

**BIOPIRACY: USING NEW LAWS AND DATABASES TO PROTECT  
INDIGENOUS COMMUNITIES**

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*“The patenting and piracy of life — of biodiversity, of natural processes, and nature itself . . . — is a violation of spiritual law, ecological law, biodiversity laws and human rights laws.”*

- Vandana Shiva<sup>1</sup>

## I. INTRODUCTION

[1] Indigenous people have a historical link to those who inhabited a country or region at the time when people of different cultures or origins arrived.<sup>2</sup> Traditionally, indigenous people have a special relationship with their ancestral environments.<sup>3</sup> But their way of living has long been under threat. The land that indigenous people live on is home to over 80% of our planet’s biodiversity, but it continues to be appropriated and plundered due to bioprospecting or, as some call it, biopiracy.<sup>4</sup> Bioprospecting is defined as “the exploration and information gathering of genetic and biochemical material to develop commercial products.”<sup>5</sup> While innovation is welcomed

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<sup>1</sup> Vandana Shiva, *We are Earth, we are nature. Patenting biodiversity means stealing the nature of life*, LIFE GATE (June 18, 2020), <https://www.lifegate.com/biodiversity-vandana-shiva> [perma.cc/ARQ7-N8FF].

<sup>2</sup> *Indigenous Peoples*, AMNESTY INT’L, <https://www.amnesty.org/en/what-we-do/indigenous-peoples/> [perma.cc/SP94-ZB2T] (last visited Mar. 27, 2023).

<sup>3</sup> *Id.*

<sup>4</sup> *Id.*; see Claudia Sobrevila, *The Role of Indigenous Peoples in Biodiversity Conservation: The Natural but Often Forgotten Partners*, THE WORLD BANK (May 2008), <https://sacredland.org/wp-content/uploads/2019/11/World-Bank-Indigenous-Peoples-in-Biodiversity-Conservation.pdf> [perma.cc/WA64-F38T] (“Traditional indigenous territories encompass up to 22 percent of the world’s land surface and they coincide with areas that hold 80 percent of the planet’s biodiversity . . . . [T]he greatest diversity of indigenous groups coincides with the world’s largest tropical forest wilderness areas in the Americas (including Amazon), Africa, and Asia, and 11 percent of world forest lands are legally owned by Indigenous Peoples and communities.”).

<sup>5</sup> Mar Campins Eritja, *Bio-Prospecting in the Arctic: An Overview of the Interaction Between the Rights Of Indigenous Peoples And Access And Benefit Sharing*, 44 B.C. ENV’T AFF. L. REV. 223, 224 (2017).

in our society, bioprospecting often involves fundamental issues of injustice and unfairness.<sup>6</sup> The injustice and unfairness present during bioprospecting led to the creation of the term “biopiracy,” which is when corporations, researchers, and scientists use sources from nature and traditional knowledge without consent and exploit the indigenous cultures from which they have obtained their information.<sup>7</sup> When the term biopiracy was first coined in 1993 by Pat Mooney, president of the Rural Advancement Foundation International, he defined it as:

[T]he use of intellectual property systems to legitimize the exclusive ownership and control of *biological resources and knowledge*, without recognition, compensation or protection for contributions from indigenous and rural communities . . . .<sup>8</sup>

[2] Through biopiracy, biopirates<sup>9</sup> misappropriate the genetic resources and traditional knowledge of countries and indigenous people without their consent.<sup>10</sup> These corporations and researchers usually go on to patent this information so that they can profit from it.<sup>11</sup> Intellectual property rights to

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<sup>6</sup> Tak Jong Kim, *Expanding the Arsenal Against Biopiracy: Application of the Concession Agreement Framework to Prevent Misappropriation of Biodiversity*, 14 SMU SCI. & TECH. L. REV. 69, 70 (2017).

<sup>7</sup> *Bioprospecting and Biopiracy*, NOVOTECH (Aug. 22, 2022), <https://novotech-cro.com/faq/bioprospecting-and-biopiracy> [perma.cc/DR85-7PCW].

<sup>8</sup> Gian Carlo Delgado, *Biopiracy and Intellectual Property as the Basis for Biotechnological Development: The Case of Mexico*, 16 INTL J. POL., CULTURE & SOC’Y 297, 299 (2002).

<sup>9</sup> Maria Fonseca, *2019 Amazon Rainforest’s Fires, Ecocide and Blockchain*, INTELLIGENTHQ, <https://www.intelligenthq.com/2019-amazon-rainforests-fires-ecocide-blockchain/> [perma.cc/9ZHE-EBXB] (last visited Jan. 24, 2024).

<sup>10</sup> Rachel Wynberg, *Biopiracy: Crying Wolf or a Lever for Equity and Conservation?*, 52 RSCH. POL’Y 1, 1 (2023).

<sup>11</sup> *Id.*

knowledge accumulated over generations are important to the survival of indigenous communities.<sup>12</sup> The intellectual property in indigenous communities is considered to be their traditional knowledge, or TK.<sup>13</sup> TK refers to an “inventory of natural resources, including species of local flora and fauna, and an understanding that certain combinations of plant and animal extracts may yield certain effects when administered to a patient in a particular way.”<sup>14</sup>

[3] Generally, the corporations and researchers committing biopiracy come from the Global North, while the pillaged communities are located in the Global South.<sup>15</sup> Much of the world’s biodiversity is concentrated in the Global South, but industrialized countries in the North are usually the ones with the technological capacities for transforming genetic raw materials into commercial products, such as pharmaceuticals and cosmetics.<sup>16</sup> Researchers and companies take advantage of a lack of regulation in certain countries and patent the biological substances they find, without recognizing or compensating the local communities that traditionally use the substance.<sup>17</sup>

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<sup>12</sup> Winston P. Nagan & Craig Hammer, *The Conceptual and Jurisprudential Aspects of Property in the Context of the Fundamental Rights of Indigenous People: The Case of the Shuar of Ecuador*, 58 N.Y.L. SCH. L. REV. 875, 877 (2013) (“There is perhaps no issue more central to the survival of indigenous nations, groups, and peoples around the world than the question of property—both real and intellectual.”).

