultimately concluding in a recommendation for the United States to become full members of the CBD and the International Treaty, as well as augment their own domestic seed banks.

¹¹ *Enabling Farmers to Face Climate Change: Second Cycle of the Benefit Sharing Fund Projects* 14 (2014), http://www.planttreaty.org/sites/default/files/BSF_2nd_cycle-booklet.pdf.

¹² *Id.*

¹³ *Global Multilateral Benefit-Sharing Mechanism*, CONVENTION ON BIOLOGICAL DIVERSITY, <https://www.cbd.int/abs/bfmechanism.shtml> (last visited May 1, 2017).

I. POPULAR INTERNATIONAL SEED BANKS AND BANK NETWORKS

Although the scale and methodology of seed saving has advanced, the act of seed saving among small-scale farming communities dates back to the beginning of agriculture itself; many places have changed very little. Sixty to seventy percent of small-scale farmers in developing countries still use the antiquated method of saving seeds from one harvest to the next.¹⁴ There has been a shift from this *In Situ* conservation to other types of seed storage due to factors such as droughts, crop failure, and conflict. An increasing number of farmers are also purchasing seed to meet their own farming requirements.¹⁵ Public sector institutions and NGO's have played an important intervening force in strengthening community-level seed supply, but federal and international regulatory frameworks for seed bank systems need to be established to ensure plant security for future generations. For instance, following a 1994 international survey of more than 1,700 botanic gardens and other plant collections, most botanic garden seed banks and gene banks voiced that they would benefit from establishing measures such as information exchanges.¹⁶ Existing vaults have established measures that can assist in preservation efforts and information sharing.

A. Svalbard Global Seed Vault

The largest and most well-known seed bank in the world is the Svalbard Global Seed Vault; it is located in the icy mountainside of Norway just inside the Arctic Circle. The funding, creation, and oversight of the Vault are done by the Norwegian government and the Global Crop Diversity Trust.¹⁷ The Vault originated from an initiative by the World Bank that financed upgrades to the seed storage facilities around the world. While many places had the proper equipment and their processes were up to international standards, many locations carried a risk, and thus a backup vault was created in the arctic.¹⁸ The Vault is open to seed deposits from anyone, regardless of their political conflicts. With so much of the world's plant diversity residing in third world countries, the fact that storage in the vault is free and focused on preservation of species from those countries truly makes it a global initiative.¹⁹

¹⁴ V Lewis and P M Mulvany, *A Typology of Community Seed Banks*, NATURAL RESOURCES INSTITUTE UNIVERSITY OF GREENWICH 1 (1997).

¹⁵ *Id.*

¹⁶ Brigitte Laliberté, *Botanic Garden Seed Banks/GeneBanks Worldwide, their Facilities, Collections and Networks*, 2 BOTANIC GARDENS CONSERVATION INTERNATIONAL 9 (1997).

¹⁷ *FAQ About The Seed Vault*, CROP TRUST, <https://www.croptrust.org/our-work/svalbard-global-seed-vault/faq-about-the-vault/> (last visited Feb. 19, 2017).

¹⁸ Fowler, *supra* note 9, at 143.

¹⁹ *Id.* at 145.

The seed vault is a 1,000-square meter facility that has the capacity to store 4.5 million seed types.²⁰ The Vault holds more than 4,000 plant species, a list of which can be viewed by anyone on the NordGen Seed Portal.²¹ Not all seeds qualify to be stored at the Vault, so priority treatment is given to seeds that are important for food and agriculture. Furthermore, to ensure that the Vault is being used solely as a backup, the seeds must be already stored in another secure gene bank, and only unique seeds will be accepted to prevent duplicates.²² Additionally, due to the protection of plant biodiversity being a global concern, the Vault prefers to assist third world countries that cannot afford to properly store seeds with the right equipment and conditions to keep them viable.²³

Norway's laws dictate what seeds can be stored in the Vault. Norway is one of the most restrictive countries when it comes to importing GMOs, deviating from its normally strong record of following European Union directives and regulations that are a little more lenient on GMO importation and use.²⁴ For the use of GMOs in a research capacity at seed banks, laboratories must obtain prior approval from the Ministry of Health and Social Affairs.²⁵

In contrast, the United States regulates genetically modified food products in a similar manner as traditional food products; the regulatory control is divided between the Food and Drug Administration ("FDA"), the Environmental Protection Agency ("EPA"), and the United States Department of Agriculture ("USDA").²⁶ With the exact regulatory authority for each agency being unclear, the United States has a more lax control over GMOs used in food products, though there is an increasing trend coming from consumers for more information and mandatory labeling.²⁷ This stark difference between the United States' and Norway's policies only highlights the need for the United States to find alternative backup seed storage mechanisms because the Svalbard Vault is unable to house any of the seeds from genetically modified crops.

²⁰ *More About the Physical Plant*, GOV'T ADMIN. SERVICES, <https://www.regjeringen.no/en/topics/food-fisheries-and-agriculture/landbruk/svalbard-global-seed-vault/mer-om-det-fysiske-anlegget/id2365142/> (last visited on Nov. 11, 2016).

²¹ *A Global Backstop*, GOV'T ADMIN. SERVICES, <https://www.regjeringen.no/en/topics/food-fisheries-and-agriculture/landbruk/svalbard-global-seed-vault/en-ekstra-beskyttelse/id2365112/> (last visited on Nov. 11, 2016).

²² *Id.*

²³ Fowler, *supra* note 9, at 142.

²⁴ *Restrictions on Genetically Modified Organisms: Norway*, LIBRARY OF CONGRESS, http://www.loc.gov/law/help/restrictions-on-gmos/norway.php#_ftn18 (last visited on Nov. 11, 2016).

²⁵ *Id.* at IV(A).

²⁶ Cinnamon Carlarne, *From the USA with Love: Sharing Home-Grown Hormones, GMOs, and Clones with a Reluctant Europe*, 37 ENV'T L. L. 301, 317 (2007).

²⁷ *Id.* at 321.