<sup>13</sup> *Id.* at 879.

<sup>14</sup> *Id.* at 880.

<sup>15</sup> See Florian Rabitz, *Biopiracy after the Nagoya Protocol: Problem Structure, Regime Design and Implementation Challenges*, 9 BRAS. POL. SCI. REV. 30, 31 (2015).

<sup>16</sup> *Id.*

<sup>17</sup> Laura Grebe, *Requiring Genetic Source Disclosure in the United States*, MARQ. UNIV. L. SCH. LEGAL STUD. RSCH. PAPER SERIES, RESEARCH PAPER NO. 10–13, at 3 (2010), available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1600254](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1600254) [perma.cc/8TZM-QUXT].

[4] Biopiracy is not a new phenomenon. Formerly colonized countries have had many of their resources, such as pepper, sugar, coffee, and rubber, forcibly removed.<sup>18</sup> For instance, Brazil once had a thriving rubber industry.<sup>19</sup> But in 1876, Henry Wickham, a rubber tapper under contract to the Royal Botanic Gardens at Kew in London, collected 70,000 highly perishable *Hevea* rubber seeds from Santarém in Brazil.<sup>20</sup> After collecting the seeds, Wickham quickly set sail for Kew, where the seeds were immediately germinated and sent to the British colonies in India.<sup>21</sup> These seeds were used to establish plantations in Southeast Asia, essentially wiping out the Brazilian rubber industry.<sup>22</sup> Brazilian officials vilified Wickham, and others called him a thief.<sup>23</sup>

[5] The problem of biopiracy persists today in the Global South, despite the existence of international treaties, such as the Convention on Biological Diversity and the Nagoya Protocol, which both require consent before taking resources as well as sharing benefits with the nations and communities where the resources come from.<sup>24</sup> For example, a 2022 study

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<sup>18</sup> Janna Rose, *Biopiracy: when indigenous knowledge is patented for profit*, THE CONVERSATION (Mar. 7, 2016, 7:32 PM), <https://theconversation.com/biopiracy-when-indigenous-knowledge-is-patented-for-profit-55589> [perma.cc/PAQ4-WBGY].

<sup>19</sup> See Michael Gollin, *Biopiracy started with a bounce*, NATURE (Feb. 27, 2008), <https://www.nature.com/articles/4511055a> [perma.cc/Z2VK-S93M] (explaining that Henry Wickham's actions broke the Amazon rubber monopoly).

<sup>20</sup> *Id.*

<sup>21</sup> *Id.*

<sup>22</sup> *Can Blockchain Save the Amazon?*, SPACETIME LABS (Apr. 20, 2018), <https://www.spacetimelabs.ai/media-and-publications/can-blockchain-save-the-amazon> [perma.cc/7G2F-RXML].

<sup>23</sup> Gollin, *supra* note 19.

<sup>24</sup> *About the Nagoya Protocol*, CONVENTION ON BIOLOGICAL DIVERSITY (June 9, 2015), <https://www.cbd.int/abs/about/#importance> [perma.cc/3UVM-YL5X].

at the Federal University of Juiz de Fora found evidence of the biopiracy of secretions from the Amazonian Kambor frog.<sup>25</sup> The frog's secretions have been used by 15 indigenous groups for its analgesic and antibiotic properties.<sup>26</sup> The study found evidence that 11 patents that may stem from the appropriation of genetic resources and the TK of indigenous peoples had been registered in developed countries.<sup>27</sup> Loopholes in international conventions on patents and biodiversity make it legal to appropriate knowledge from the South.<sup>28</sup> Further, countries in the Global North have a more efficient bureaucratic system and a concentration of economic power, which facilitates biopiracy.<sup>29</sup>

[6] Indigenous people have the right to control and profit from the resources found on their lands and the knowledge that they have cultivated for thousands of years. This paper considers solutions that would protect indigenous communities from the practice of biopiracy. Part II first discusses the effects of biopiracy on indigenous communities and developing nations. It also includes a case study of how biopiracy has negatively impacted the Guaraní community of the Amazon and how this treatment goes against the United Nations Declaration on the Rights of Indigenous Peoples.

[7] Part III discusses domestic and international frameworks that have failed to protect indigenous communities: the U.S. patent system, the Convention on Biological Diversity, the Nagoya Protocol, and the TRIPS

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<sup>25</sup> Lucas Pordeus Leon, *Study finds evidence of biopiracy of indigenous knowledge from Brazil*, AGÊNCIA BRASIL (Apr. 6, 2022), <https://agenciabrasil.ebc.com.br/en/geral/noticia/2022-04/study-finds-evidence-biopiracy-indigenous-knowledge-brazil> [perma.cc/B845-52CB].

<sup>26</sup> *Id.*

<sup>27</sup> *Id.*

<sup>28</sup> *Id.*

<sup>29</sup> *Id.*

Agreement. Part IV discusses the recent development of digital sequencing information which has worsened the issue of biopiracy. This section also discusses how biopiracy was recently addressed at COP15, which occurred in December 2022. Part V discusses my proposed solutions for curbing biopiracy and protecting the rights of indigenous communities: countries in both the Global North and Global South should create laws that adhere to the Convention on Biological Diversity and Nagoya Protocol, and countries in the Global South should map genetic resources on the blockchain and create TK libraries to be shared with patent examiners around the world.

## II. EFFECTS OF BIOPIRACY ON INDIGENOUS COMMUNITIES AND DEVELOPING NATIONS

[8] Many developing countries suffer financially due to biopiracy.<sup>30</sup> When corporations steal knowledge and claim ownership over it, they take away a developing country's opportunity to fund their own projects and support their indigenous communities.<sup>31</sup> Western corporations have monopolies over resources derived from the Global South.<sup>32</sup> People who have been cultivating and using the source of these products for generations are now unable to compete in the global marketplace with their own natural resources because that control is now possessed by Western institutions.<sup>33</sup> Protecting TK would benefit countries by giving them and their indigenous communities control over their knowledge and a chance to commercialize products associated with it.<sup>34</sup> Products deriving from TK have proven to be

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<sup>30</sup> Tanya Wyatt & Avi Brisman, *The Role of Denial in the 'Theft of Nature': Comparing Biopiracy and Climate Change*, 25 CRITICAL CRIMINOLOGY 325, 329 (2016).

<sup>31</sup> *Id.*

<sup>32</sup> *Id.*

<sup>33</sup> *Id.*

<sup>34</sup> Jay Erstling, *Using Patents to Protect Traditional Knowledge*, 15 TEX. WESLEYAN L. REV. 295, 299 (2009).

very lucrative.<sup>35</sup> TK-based products include lucrative plant-based medicines, cosmetics, health products, and more.<sup>36</sup> Unfortunately, indigenous communities rarely see any of the money earned from those products.<sup>37</sup> Further, countries and indigenous communities want to protect their resources and TK to protect their livelihoods and stop the depletion of biodiversity and associated TK practices.<sup>38</sup> Many indigenous communities depend on TK for their livelihoods and well-being as well as to sustainably manage and exploit their local ecosystems.<sup>39</sup>

[9] Protecting TK would allow the local communities “to maintain livelihood security and physical well-being while also providing opportunities for economic development.”<sup>40</sup> Additionally, biopiracy can cause “irreparable” harm to biodiversity, which leads to the destruction of the environment that indigenous communities cherish.<sup>41</sup> For instance, biopiracy has led to practices like monocropping, the practice of growing large amounts of a single crop on the same land, which fails to provide the

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<sup>35</sup> *Id.*

<sup>36</sup> *Id.*

<sup>37</sup> Daniella Silva, *Biopiracy: the largely lawless plundering of Earth’s genetic wealth*, THINK LANDSCAPE (Dec. 15, 2020), [https://thinklandscape.globallandscapesforum.org/48905/biopiracy-the-largely-lawless-plundering-of-earths-genetic-wealth/\[perma.cc/4KAH-YSP4\]](https://thinklandscape.globallandscapesforum.org/48905/biopiracy-the-largely-lawless-plundering-of-earths-genetic-wealth/[perma.cc/4KAH-YSP4]).

<sup>38</sup> Oluwatobiloba Moody, *Addressing Biopiracy Through an Access and Benefit Sharing Regime-Complex: In Search of Effective Protection for Traditional Knowledge Associated with Genetic Resources*, 16 ASPER REV. 231, 233 (2016).

<sup>39</sup> Erstling, *supra* note 34, at 299.

<sup>40</sup> *Id.*

<sup>41</sup> C.L. Akurugoda, *Bio Piracy and its Impact on Bio Diversity: A Critical Analysis with Special Reference to Sri Lanka*, 2 INT’L J. BUS. ECON. & L. 48, 49 (2013).



diversity necessary for a healthy ecosystem.<sup>42</sup> On the other hand, traditional methods of farming enhance and preserve plant and animal diversity.<sup>43</sup> Biopiracy and the depletion of resources can hinder indigenous communities' access to medicine.<sup>44</sup> Further, biopiracy of live animals has caused the extinction of certain species.<sup>45</sup> For example, Bulath Hapaya is now an endangered freshwater fish species in Sri Lanka due to the illegal export of ornamental fish.<sup>46</sup>

### A. The Guaraní and Stevia

[10] The Guaraní is Latin America's largest indigenous tribe, with territory in both Brazil and Paraguay.<sup>47</sup> For generations, the Guaraní have cultivated the "ka'a he'e," which is the Guaranian name for the sweet wild herb that the rest of the world knows as stevia.<sup>48</sup> The Guaraní have long

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<sup>42</sup> Faye Sakellaridis, *Biopiracy: When Corporations Patent Nature*, SYNERGETIC PRESS (Mar. 20, 2020), <https://synergeticpress.com/blog/sustainability-ecology/biopiracy-corporations-patent-nature/> [perma.cc/TQ8F-HYB7].

<sup>43</sup> Erstling, *supra* note 34, at 299.

<sup>44</sup> Tim K. Mackey & Bryan A. Liang, *Integrating Biodiversity Management and Indigenous Biopiracy Protection to Promote Environmental Justice and Global Health*, 102 AM. J. PUB. HEALTH 1091, 1091 (2012).

<sup>45</sup> *What is Biopiracy?*, VEDANTU, <https://www.vedantu.com/biology/biopiracy> [perma.cc/6YJY-V5TT] (last visited Jan. 25, 2024).

<sup>46</sup> *Id.*

<sup>47</sup> Mark Schapiro, *After Centuries of Exploitation, Will Indigenous Communities in Biodiversity Hotspots Finally Get Their Due?*, CIV. EATS (Mar. 7, 2023), <https://civileats.com/2023/03/07/after-centuries-of-exploitation-will-indigenous-communities-in-biodiversity-hotspots-finally-get-their-due/> [https://perma.cc/2EAS-DZCD].