B. Millennium Seed Bank

Managed by Kew and the Royal Botanical Garden, the Millennium Seed Bank in the United Kingdom has been participating in seed conservation since its creation in 2002.²⁸ Prince Charles played a large role in opening the seed bank and stated that it is “a gold reserve” where life itself is stored.²⁹ Currently, the Millennium Seed Bank is working with 80 different countries and has secured 13% of the world’s plant species, and the seed bank has a goal of securing 20% by 2020.³⁰ These partnerships are based on legally binding agreements in which Kew and the partners “will access, use and transfer the material, and will share all resulting benefits.”³¹

In accordance with the International Treaty, the Millennium Seed Bank has two seed lists that provide people with the opportunity to request certain seeds for non-commercial or research purposes.³² Seed deposits can be made by any organization if they meet the following criteria: (1) seeds are collected legally, (2) they are of wild provenance, (3) they are recently harvested, and (4) their statistics and collections are well documented.³³

The value of seed banks also comes from its participating network, such as the Millennium Seed Bank Partnership. The Millennium Seed Bank can duplicate seed collection in partner seed banks, thus providing a safeguard in multiple locations.³⁴ By doing so, not only does the Millennium Seed Bank acquire new seeds to reach their seed securing goals, but costs are cut for nations and seed banks that do not have the resources to duplicate seeds on their own. The Millennium Seed Bank Partnership also promotes one common standard for seed conservation making the sharing of information easier.³⁵ By including 123 institutions from 54 countries in this partnership, Kew hopes to educate and promote conservation policies internationally that are sustainable in the long run, and they understand that long term funding is essential to this goal.³⁶ Through the partnership, Kew has had a leading hand in providing the scientific expertise and advice needed for the implementation of mul-

²⁸ Clare Tenner, *The Millennium Seed Bank*, 21 CURTIS'S BOTANICAL MAG. 91, 91 (2004).

²⁹ KEW ROYAL BOTANIC GARDENS, <http://www.kew.org/visit-wakehurst/explore/attractions/millennium-seed-bank> (last visited on Nov. 12, 2016).

³⁰ Kew Royal Botanical Gardens, *supra* note 1, at 38.

³¹ Tenner, *supra* note 28, at 92.

³² *Can I Request Seeds from Kew's Millennium Seed Bank?*, <http://www.kew.org/science-conservation/collections/millennium-seed-bank/about/millennium-seed-bank-faqs> (last visited on Nov. 12, 2016).

³³ *Id.*

³⁴ Millennium Seed Bank Partnership, Kew Royal Botanical Gardens, <http://www.kew.org/science-conservation/research-data/science-directory/teams/millennium-seed-bank-partnership> (last visited on Nov. 12, 2016).

³⁵ Kew Royal Botanical Gardens, *supra* note 1, at 38.

³⁶ *Id.*

multiple international doctrines, particularly the CBD in relation to the Nagoya Protocol.³⁷ This illustrates that seed banks and seed bank networks are important not only in their function as a conservation institution, but they also play a vital role in educating and lobbying for the policies necessary to support seed banks' longevity.

II. SEED BANKS IN THE UNITED STATES AND SECURITY CONCERNS

Seed banks are utilized for multiple purposes, ranging from saving endangered plant species to food crop safety; therefore, they are under the jurisdiction of both environmental and agriculture industries. The United States Code regulates seeds, stating that “[t]he Secretary of the Treasury and the Secretary of Agriculture shall make, jointly and severally, such rules and regulations as they may deem necessary for the effective enforcement of subchapter III[foreign commerce of seeds] of this chapter.”³⁸ This sharing of responsibilities means that there are even more steps and processes that seed banks have to go through, but even with the complex web of groups involved, navigation of this chapter is possible. With plant biodiversity at risk every day, the need to buttress seed banks with a proper regulatory framework is more urgent than ever.³⁹

A. Hawaii Seed Bank Networks

Hawaii, with its large plant diversity, has taken conservation efforts diligently. Hawaii has been focusing its efforts on “species of conservation importance” which are pulled from federally listed endangered and threatened taxa, and the Hawai’i Plant Extinction Prevention list.⁴⁰ Hawaii banks further determine what seeds have seed bank potential by looking to see if they can be stored in the classic seed bank environment of -18 degrees Celsius with 20% relative humidity, and then the seed storage potentials are classified as high, low, or unknown.⁴¹ In addition to having banks and other research facilities that house seeds, the efforts are useless unless the seeds they store are viable for use. Not all seed banks or other seed storage facilities are following internationally accepted storage preparation methods or conducting viability testing.⁴² Thus rendering the seeds unable to be successfully planted to revive dying plant populations.

³⁷ *Id.* at 44.

³⁸ 7 U.S. Code § 1592 (West 1939).

³⁹ M. Milosevic, et. al., *Biodiversity and the Basic Aspects of Its Preservation*, 52 *FIELD & VEGETABLE CROP RESEARCH* 29, 32 (2015).

⁴⁰ Weisenberger, *supra* note 6, at 527.

⁴¹ *Id.*

⁴² *Id.*

As of October 2014, Hawaii's work on collecting and maintaining *Ex Situ* representation has resulted in having an astounding 73% of their classified species of conservation importance represented in conservation efforts.⁴³ This is substantially higher than the North American representation of 39%, so Hawaii's bank system's efficiency can act as a role model for other states and the system federally.⁴⁴ With four seed banks spread through the island state, Hawaii's in-state conservation is doing well in comparison to other states. As far as actual vitality, all those seeds need to have duplicates in other locations as a back-up due to the constant threat of environmental disasters.

B. The National Center for Genetic Resources Preservation

Currently, the largest seed vault in the United States is the National Center for Genetic Resources Preservation; located in Fort Collins, Colorado, and regulated by the USDA.⁴⁵ Although the vault was originally built in 1958 as the National Seed Storage Laboratory, gene banking in the United States dates back to the 1890's when Plant Introduction Stations were created around the country to study plant traits.⁴⁶ As research continued and the field of modern cryobiology expanded, the storage facility was expanded to include animal germplasms and plant-associated microbes to protect all-important components of United States.⁴⁷ This led to the vault's name changing in 2002, and a new mission of "preserving germplasm of all life forms that are important to United States agriculture."⁴⁸ Although the vault is technically a federal building, private companies such as Monsanto and DuPont are allowed to store seeds there, including GMO seeds.⁴⁹

A complaint was filed in the U.S. District Court for the District of Columbia asking for a review of the seed bank's germplasm program, claiming that the improper storage and inventorying of seeds is negatively impacting biodiversity in the bank.⁵⁰ In response, the USDA's Agricultural Research Service said they were examining how to maintain and

⁴³ *Id.* at 530.