<sup>48</sup> Eric J. Wallace, *The Indigenous Tribes Fighting to Reclaim Stevia From Coca-Cola*, GASTRO OBSCURA (July 12, 2019), <https://www.atlasobscura.com/articles/where-is-stevia-from> [https://perma.cc/JU9A-D5A8].

used stevia as a sweetener, antiseptic, digestive aid, astringent, and antiparasitic.<sup>49</sup> Coca-Cola, PepsiCo, and other companies have used the Guaranian herb to build an industry valued at nearly \$500 million per year.<sup>50</sup> The West did not “discover” the usefulness of the herb but were rather introduced to it by the Guaraní.<sup>51</sup> Wealthy companies have now patented the herb and continue to profit from and take credit for the knowledge of the Guaraní people.<sup>52</sup> Despite the Guaraní being used in marketing materials for stevia, the indigenous community has never been consulted or compensated for their herb.<sup>53</sup> Today, the ka’a he’e is critically endangered in its native growing region because of biopiracy.<sup>54</sup> In 2017, the Guaraní and the Swiss NGO Public Eye protested the commercialization of stevia, denouncing “the multinationals that make profits based on their knowledge and their biodiversity.”<sup>55</sup> The protests called for Coca-Cola and other companies to agree to share the financial benefits with the tribe.<sup>56</sup> Their demands were ignored, and they have not been met to date.<sup>57</sup>

[11] While the Convention on Biological Diversity (CBD) and the Nagoya Protocol (discussed in further detail below) were designed to stop this type of abuse, neither have been adopted by all countries, and, notably,

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<sup>49</sup> *Id.*

<sup>50</sup> *Id.*

<sup>51</sup> *Id.*

<sup>52</sup> *Id.*

<sup>53</sup> Wallace, *supra* note 48.

<sup>54</sup> *Stevia*, SPECIALTY PRODUCE, [https://specialtyproduce.com/produce/Stevia\\_10831.php](https://specialtyproduce.com/produce/Stevia_10831.php) [perma.cc/YBU8-2MK5] (last visited Feb. 5, 2024).

<sup>55</sup> Schapiro, *supra* note 47.

<sup>56</sup> *Id.*

<sup>57</sup> *Id.*

the U.S. has refused to ratify either convention.<sup>58</sup> Both conventions require prior informed consent from indigenous communities to commercialize products using indigenous resources and knowledge, and indigenous people must receive a fair share of benefits derived from use of such resources and knowledge.<sup>59</sup> If countries were abiding by the CBD and Nagoya Protocol, the Guaraní people and the states of Brazil and Paraguay would have the choice of consenting to the use of stevia for commercial purposes.<sup>60</sup> If they provided their consent, the Guaraní people would also be entitled to receive a share of the resulting benefits derived from the commercial use of stevia.<sup>61</sup> But this has not happened so far.<sup>62</sup> Today, “nefarious actors in the food and drinks industry continue to enrich themselves with impunity as they use ‘stolen’ resources.”<sup>63</sup>

### **B. United Nations Declaration on the Rights of Indigenous Peoples**

[12] The treatment of indigenous communities due to biopiracy is contrary to the rights given to them by the United Nations Declaration on the Rights of Indigenous Peoples.<sup>64</sup> According to the declaration, indigenous people should have control over developments affecting them

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<sup>58</sup> *Stevia*, PUBLIC EYE (May 1, 2018), <https://www.publiceye.ch/en/topics/archive/biopiracy/case-studies/stevia> [perma.cc/M5WE-DDF6] [hereinafter *Stevia*].

<sup>59</sup> *Id.*

<sup>60</sup> *Id.* (“[I]f someone wants to use stevia for commercial purposes, then the Guaraní people and the states of Brazil and Paraguay must have the choice of consenting, or not, and where applicable they must receive a share of the resulting benefits.”).

<sup>61</sup> *Id.*

<sup>62</sup> *Id.*

<sup>63</sup> *Stevia*, *supra* note 58.

<sup>64</sup> See G.A. Res. 61/295, United Nations Declaration on the Rights of Indigenous Peoples (Sept. 13, 2007).

and their lands, territories, and resources.<sup>65</sup> Control will enable these communities to maintain and strengthen their institutions, cultures, and traditions.<sup>66</sup> The declaration also recognizes that “respect for indigenous knowledge, cultures, and traditional practices contributes to sustainable and equitable development and proper management of the environment.”<sup>67</sup> Importantly, the declaration notes that states shall provide redress through effective mechanisms, such as restitution, concerning indigenous peoples’ cultural, intellectual, religious, and spiritual property taken without their free, prior, and informed consent or in violation of their laws, traditions, and customs.<sup>68</sup> Despite the existence of this declaration, the rights of indigenous communities continue to be ignored due to Western-driven patent systems and hard-to-enforce international treaties.<sup>69</sup>

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<sup>65</sup> *Id.*

<sup>66</sup> *Id.*

<sup>67</sup> *Id.*

<sup>68</sup> *Id.*

<sup>69</sup> See Erica-Irene A. Daes, Lecture at the Museum of Sydney: The Impact of Globalization on Indigenous Intellectual Property and Cultures (May 25, 2004).

### III. INADEQUATE DOMESTIC AND INTERNATIONAL FRAMEWORKS

#### A. The U.S. Patent System

[13] The rights of indigenous communities have been largely ignored by the intellectual property rights system in the U.S.<sup>70</sup> Professor Vandana Shiva has explained that "[f]ive hundred years after Columbus, a more secular version of the same project of colonization continues through patents and intellectual property rights. . . . The creation of property through piracy of others' wealth remains the same as 500 years ago."<sup>71</sup> Patent laws give exclusive rights to the inventor of an invention.<sup>72</sup> These exclusive rights give the patent holder the right to manufacture, use, or sell the patented product.<sup>73</sup> The theory is that the person who "invents" or "discovers" something should be rewarded for their work.<sup>74</sup> However, genetic resources and TK often fail to meet the technical requirements for patent protection, such as that the object be new, non-obvious, and useful.<sup>75</sup>

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<sup>70</sup> See Aman Gebru, *Patents, Disclosure, and Biopiracy*, 96 DENV. L. REV. 535, 541 (2019) ("Patentees in the United States have repeatedly been accused of engaging in biopiracy—the act of applying for and receiving patent rights over TK without the knowledge or consent of the source community."); see also Surbhi Pareek, *Evaluating the Extent and the Effectiveness of Indigenous Peoples' Intellectual Rights Protection in the US*, JUDICATEME: LEGAL BLOG (Nov. 16, 2021), <https://judicateme.com/evaluating-the-extent-and-the-effectiveness-of-indigenous-peoples-intellectual-rights-protection-in-the-us/> [perma.cc/E9KH].