⁴⁴ *Id.* at 531.

⁴⁵ *History of NCGRP*, USDA, <http://www.ars.usda.gov/Aboutus/docs.htm?docid=17890> (last modified Aug. 13, 2016).

⁴⁶ *Id.*

⁴⁷ *Id.*

⁴⁸ *Id.*

⁴⁹ Luke Runyon, *Colorado Vault is Fort Knox for the World's Seeds*, NPR (Aug. 15, 2013, 7:59 AM), <http://www.npr.org/sections/thesalt/2013/08/15/211451380/colorado-seed-vault-is-fort-knox-for-the-worlds-seeds>.

⁵⁰ Mark Crawford, *USDA Bows to Rifkin Call for Review of Seed Bank*, 230 SCIENCE MAGAZINE 1146, 1146 (1985).

operate the Colorado bank, also recognizing that the seed program is subject to the National Environmental Policy Act for the first time.⁵¹

Seeds need to be stored in very precise conditions, including periodic vitality testing to ensure that they are still viable. When small changes such as slight temperature increases can decimate entire stores of seeds, forethought and planning must go into multi-location seed storage. Just as the Svalbard vault requires any seeds deposited to be deposited in a seed bank somewhere else first, if the Colorado seed bank is intended to be the major seed bank of the United States, it should implement a similar rule to act as the United State's back up vault. This is just one example of how the United States should regulate its seed vaults similarly to other established international seed vaults.

C. Security Concerns

Because seed banks are meant to act as back-ups in the event of natural or man-made catastrophes, the security of the actual vaults themselves need to be better addressed. Though generally not targets of conventional warfare, many seed banks are located in metropolitan areas and thus susceptible to incidental harm. According to The Crop Trust, the company that manages the Svalbard vault, there are around 1,700 seed banks in the world, but many are in danger of natural disasters, war, and insufficient funding.⁵² The situation in Syria is a prime example of incidental harm to vaults. Fortunately, the International Center for Agricultural Research in the Dry Areas ("ICARDA") moved headquarters from Aleppo, Syria to Beirut, Lebanon during the early stages of conflict in 2012, but the gene bank in Aleppo sustained enough damage to warrant the first ever withdrawal from Svalbard.⁵³ The withdrawal included 128 crates of seeds, amounting to 38,000 seed samples taken out of the Svalbard vault and returned to the International Gene Bank of Syria.⁵⁴ Syria's Aleppo Bank was further damaged in the midst of the civil war forcing the ICARDA staff to flee the county as continued bombings threatened their lives.⁵⁵ The poor outlook for peace in Syria's foreseeable future means that crop seeds for wheat, barley, and grasses will be sent to centers in Lebanon and Morocco for their safety.⁵⁶ While it is unfeasible to

⁵¹ *Id.*

⁵² Laura Wagner, *Syrian Civil War Prompts First Withdrawal from Doomsday Seed Vault in the Arctic*, NPR (Sept. 24, 2015, 4:03 PM), <http://www.npr.org/sections/thetwo-way/2015/09/23/442858657/syrian-civil-war-prompts-first-withdrawal-from-doomsday-seed-vault-in-the-arctic>.

⁵³ *Id.*

⁵⁴ *Svalbard Global Seed Vault Returns Seeds to Syrian Gene Bank*, GOVERNMENT.NO (Oct. 14, 2015), <https://www.regjeringen.no/en/aktuelt/svalbard-globale-frohvelv-retturnerer-fro-til-genbank-i-syria/id2457931/>.

⁵⁵ Wagner, *supra* note 7.

⁵⁶ *Id.*

always anticipate imminent war, events like those in Syria are reminders as to why seed banks are necessary in the first place, and show why ineffectively regulated and managed seed banks serve their purpose poorly.

Another security issue that makes companies hesitant to place their seeds in national seed banks is not one of physical security, but rather security of their seed intellectual property. Biotech giant Monsanto is infamously known for zealously going after farmers that infringe on their seed patent rights, and strong players like Monsanto are part of the reason why much of the literature surrounding seed vaults are about their IP protection and not their actual management.⁵⁷ The National Center for Genetic Resources Preservation in Colorado has made exceptions to store seeds from private companies such as Monsanto and DuPont, but the vault's security was questioned when some of Monsanto's patent protected glyphosate-resistant wheat was found growing in a small field in Oregon.⁵⁸ It is essential for large companies that own the seed IP rights to a majority of the crops grown for agriculture purposes, to trust seed vaults in storing their GMO seeds. While the USDA's investigation ultimately turned suspicions away from the seed vault to other speculations, the incident brought attention to seed vault security.⁵⁹

To ensure cooperation and guarantee IP security of information that large seed companies are worried will be compromised, the Black Box System implemented at the Svalbard Vault should be undertaken. The Black Box System is a system that permits only the depositor of the seeds the ability to withdraw their seeds or open the boxes where their seeds are stored.⁶⁰ This system ensures that each depositor is in full control and is the only person that has access to their seeds, adding a layer of trust in the vault's security.

The Colorado facility uses a different approach. They limit the number of people who can physically access the seed vault, and also use a bar-coded labeling system so that even someone holding a seed pouch would be unable to tell what seeds were inside without scanning the barcode and accessing their secure database.⁶¹ A combination of the black box system and bar-coded labeling would limit the number of people who have access to the seeds and data regarding them, thus minimizing

⁵⁷ Charles R. McManis, *The Interface of Open Source and Proprietary Agricultural Innovation: Facilitated Access and Benefit-Sharing Under the New FAO Treaty*, 30 WASH. U. J.L. & POL'Y 405, 407 (2009).

⁵⁸ *History of NCGRP*, *supra* note 45.

⁵⁹ Dan Charles, *In Oregon, The GMO Wheat Mystery Deepens*, NPR (Jul. 18, 2013, 4:34 PM), <http://www.npr.org/sections/thesalt/2013/07/17/202684064/in-oregon-the-gmo-wheat-mystery-deepens>.

⁶⁰ *An International and Black Box System*, CORP TRUST, <https://www.croptrust.org/what-we-do/svalbard-global-seed-vault/> (last visited on Nov. 12, 2016).

⁶¹ USDA, *supra* note 45.

any IP related security risks and providing an incentive for more companies to deposit their seeds.

III. KEY INTERNATIONAL DOCTRINE ON PLANT GENETIC RESOURCE CONSERVATION

The United Nations has taken on the role of providing a platform through which many international seed bank initiatives are being born. Due to the nature of conservation as a collective resources issue, international coordination is necessary for there to be any cognizable amount of change. These collaborative models recognize the necessity to remain flexible and allow members to tailor their policies depending on that state's needs and context. The international doctrines on biological diversity conservation can help set the framework for the future of United State's own plant regulation.

A. The Convention On Biological Diversity And Subsequent Protocols

The keystone document in the field of conservation is the Convention on Biological Diversity, which entered into force on December 29, 1993.⁶² At the Conference of the Parties 10, the participants came to decision X/2 Strategic Plan for Biodiversity 2011 – 2020 which includes multiple targets for preserving plant biodiversity.⁶³ The targets set out a flexible plan, allowing the targets to take into account each nation's different needs, priorities, and socio economic conditions.⁶⁴ For example, Target 13 enumerates that “by 2020, the genetic diversity of cultivated plants ... is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.”⁶⁵ Regardless of the flexibility in implementation afforded to each nation, the United States has yet to become a party to the convention or any of its additional protocols.

The first protocol to the CBD was added on September 11, 2003, the Cartagena Protocol on Biosafety to the Convention on Biological Diversity (“Cartagena Protocol”).⁶⁶ The Cartagena Protocol focuses on the transboundary movement of living genetically modified organisms

⁶² *Introduction*, CONVENTION ON BIOLOGICAL DIVERSITY, <https://www.cbd.int/intro/default.shtml> (last visited on Nov. 12, 2016).

⁶³ *COP 10 Decision X/2: X/2. Strategic Plan for Biodiversity 2011-2020*, CONVENTION ON BIOLOGICAL DIVERSITY, <https://www.cbd.int/decision/cop/?id=12268> (last visited on Nov. 12, 2016).

⁶⁴ *Id.* at Section III (12).

⁶⁵ *Id.* at Section IV (13), Target 13.

⁶⁶ *About the Protocol*, CONVENTION ON BIOLOGICAL DIVERSITY, <https://bch.cbd.int/protocol/background/> (last visited Nov. 14, 2016).

through modern biotechnology.⁶⁷ The United States is less likely to become a party to this protocol because it aims to control and restrict the transboundary transportation of living GMOs, which would not be advantageous for the United State's agricultural industry because it relies greatly on GMOs. The Protocol requires parties to make use of the Biosafety Clearing-House, adding another regulatory step to the importing or exporting of GMOs; a potential downside to the likelihood that the United States will want to be a party.⁶⁸ However, the Cartagena Protocol does not outright bar the importation of GMOs, but rather allows individual "countries to bar imports of genetically altered seeds, microbes, animals and crops that they deem a threat to their environment."⁶⁹ GMO importation for seed banks is unlikely to create a threat to any country's environment because the seeds imported and exported are for storage purposes and scientific research only, not to be introduced into the local environment.

One of the main subsequent additions to the CBD, adopted on October 29, 2010, is the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity ("Nagoya Protocol").⁷⁰ The main advantage to becoming a party of the Nagoya Protocol is the Access and Benefit Sharing program, which implicates multiple international institutions, including the World Trade Organization, the UN Convention on the Law of the Sea, the World Intellectual Property Organization, the Antarctic Treaty, the Food and Agriculture Organization of the UN, the World Health Organization, and many others.⁷¹ The Nagoya Protocol focuses on the legal framework for the parties that both provide and use genetic resources, and to ensure that benefits are shared equally so that big players are not taking advantage of local or indigenous communities.⁷² With so many interconnected doctrines, it is understandable that the United States has hesitated to fully ratify and implement the Nagoya Protocol in midst of such a complex regulatory field. The Nagoya Protocol also excludes some crops like soy beans, ground-

⁶⁷ Text of the Cartagena Protocol on Biosafety to the Convention on Biological Diversity: Article 1, CONVENTION ON BIOLOGICAL DIVERSITY, <https://bch.cbd.int/protocol/text/> (last visited Nov. 14, 2016).

⁶⁸ *Id.* at Article 20(1)(a).

⁶⁹ The Coca-Cola Company, SEC No-Action Letter, 2000 WL 197254, 10 (February 7, 2000).

⁷⁰ Secretariat of the Conv. on Biological Diversity Montreal, *The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity*, CONVENTION ON BIOLOGICAL DIVERSITY 1 (2011), <https://www.cbd.int/abs/doc/protocol/nagoya-protocol-en.pdf>.

⁷¹ Sebastian Oberthür and Justyna Pożarowska, *Managing Institutional Complexity and Fragmentation: The Nagoya Protocol and the Global Governance of Genetic Resources*, 13 GLOBAL ENVTL. POLITICS 100, 118 (Aug. 2013).