<sup>71</sup> Kim, *supra* note 6, at 70.

<sup>72</sup> Marcia Ellen DeGeer, *Biopiracy: The Appropriation of Indigenous Peoples' Cultural Knowledge*, 9 NEW ENG. J. INT'L & COMP. L. 179, 182–83 (2003).

<sup>73</sup> *Id.* at 183.

<sup>74</sup> *Id.*

<sup>75</sup> See Vandana Shiva, *Biopiracy -- U.S. Patent Law Must Change*, IATP: INST. FOR AGRIC. & TRADE POL'Y (Aug. 5, 1999), <https://www.iatp.org/news/biopiracy-us-patent-law-must-change> [perma.cc/YAXM].

Yet, numerous patents have been awarded to “discoveries” involving genetic resources and TK.<sup>76</sup>

[14] Under 35 U.S. Code § 101, whoever “invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent[.]”<sup>77</sup> A patent will not be granted if there is “prior art,” which is evidence that the invention is already known.<sup>78</sup> Specifically, it will not be granted if “the claimed invention was patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the effective filing date of the claimed invention[.]”<sup>79</sup>

[15] Prior art from other countries has been “systematically” ignored by the U.S. patent system.<sup>80</sup> For example, in 1999, a New Jersey research company, Cromak Research Inc., was granted patents on the Indian plants karela (bitter gourd), jamun (syzygium cumini), and brinjal (eggplant).<sup>81</sup> Professor Shiva has explained that the use of karela, jamun, and brinjal for the control of diabetes is common knowledge and everyday practice in India.<sup>82</sup> The use of these plants in the treatment of diabetes is documented in treatises such as the “Wealth of India,” the “Compendium of Indian

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<sup>76</sup> WIPO, *Intellectual Property and Genetic Resources*, Background Brief No. 10 (2023).

<sup>77</sup> 35 U.S.C.A. § 101 (Westlaw through P.L. 118–30).

<sup>78</sup> *What is prior art?*, EUR. PAT. OFF., <https://www.epo.org/learning/materials/inventors-handbook/novelty/prior-art.html> [<https://perma.cc/P9J3-MH4N>] (last visited Feb. 4, 2024).

<sup>79</sup> 35 U.S. Code § 102(a)(1).

<sup>80</sup> Shiva, *supra* note 75.

<sup>81</sup> *Id.*

<sup>82</sup> *Id.*

Medicinal Plants,” and the “Treatise on Indian Medicinal Plants.”<sup>83</sup> Indigenous knowledge and use constitute prior art, and patents may not be granted where prior art exists.<sup>84</sup> However, Professor Shiva has argued that U.S. patent law “does not recognise technologies and methods in use in other countries as prior art. If knowledge is new for the U.S., it is novel, event [sic] if it is part of an ancient tradition of other cultures and countries.”<sup>85</sup>

[16] Indigenous people’s knowledge is usually passed down for generations and may have been “invented” years ago.<sup>86</sup> U.S. patent law does not work in indigenous people’s favor since communal knowledge is excluded from the framework.<sup>87</sup> Further, as one legal commentator argued, “[t]he western individualized approach of patent law is not malleable to the communal nature of tribal communities.”<sup>88</sup> Many believe the system needs to be reformed to protect indigenous communities from appropriation and

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<sup>83</sup> *Id.*

<sup>84</sup> *Id.*

<sup>85</sup> Shiva, *supra* note 75.

<sup>86</sup> *See* DeGeer, *supra* note 72, at 185 (“The fact that cultural knowledge has been passed down for generations will not allow the present Indigenous communities to claim that they are the original inventor.”).

<sup>87</sup> *Id.* at 193.

<sup>88</sup> *See id.* at 185; *see also* Gebru, *supra* note 70, at 538 fn. 15 (discussing another Western-driven patent system, the EU system. Quoting “Although there are differences in the patent laws of the United States and the European Union (EU), years of international patent law harmonization has resulted in very similar patent systems on patentability requirements with only a few differences between the two jurisdictions. One of the main tools through which patent laws have been harmonized internationally is the World Trade Organization’s (WTO) Trade-Related Intellectual Property Rights Agreement.”).

exploitation.<sup>89</sup> For instance, Raghunath Mashelkar, former director general of the Council for Scientific and Industrial Research, has stated that since there are around 300,000 to 400,000 patent applications submitted in the U.S. every year, it is difficult to confirm whether such products related to karela, jamun, and brinjal plants already exist.<sup>90</sup> Mashelkar says this is why it is important to create awareness about such plants through an electronic database.<sup>91</sup>

### **B. The Convention on Biological Diversity**

[17] The CBD was adopted in 1992 at the U.N. Conference on Environment and Development in Brazil.<sup>92</sup> The objectives of the CBD are:

[1] the conservation of biological diversity, [2] the sustainable use of its components and [3] the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding.<sup>93</sup>

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<sup>89</sup> See *New Jersey-based company get patent rights on karela, brinjal*, DOWN TO EARTH (Aug. 15, 1999), <https://www.downtoearth.org.in/news/new-jerseybased-company-get-patent-rights-on-karela-brinjal-20239> [<https://perma.cc/9DJZ-BRAM>].

<sup>90</sup> *Id.*; Gebu, *supra* note 70, at 538 (explaining that patent examiners in the U.S. rarely consult unpublished sources that may disclose the claimed invention and that an invention that relies on oral history and traditional practices may still be granted without the source being considered).

<sup>91</sup> *New Jersey-based company get patent rights on karela, brinjal*, *supra* note 89.