⁷² The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity, *supra* note 70.

nut, tomatoes, and some wild wheat and maize, many of which are vital to the United States' agriculture economy, and thus interested third parties can voice their opinion on how to address these exclusion in federal laws.⁷³

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

The Preamble of the Nagoya Protocol recognizes the multitude of international treaties and agreements that work in concert toward the aim of food security and sustainable development; for example, the 16th stanza acknowledging the importance of the International Treaty for Plant Genetic Resources for Food and Agriculture, created by the Food and Agricultural Organization ("FAO").⁷⁴ The Preamble of the International Treaty denotes that due to all countries relying heavily on food and agriculture that originated elsewhere, and the continued depletion of many natural resources, conservation is a common concern for all countries.⁷⁵ While the United States signed the treaty in 2002, it has yet to be a contracting party, and thus cannot access the benefits of being a full-fledged member.⁷⁶ The objective of this treaty is "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."⁷⁷ Particularly, the Benefit Sharing Fund, a multilateral system that offers both monetary benefits and non-monetary benefits, can be used for projects that represent innovative partnerships, potentially including seed bank networks.⁷⁸

The United States can take advantage of the Multilateral System offered by the treaty and protocols to not only bolster the funds allocated to current domestic seed banks, but also to build additional seed banks. This system increases the chances for innovative solutions to be found to these complex issues around seed banks and regulation, partially due to the International Treaty declaring the genetic resources of 64 important crops, comprising of crops that account for 80% of all human consump-

⁷³ Dave Wood, *Future Food: Politics Plague Seed Banks*, 499 NATURE 7459, 409 (July 25, 2013).

⁷⁴ *The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity*, *supra* note 70, at Preamble.

⁷⁵ *International Treaty for Plant Genetic Resources for Food and Agriculture*, *supra* note 3, at Preamble.

⁷⁶ <http://www.planttreaty.org/map/index.html> (last visited on Nov. 14, 2016).

⁷⁷ *International Treaty for Plant Genetic Resources for Food and Agriculture*, *supra* note 3, at Article 1.1.

⁷⁸ *International Treaty for Plant Genetic Resources for Food and Agriculture, The Benefit-Sharing Fund in Brief*, <http://www.planttreaty.org/node/3072> (last visited on Mar. 3, 2016).

tion, accessible to everyone.⁷⁹ The more minds working on preservation issues, the more likely a solution can be found. The genetic material for those crops can be accessed via gene banks around the world, from small research operations to national and international seed collections.⁸⁰ Ratifying also comes with the benefit of funding from the Global Crop Diversity Trust, which is committed to raising funds for gene banks.⁸¹

Finally, in terms of addressing industry intellectual property and commercial competitive fears, agricultural corporations do not have to worry about being mandated to share new developments. In lieu of sharing the new developments, companies can simply pay a percentage of commercial benefits from research to a common fund that supports conservation in developing countries;⁸² a business and philanthropic two-in-one. There is also a mandatory Standard Material Transfer agreement that parties utilizing the Multilateral System must use; thus bringing uniformity to the transfer of plant genetic resources for food and agriculture use and ensuring conformity to the Treaty.⁸³

UN agreements, such as the Standard Material Transfer, also take into account, and act in concert with, other international agreements such as the Rome Declaration on World Food Security and the World Food Summit Plan of Action. The combination of agreements provides a regulatory framework that is sufficient for United States policy makers to concoct cohesive laws on how the nation deals with food security, particularly seed storage and backups.

IV. UNITED STATES NECESSITY FOR SELF-RELIANCE

While the Svalbard Vault is meant to be a global backup, Norway's laws against the importation of genetically modified materials, including seeds, prohibit a large amount of the seeds used in the United States' agricultural industry from being stored in the facility. Given the current political climate around environmental protection, it is more imperative than ever to bolster domestic seed banks against international uncertainty.

A. Norway Does Not Accept GMO Seeds

In Norway, GMOs cannot be used in farming and their importation is limited to research purposes in approved laboratories, which seed vaults do not qualify as.⁸⁴ Not only does the United States heavily rely on

⁷⁹ *Id.*

⁸⁰ *Id.*

⁸¹ *Id.*

⁸² *Id.*

⁸³ FAO, Standard Material Transfer Agreement, Article 4.1,

<ftp://ftp.fao.org/ag/agp/planttreaty/agreements/smta/SMTAe.pdf> (last visited on Nov. 15, 2016).

⁸⁴ Fowler, *supra* note 9, at 144.

genetically engineered crops, but the country's usage of them has steadily increased over the past two decades to a recent plateau,⁸⁵ meaning that the Svalbard Vault is not an option as back up to protect those crops.

Given that the United States is the world leader in producing GM crops, accounting for 40% of the biotech crops grown globally in 2012, it needs alternative seed banks to store the seeds of the plants that supply much of the nation's food.⁸⁶ The USDA records indicate that for corn, the number one crop grown in the United States, a staggering 92% of planted acreage in 2016 adopted some sort of genetically engineered seed.⁸⁷ With numbers these large, inadequate protection would be detrimental in the event of a crop catastrophe.

Norway, though not a full EU Member, is part of the European Economic Area and implements many EU Directives.⁸⁸ The Norway Gene Technology Act and the National Food Act, both of which require import approval by the Norwegian Food Safety Authority, as well as an environmental risk assessment by the Norwegian Environmental Agency, regulate use of GMOs in foods.⁸⁹ With such strict regulations and Norwegians' skepticism of GMOs, it is unclear whether Norway's position on the import of GMOs may be altered due to recent governmental, therefore, the Svalbard Vault cannot be fully utilized for many of the United States' crop seeds.⁹⁰

The Svalbard Vault's rules also dictate that any seeds stored there must be duplicated and stored at another facility; it is not a primary storage and preservation location. The vault only agrees to receive seeds that are shared under the Multilateral System or Article 15 of the International Treaty, and that have originated from the depositor's country.⁹¹ Since the United States is not a party to the International Treaty, there is a drastic limit on the types and amounts of seeds that can be safely stored in Svalbard. However, since the Svalbard Vault is an internationally established and reputable vault, following many of the rules and procedures it has implemented can save the time and resources of having to create rules and procedures from scratch. While the United States works with multiple other seed banks internationally, those seed banks do not

⁸⁵ *Recent Trends in GE Adoption*, USDA, <http://www.ers.usda.gov/data-products/adoption-of-genetically-engineered-crops-in-the-us/recent-trends-in-ge-adoption.aspx> (last updated Nov. 3, 2016).

⁸⁶ Law Library of Congress, *Restrictions on Genetically Modified Organisms*, 208 (Mar. 2014) <https://www.loc.gov/law/help/restrictions-on-gmos/restrictions-on-gmos.pdf> (last visited on Nov. 15, 2016).

⁸⁷ *Recent Trends in GE Adoption*, *supra* note 85.

⁸⁸ Law Library of Congress, *supra* note 86, at 161-163.

⁸⁹ *Id.* at 160,162.

⁹⁰ *Id.* at 157.

⁹¹ *Svalbard Global Seed Vault*, CROP TRUST, <https://www.croptrust.org/what-we-do/svalbard-global-seed-vault/> (last visited on Nov. 15, 2016).

compare in scope with the Svalbard Vault, and, thus, are not equivalent alternatives.

B. Self-Reliance Does Not Mean Having To Do It All Alone

While the United States does need to ensure the conservation of its own seeds, cooperative efforts are likely to achieve the best results. As a country that imports many of its crops, it is in the United States' best interest to take part in the conservation of those imported crops as well. By partnering with third-world countries to preserve their seeds, there is a mutually shared benefit. The FAO has a benefit-sharing fund, as part of the International Treaty, which invests in high impact farming projects to conserve crop diversity.⁹² This fund aims to support projects and programs for the benefit of farmers and local communities in developing and economically transitioning countries, projects for the increased use of genetic resources for food and agriculture.⁹³ An argument could be made that seed banks should be included in these projects.

Contracting parties to the International Treaty are working in conjunction with farmers' organizations to protect farmers' rights and to share information on the sustainable use of plant genetic resources.⁹⁴ With international funds and trusts, like this one, ready to support seed bank projects, there are a plethora of resources available to the United States to take advantage of.

V. UNITED STATES HESITATION ON JOINING INTERNATIONAL TREATIES UNFOUNDED

Historically, when it comes to international treaties regarding food genetic preservation, the United States has been hesitant, and in many cases refused, to join on as a party. This should no longer be the case. Environmental and food security is an international concern, so it is only logical that internationally coordinated efforts are the only viable way to address and alleviate those problems. William J. Snape, III, Senior Counsel at the Center for Biological Diversity argues for the United States joining the CBD, a treaty the organization was vocal in the creation of, stating "[n]o country possesses an inventory, description, and understanding of its wildlife, habitat networks, and ecological processes

⁹² *Benefit-sharing Fund*, FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, <http://www.fao.org/plant-treaty/areas-of-work/benefit-sharing-fund/projects-funded/en/> (last visited Feb. 18, 2017).

⁹³ *Benefit-sharing Fund: The Treaty's Grant Making Process*, FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, <http://www.planttreaty.org/content/potential-partners-benefit-sharing-fund> (last visited Mar. 3, 2016).

⁹⁴ *International Treaty for Plant Genetic Resources for Food and Agriculture*, *supra* note 3, at art. 9.

greater than the United States.”⁹⁵ The United States is in a unique position to act as an international leader on plant genetic resources conservation through seed vaults, but to do so it is vital to join these international, multilateral agreements and become an active member in their discussions on implementation and future amendments.

A. Hesitancy to Join the Convention on Biological Diversity

Over 190 members have signed and ratified the CBD; the United States being the only developed country to remain as non-members.⁹⁶ Having such a large track record of success in protecting biodiversity, and still choosing to not take part means the United States must have some large incentives to remain as a non-member. In light of support from most pharmaceutical companies, biotechnology companies, and environmental organizations, the question arises as to what valid reason the United States has to be the only industrialized country to not ratify.⁹⁷ The benefits that the United States would receive by ratifying the CBD are two-fold: not only would the treaty strengthen domestic biodiversity-related programs such as seed banks, but it would also allow the United States to aid foreign communities, which could strategically bolster international trade and commerce.⁹⁸ Joining the CBD is also a prerequisite to join and receive benefits from its subsequent provisions such as the Nagoya Protocol and the Cartagena Protocol.⁹⁹

President George H. W. Bush refused the initial ratification of the CBD in 1992, and when President William J Clinton signed it in 1993, the Senate refused to ratify.¹⁰⁰ In 1992 when EPA Administrator Reilly announced at the UN Conference on the Environment and Development that the United States would not be ratifying, the reasoning provided consisted of disagreements over the financial mechanism, intellectual property rights treatment, and the requirement to share benefits and technology gained from biological resources.¹⁰¹ However, a memorandum by Reilly that was leaked at a later time showed that he actually recommended signing the CBD, so why does that not match the announcement?¹⁰²

⁹⁵ William J. Snape, III, *Joining the Convention on Biological Diversity: A Legal and Scientific Overview of Why the United States Must Wake Up*, 10 SUSTAINABLE DEV. L. & POL’Y 6, 6 (2010).

⁹⁶ *List of Parties*, CONVENTION ON BIOLOGICAL DIVERSITY, <https://www.cbd.int/information/parties.shtml> (last visited on Feb. 18, 2017).

⁹⁷ Robert F. Blomquist, *Ratification Resisted: Understanding America’s Response to the Convention on Biological Diversity, 1989-2002*, 32 GOLDEN GATE U. L. REV. 493, 547 (2002).

⁹⁸ Snape, *supra* note 95.

⁹⁹ Myrna E. Watanabe, *The Nagoya Protocol on Access and Benefit Sharing: International Treaty Poses Challenges for Biological Collection*, 65(6) OXFORD J. BIOSCIENCE 543, 544 (2015).

¹⁰⁰ Blomquist, *supra* note 97, at 494.

¹⁰¹ *Id.* at n.3.

¹⁰² *Id.*

Article 9 of the CBD addresses *Ex Situ* conservation and the establishment and regulation of seed banks.¹⁰³ Article 9 gives discretion to each country to determine the means by which their *Ex Situ* conservation is administered, with the additional provision that each party shall “cooperate in providing financial and other support for *Ex Situ* conservation...and in the establishment and maintenance of *Ex Situ* conservation facilities in developing countries.”¹⁰⁴ The CBD does not impede on each nation’s autonomy by dictating the particulars of how to implement the articles, those are left up to each contracting party to develop according to their nation’s needs.