<sup>92</sup> Ryann Beck, *Farmers' Rights and Open Source Licensing*, 1 ARIZ. J. ENV'T. L. & POL'Y 167, 184 (2010).

<sup>93</sup> *Id.*



[18] The treaty encourages the sustainable use of natural resources through its members' national conservation laws.<sup>94</sup> It also recognizes TK and that countries have the "sovereign right" over the genetic resources within their own territory.<sup>95</sup> Article 15(7) recognizes that genetic resources have commercial value and that there should be fair and equitable sharing of the benefits derived from the use of these resources.<sup>96</sup> Further, according to the treaty, members have "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."<sup>97</sup> Article 15(1) recognizes that governments have the authority to regulate physical access to genetic resources within their jurisdiction.<sup>98</sup> However, the treaty does not specifically grant indigenous communities any property rights over these resources.<sup>99</sup>

[19] The adoption of the CBD has not prevented instances of biopiracy from occurring.<sup>100</sup> For example, in 2002, the non-profit organization GRAIN listed 24 patents for African resources that were held by private firms, showing that most were registered in the U.S., followed by the

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<sup>94</sup> Convention on Biological Diversity, Preamble, art. 3, May 6, 1992, 1760 U.N.T.S. 79 [hereinafter *CBD*].

<sup>95</sup> *Id.* at art. 15.

<sup>96</sup> *Id.* at art. 15(7).

<sup>97</sup> *Id.* at art. 3.

<sup>98</sup> *Id.* at art. 15(1).

<sup>99</sup> Beck, *supra* note 92, at 187.

<sup>100</sup> Lara Bullens, *Biopiracy: The fight for fairness in the scientific exploitation of natural resources*, FRANCE24 (Sept. 12, 2022, 8:29 PM), <https://www.france24.com/en/environment/20221209-biopiracy-the-fight-for-fairness-in-the-scientific-exploitation-of-natural-resources> [<https://perma.cc/YQ5C-2XVV>].

Netherlands, Denmark, Russia, France, Japan, and Italy.<sup>101</sup> None of these private companies from the Global North included a share in their profits derived from exploiting African resources for the communities that developed them.<sup>102</sup> Another example of ongoing biopiracy occurred in 2005, when French researchers traveled to French Guiana, where they interviewed local indigenous groups to learn more about their anti-malarial remedies.<sup>103</sup> Ten years later, the French Institute for Research and Development (IRD) was granted a patent for a compound derived from the Quassia Amara plant native to Central and South America—despite local knowledge leading researchers to the anti-malarial plant.<sup>104</sup> In 2015, an appeal was filed against the patent stating that the IRD had committed biopiracy by appropriating traditional knowledge and failed to recognize the contributions of indigenous and local people.<sup>105</sup> The IRD ultimately agreed to share any potential scientific and economic benefits derived from the patent with French Guiana.<sup>106</sup> However, in 2018 the European Patent Office ruled that the IRD could retain the patent—meaning that they could exclude the local communities from using the patented remedy.<sup>107</sup>

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<sup>101</sup> Loza Seleshie, *Biopiracy: How can African countries protect their plants and traditions?*, AFR. REP. (Oct. 15, 2021, 2:01 PM), <https://www.theafricareport.com/135045/biopiracy-how-can-african-countries-protect-their-plants-and-traditions/> [https://perma.cc/S6XS-AXX2].

<sup>102</sup> *Id.*

<sup>103</sup> Bullens, *supra* note 100.

<sup>104</sup> *Id.*

<sup>105</sup> *Id.*

<sup>106</sup> *Id.*

<sup>107</sup> *Id.*

[20] Notably, the U.S. signed the CBD but did not ratify it.<sup>108</sup> The U.S. objected to the provisions on intellectual property, benefit sharing, and the requirements for domestic conservation.<sup>109</sup> According to the Vienna Convention on the Law of Treaties, because the U.S. signed the CBD, it is obligated to not defeat the purpose of the treaty.<sup>110</sup> However, acts of biopiracy committed by U.S. companies have continued unabated since the U.S. government signed the CBD.<sup>111</sup> U.S. companies hold many patents on genetic resources deriving from other countries, and some scholars have argued that these companies have “no interest in benefit-sharing, only in benefiting.”<sup>112</sup>

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<sup>108</sup> See Vanessa Danley, *Biopiracy in the Brazilian Amazon: Learning from International and Comparative Law Successes and Shortcomings to Help Promote Biodiversity Conservation in Brazil*, 7 FLA. A&M U. L. REV. 291, 304 (2012); see also Beck, *supra* note 92, at 187 (“From the time of the treaty’s negotiation, the United States voiced its discomfort with the potentially limitless amount of funding and technology that the CBD could obligate the United States to divert to developing countries.”).

<sup>109</sup> Danley, *supra* note 108, at 304.

<sup>110</sup> Vienna Convention on the Law of Treaties art. 18, May 23, 1969, 1155 U.N.T.S. 331 (1969).

<sup>111</sup> See Anthony Boadle, *Brazil probes California firm for 'biopiracy' of tropical fruit açai*, REUTERS (June 12, 2018, 7:52 PM), <https://www.reuters.com/article/us-brazil-biopiracy/brazil-probes-california-firm-for-biopiracy-of-tropical-fruit-aa-idUSKBN1J82SJ> [<https://perma.cc/EAR3-8VXK>] (discussing that in 2018, Brazil was investigating a U.S. company for alleged biopiracy, accusing it of illegally using genetic components of the açai berry in nutritional supplements).

<sup>112</sup> Danley, *supra* note 108, at 304.