Article 3 of the CBD explicitly guarantees autonomy by stating, “States have...the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.”¹⁰⁵ By having such a low bar for base requirements, it seems that all the benefits conferred would outweigh the slight concessions that would have to be made. One large concern is that new legislation will be needed to ratify and join the CBD, which would take time and resources.¹⁰⁶ That concern can be dampened, because no new legislation is necessary, eliminating a procedural barrier that slows down the governmental process.¹⁰⁷ This is all part of the treaty being a “framework convention,” one that “sets the tone, establishes certain principles and even enunciates certain commitments... As a rule, it does not contain specific obligations... nor does it contain a detailed prescription of certain activities.”¹⁰⁸ With this allotted sovereignty, there seems to be no cognizable reason as to why the United States has remained a non-member for so long.

If the United States is resisting due to the financial and other aid it must supply to developing countries, such concerns should be assuaged because any resources spent will reap benefits for the United States as well. As a country that participates in the import and export of crops and seeds, protecting the biodiversity of other countries is necessary to protect its own agricultural interests. With the reasons provided when announcing that the United States would not be joining the CBD (IP rights, new legislation, financial mechanisms, requirement to share benefits and

¹⁰³ 1992 Convention on Biological Diversity art. 9, June 5, 1992, 1760 U.N.T.S. 79.

¹⁰⁴ *Id.*

¹⁰⁵ *Id.* at art. 3.

¹⁰⁶ Snape, *supra* note 95, at 14.

¹⁰⁷ *Id.*

¹⁰⁸ *Id.* at pg. 8. (quoting W. Lang, *International Environmental Cooperation*, G. Sjustedt & S. Uno, The Swedish Institute of International Affairs, *International Environmental Negotiations: Process, Issues and Contexts* 19 (1993)).

technology),¹⁰⁹ those concerns are alleviated through either the text of the convention itself, or the structure it operates within. The benefits of joining this truly international initiative, which is working on the global issue of biodiversity conservation, clearly outweigh outdated hesitations.

In addition to joining the CBD, the subsequently created Nagoya Protocol is equally as important to ratify. The Nagoya Protocol fleshes out some of the ideas presented in the CBD, particularly genetic resources, and the fair sharing of their benefits. Similar to the CBD, once a country chooses to ratify the protocol, they are allowed to implement it with plenty of room for different legislation and policy measures as considered appropriate for that country.¹¹⁰

There are some requirements that the United States may find to be disincentives to joining. A country must enter information about its agreements in the ABS Clearing House; precise terms of the agreement are not required but enough information is supposed to be given to show that an agreement has been made.¹¹¹ Countries must also establish at least one checkpoint to ensure that all genetic resources are acquired legally from the country of origin.¹¹² This protocol, which went into effect in 2014, is legally binding on its parties, and has made membership a harder sell to the United States.¹¹³ Furthermore, there are also issues within the Nagoya Protocol's requirement concerning disclosure of the origin of genetic resources or associated "traditional knowledge" in patent applications, as a compliance rule with access and benefit sharing.¹¹⁴ However, many scholars believe that joining the Nagoya Protocol will be more profitable than harmful. Luiz Rocha, curator of ichthyology at the Cal Academy of Sciences in San Francisco, said that the Nagoya Protocol "is all about the profit."¹¹⁵ The big bioprospecting companies get permits and will make money out of it."¹¹⁶ Even with all the requirements, companies have a monetary enticement to participate internationally. While taking the financial aspects into consideration, the shared environmental benefits should be the main element discussed when deciding to sign the Protocol.

¹⁰⁹ Blomquist, *supra* note 97, at 494.

¹¹⁰ *The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity*, *supra* note 70, at art. 15(1).

¹¹¹ Watanabe, *supra* note 99, at 546.

¹¹² *Id.*

¹¹³ *Id.* at 544.

¹¹⁴ Dr. Konstantia Koutouki & Katherina Rogalla von Bieberstein, *The Nagoya Protocol: Sustainable Access and Benefits-Sharing for Indigenous and Local Communities*, 13 VT. J. ENVTL. L. 513, 531 (2012).

¹¹⁵ Watanabe, *supra* note 99, at 545

¹¹⁶ *Id.*

The Cartagena Protocol on Biosafety, adopted in 2000 and entered into force in 2003, is another addition to the CBD that should get similarly serious consideration.¹¹⁷ While outside the scope of this article, this protocol is primarily aimed at the governing of international movement of living modified organisms resulting from modern biotechnology, rather than the regulation of seed banks.

B. Hesitancy to Join the International Treaty on Plant Genetic Resources for Food and Agriculture

The U.N. Food and Agriculture Organization has played an integral role in organizing global conservation of plant genetic resources for food and agriculture, with the definition of food and agriculture being very broad.¹¹⁸ The FAO has been discussing plant genetic resources since 1946, but conservation efforts did not become active until 1967, when the first International Technical Conference on Plant Genetic Resources took place.¹¹⁹

When it comes to *Ex Situ* conservation methods like seed banks, the global plan of action adopted to implement the International Treaty focuses on sustaining existing *Ex Situ* collections, regenerating threatened *Ex Situ* accessions, supporting planned and targeted collecting of plant genetic resources, and expanding *Ex Situ* conservation activities.¹²⁰ Unlike its precursor, the International Undertaking on Plant Genetic Resources for Food and Agriculture, the International Treaty does not have a provision requiring signatories to submit annual reports to the FAO about measures taken or proposed for the exploration, preservation, evaluation, and availability of plant genetic resources.¹²¹ This should make it a more desirable treaty to join because of lessened requirements. The FAO's efforts and the International Treaty are focused on *Ex Situ* conservation, whereas the CBD emphasizes *In Situ* conservation. Both, however, focus on the standards for fair and equitable access to plant genetic material as well as benefit sharing between the contracting parties.¹²²

Article 15 of the International Treaty deals with *Ex Situ* collections, and puts "the scientific and technical facilities in which such *Ex Situ* collections are conserved ... under the authority of the International

¹¹⁷ The Cartagena Protocol on Biosafety to the Convention on Biological Diversity, Jan. 29, 2000, 2226 U.N.T.S. 208.