### C. The Nagoya Protocol

[21] The U.S. is also not a member of the Nagoya Protocol, a supplementary agreement to the CBD.<sup>113</sup> The Nagoya Protocol provides a framework for the implementation of the fair and equitable sharing of benefits arising out of the utilization of genetic resources.<sup>114</sup> The protocol was adopted in 2010 and went into force in 2014.<sup>115</sup> Protocol members commit to ensuring that there is informed consent with mutually agreed-upon terms when research occurs and dispute resolution procedures when such terms have been violated.<sup>116</sup> Further, under the protocol, members commit to monitoring the utilization of genetic resources, cooperating with indigenous and local communities, and taking into consideration these communities' customary laws.<sup>117</sup> To figure out how to comply with the Nagoya Protocol, there is an Access and Benefit-Sharing (ABS) Clearing House website that describes the policies of each member country.<sup>118</sup> Member countries have implemented several policies to enforce the Nagoya Protocol: certificates of compliance, reports on research findings to the local communities, and agreements that detail the transfer of intellectual property and benefits-sharing.<sup>119</sup>

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<sup>113</sup> Jackie Salwa, *The Nagoya Protocol: Regulating Research in the Wake of Biopiracy*, JD SUPRA (Dec. 9, 2022), <https://www.jdsupra.com/legalnews/the-nagoya-protocol-regulating-research-2647225/> [<https://perma.cc/R4S-SXMW>].

<sup>114</sup> *Id.*

<sup>115</sup> *About the Nagoya Protocol*, *supra* note 24.

<sup>116</sup> Salwa, *supra* note 113.

<sup>117</sup> *Id.*

<sup>118</sup> *Id.*

<sup>119</sup> *Id.*

[22] The Nagoya Protocol is difficult to enforce.<sup>120</sup> Specifically, it is burdensome to keep track of where biological resources come from, how they are used, and who is profiting from them.<sup>121</sup> Further, the degree to which fair and equitable benefit-sharing will be achieved under Nagoya largely depends on the implementation of the protocol in major user jurisdictions.<sup>122</sup> For example, the European Union has shown a willingness to cooperate with the demands of countries that require access and benefit-sharing.<sup>123</sup> Some research institutions and companies are also trying to comply with ABS rules.<sup>124</sup> However, others still circumvent regulations.<sup>125</sup> Professor Daniel Robinson argues that “[s]ometimes this is due to naivete, but sometimes it’s researchers willing to take the risk.”<sup>126</sup>

[23] Few access and benefits contracts have been negotiated as a result of the Nagoya Protocol.<sup>127</sup> Those that do exist have resulted in “trivial” profits back to indigenous communities.<sup>128</sup> The percentage of benefits that go back to communities can be as low as 0.1% of total corporate profits.<sup>129</sup> A well-known example of “inadequate benefit sharing and questionable

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<sup>120</sup> *Can Blockchain Save the Amazon?*, *supra* note 22.

<sup>121</sup> *Id.*

<sup>122</sup> Rabitz, *supra* note 15, at 45.

<sup>123</sup> *Id.* at 31–32.

<sup>124</sup> DW Planet A, *Biopiracy: How Companies Are Buying Up Nature*, YOUTUBE (Nov. 11, 2022), <https://www.youtube.com/watch?v=0WHeUG9UW7A> [<https://perma.cc/8KWH-YDDX>].

<sup>125</sup> *Id.*

<sup>126</sup> *Id.*

<sup>127</sup> Silva, *supra* note 37.

<sup>128</sup> *Id.*

<sup>129</sup> *Id.*

prior informed consent” is the Hoodia cactus, an appetite suppressant that capitalized on the traditional knowledge of the San people.<sup>130</sup> For thousands of years, the San people of South Africa used the Hoodia plant to suppress their appetite and give them energy for hunting or long trips.<sup>131</sup> The San people also shared their traditional knowledge with outsiders for small gifts.<sup>132</sup> Hoodia was then patented by the South African Council for Scientific and Industrial Research, and the exclusive rights were sold to a British company.<sup>133</sup> The rights were eventually sold to Pfizer for \$25 million.<sup>134</sup> After public outcry, it was agreed that the San people would

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<sup>130</sup> Press Release, Report Points to Widespread Biopiracy in Africa, EDMONDS INST. AND AFRICAN CTR. FOR BIOSAFETY (Jan. 30, 2006) [hereinafter Report Points to Widespread Biopiracy in Africa].

<sup>131</sup> *Leveraging Economic Growth through Benefit Sharing*, WORLD INTELL. PROP. ORG., <https://www.wipo.int/ipadvantage/en/details.jsp?id=2594> [<https://perma.cc/22MN-DP4S>] (last visited Feb. 4, 2024).

<sup>132</sup> *See id.*; see also Lere Amusan, *Politics of Biopiracy: An Adventure Into Hoodia/Xhoba Patenting in Southern Africa*, 14 AFR. J. TRADITIONAL, COMPLEMENTARY ALT. MEDS. 103, 103 (2018), <https://journals.athmsi.org/index.php/ajtcam/article/view/4510/pdf> [<https://perma.cc/5A4S-ABGZ>] (“Hoodia’s chemical composition as a source of obesity treatment, a common disease in developed states, is a traditional knowledge (TK) of the San peoples confined to a community with culturally based way of life. Information gathered from the San people on the use of the plant led to the laboratory research commissioned by Council for Scientific and Industrial Research (CSIR). When the breakthrough was achieved, the owners of the knowledge were not consulted.”).

<sup>133</sup> *See* Report Points to Widespread Biopiracy in Africa, *supra* note 130.

<sup>134</sup> Seleshie, *supra* note 101.

receive 6% of all royalties when the drug reached the market.<sup>135</sup> This percentage has been criticized as “miniscule.”<sup>136</sup>

#### D. The TRIPS Agreement

[24] The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement) is administered by the World Trade Organization.<sup>137</sup> It is a multilateral treaty, signed by 125 states in 1994,<sup>138</sup> which aims to “reduce distortions and impediments to international trade.”<sup>139</sup> Article 27 of the treaty states that patents shall be available for any invention, whether products or processes, in all fields of technology, as long as they are new, involve an inventive step, and are capable of industrial

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<sup>135</sup> *Sharing the Secrets of the Hoodia: San to Reap Financial Benefits of Traditional Knowledge*, CULTURAL SURVIVAL (May 2, 2003), <https://www.culturalsurvival.org/news/sharing-secrets-hoodia-san-reap-financial-benefits-traditional-knowledge> [<https://perma.cc/BG57-VY3G>] (“The money will be placed in a trust administered by representatives of the regional San Councils, WIMSA and CSIR. A payment of \$32,000 has already been made, and the San have big plans for the windfall.”).