¹¹⁸ Gregory Rose, *International Law of Sustainable Agriculture in the 21st Century: The International Treaty on Plant Genetic Resources for Food and Agriculture*, 15 GEO. INT'L ENVTL. L. REV. 583, 587 (2003).

¹¹⁹ *Id.*

¹²⁰ *Id.* at 591.

¹²¹ *Id.* at 590.

¹²² Baranski, Marci, *International Treaty on Plant Genetic Resources for Food and Agriculture* (2001), EMBRYO PROJECT ENCYCLOPEDIA (Oct. 7, 2013), <https://embryo.asu.edu/pages/international-treaty-plant-genetic-resources-food-and-agriculture-2001>.

Agricultural Research Center (“IARC”), which undertake to manage and administer these *Ex Situ* collections in accordance with internationally accepted standards.”¹²³ Again, each nation’s opinion is considered because the IARC recognizes that the Governing Body, comprised of each country’s representatives, have the authority to make policy guidelines for those collections, just subject to the provisions of the International Treaty.¹²⁴ Additionally, a percentage of profits created from the commercialization of the plant genetic resources goes into a common fund to be used for the conservation and sustainable use of plant genetic resources efforts in developing countries and countries with economies in transition.¹²⁵ This again goes to the idea that plant biodiversity conservation is a collective concern and effort. It is in everyone’s best interest to ensure that plant biodiversity is protected, and developing countries are usually the ones with the largest range of biodiversity as well as facing the biggest threats to extinction.

The IARC also oversees a network of seed banks that operate through Material Transfer Agreements (“MTA”).¹²⁶ When a seed bank receives germplasms, the MTA states that they are holding those germplasms as trustees for the work community for public benefit, and that the holder cannot assert any legal ownership or intellectual property rights over the germplasm or related information.¹²⁷ This alleviates concerns that have been brought up regarding companies afraid of losing intellectual property rights to their protected seeds. By participating in these seed bank networks, United States’ researchers and scientists get the added benefit of sharing and receiving information from seed banks all over the world.

CONCLUSION

Conservation of the world’s plant biodiversity is a responsibility we have to all future generations, and one that should be taken very seriously in its methodology and regulation. Protection of plant seeds is justified with a dual-purpose, anthropocentric and biocentric, meaning that not only are they valuable in their economic and resource value to man, but they have intrinsic value worthy of protection from extinction.¹²⁸ Both of these purposes are served by strengthening seed banks and other plant biodiversity conservation efforts.

¹²³ *International Treaty for Plant Genetic Resources for Food and Agriculture*, *supra* note 3, at art. 15.1(d).

¹²⁴ *Id.* at art. 15.1(c).

¹²⁵ *Id.* at art. 15.1(b)(iii).

¹²⁶ Rose, *supra* note 118, at 595.

¹²⁷ *Id.*

¹²⁸ Matthew Schuckman, *Making the Hard Choices: A Collaborative Governance Model for the Biodiversity Context*, 79 WASH. U.L.Q. 343, 347 (Spring 2001).

With the expectation that seed banks will be a long-term solution, the domestic and international policies that regulate them should also take into consideration long-term goals and plans. The late Nobel laureate Wangari Maathai commented on the publicity that seed vaults like Svalbard were receiving, stating that “[t]he significant public interest in the seed vault project indicates that collectively we are changing the way we think about environmental conservation. We now understand that along with international movements to save endangered species and the rainforests of the world, it is just as important for us to conserve the diversity of the world’s crops for future generations.”¹²⁹

This changing generational view on environmental conservation means that prior beliefs on how the country should go about protecting its biodiversity need to be reassessed under the light of new information and collective interests. While the United States may have had its reasons in the past to withhold joining the Convention on Biological Diversity and its subsequent protocols, the benefits outweigh the negligible reasons for why it should not move to obtain full membership now. Seed banks like Svalbard and Millennium are paving the path for the future of crop biodiversity, and they are able to do so because the nations that house them have adopted the necessary international principles.

Where the International Treaty on Plant Genetic Resources for Food and Agriculture can be read to be more specifically targeting and regulating seed banks, the Convention on Biological Diversity encompasses broader plant biodiversity conservation. A strategic implementation of both can reap positive results such as protecting endangered plant species and improving food security. Even while the United States remains a non-party to both of these international doctrines, they are still affected by them because countries that it interacts with have implemented those rules.¹³⁰ For example, the National Plant Germplasm System’s Plant Exploration Program has reported that it is difficult to collect plant material from other countries because those countries have access and benefits to sharing laws that the United States is not in accordance with.¹³¹

Joining the Convention on Biological Diversity would not be unduly burdensome for the United States because many of the requirements, such as a system of protected areas, laws on endangered species, and acknowledgement of tribal rights, are already in place.¹³² As William

¹²⁹ Ola T. Westengen, Simon Jeppson & Luigi Guarino, *Global Ex-Situ Crop Diversity Conservation and the Svalbard Global Seed Vault: Assessing the Current Status*, 5 PLOS ONE 8, 9 (May 2013), available at <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0064146>.

¹³⁰ Amy Hackney Blackwell, *Botanical Gardens: Driving Plant Conservation Law*, 5 KY. J. EQUINE, AGRIC. & NAT. RESOURCES L. 1, 29 (2012-2013).

¹³¹ *Id.*

¹³² *Id.* at 31.

J. Snape, III at the Center for Biological Diversity expressed, “younger and future generations of American and global citizens will thank the President and Senate that finally enables the United States to take its rightful place as a member of the Convention on Biological Diversity.”¹³³ As natural and man-made disasters plague the news, efforts need to be made now to protect the livelihood of generations to come, and as a species that survives on plants, our protection of biodiversity through well-regulated seed banks is more urgent than ever. While significant advances have been made by seed bank projects in Hawaii and Colorado, more structured collaborative environmentalism initiatives in the United States are necessary for long-term and widespread biodiversity protection.

¹³³ Snape, *supra* note 94.