<sup>136</sup> See Press Release, Report Points to Widespread Biopiracy in Africa, *supra* note 130; see also Seleshie, *supra* note 101 (“After a long legal battle, a memorandum of understanding as the basis for benefit-sharing negotiations was signed in 2002 between the CSIR and representatives of the San community. A gesture that may be more symbolic than legally binding.”); see also *Case Study: Hoodia Cactus (South Africa)*, CASE W. RSRV. U., <https://case.edu/affil/sce/authorship-spring2004/hoodia.html> [<https://perma.cc/NMY3-7VF5>] (last visited Jan. 25, 2024) (“Not everyone, however, is hailing the outcome of this case a success. Dr. Tewolde Berhan Egziabher, of the Institute for Sustainable Development in Ethiopia, said ‘they (pharmaceutical firms) are stealing the loaf and sharing the crumbs.’ Nevertheless, Egziabher goes on to concede ‘after centuries of unjust and unfair extraction of our resources that continues today, this is a small step towards justice.’”).

<sup>137</sup> Agreement on Trade-Related Aspects of Intellectual Property Rights, Apr. 15, 1994, 1869 U.N.T.S. 299 [hereinafter TRIPS Agreement].

<sup>138</sup> Beck, *supra* note 92, at 188.

<sup>139</sup> TRIPS Agreement, *supra* note 137, at 320.

application.<sup>140</sup> Further, patents shall be available without discrimination as to the place of the invention or whether products are imported or locally produced.<sup>141</sup> While many nations are critical of adopting rights in nature, they often feel pressure to comply with the world trade system.<sup>142</sup> These rights “disregard the knowledge and historical contributions of Indigenous Peoples in nurturing those natural resources.”<sup>143</sup>

[25] Moreover, Article 27.2 provides a general exception and states that a member need not grant patents for inventions objected to as being contrary to public order or morality, including inventions that would damage the environment.<sup>144</sup> However, 27.3 states that “[m]embers shall provide for the protection of plant varieties either by patents by an effective *sui generis* system or by any combination thereof,”<sup>145</sup> meaning that members are not permitted to completely refrain from offering plant monopoly rights.<sup>146</sup>

#### **E. No Mutual Support Between TRIPS and Biodiversity Treaties**

[26] There is debate on whether the CBD and the Nagoya Protocol are compatible with the TRIPS Agreement. The TRIPS Agreement allows genetic resources and TK to be patented, while the CBD and Nagoya assign

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<sup>140</sup> *Id.* at 331.

<sup>141</sup> *Id.*

<sup>142</sup> DeGeer, *supra* note 72, at 193.

<sup>143</sup> *Id.*

<sup>144</sup> TRIPS Agreement, *supra* note 137, at art. 27.2.

<sup>145</sup> *Id.* at art. 27.3.

<sup>146</sup> *Id.*; Beck, *supra* note 92, at 188.



sovereignty in biological resources to the countries that possess them.<sup>147</sup> The biodiversity treaties may prevail in some countries and may be trumped by intellectual property rights in others.<sup>148</sup> The TRIPS Agreement also does not have any provision requiring prior informed consent for access to biological resources.<sup>149</sup>

[27] Another point of controversy is that the disclosures of the origin of genetic resources and TK are not patent requirements under the TRIPS Agreement.<sup>150</sup> Several countries such as Bolivia, Brazil, Colombia, Cuba, Dominican Republic, Ecuador, India, Peru, and Thailand have argued that the TRIPS Agreement should be amended to include a mandatory disclosure

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<sup>147</sup> *TRIPs vs. Convention on Biological Diversity: Rivals or Partners?*, KASHISH INTELL. PROP. GRP., <https://www.kashishworld.com/blog/trips-vs-convention-on-biological-diversity-rivals-or-partners/> [<https://perma.cc/GMM5-DKX5>] (last visited Feb. 4, 2024).

<sup>148</sup> *Id.*

<sup>149</sup> *Id.*

<sup>150</sup> See Thomas Greiber et al., *An Explanatory Guide to the Nagoya Protocol on Access and Benefit-Sharing*, 83 IUCN ENV'T POL'Y & L. 1, 40 (2012), <https://portals.iucn.org/library/efiles/documents/eplp-083.pdf> [<https://perma.cc/S62S-9CYE>]; see also *Background and the current situation*, WORLD TRADE ORG., [https://www.wto.org/english/tratop\\_e/trips\\_e/art27\\_3b\\_background\\_e.htm](https://www.wto.org/english/tratop_e/trips_e/art27_3b_background_e.htm) [<https://perma.cc/6XX3-R3HP>] (last visited Feb. 4, 2024) (concluding that members' views continue to diverge on the issue but that discussions “underscore the benefits of understanding more fully how countries' own intellectual property systems work – the scope of protection for geographical indications in practice in various countries, and the ‘practical and operational context’ of the existing patent mechanisms for disclosing the origins of genetic material and any associated traditional knowledge used in inventions.”).

requirement.<sup>151</sup> In patent applications, this would require applicants to disclose the country of origin of the genetic resource and the TK associated with it.<sup>152</sup> If they fail to do so, the application would not be processed.<sup>153</sup>

#### IV. RECENT DEVELOPMENTS

##### A. Digital Sequencing Information

[28] Many companies are now using digital sequencing information (DSI) as a loophole around the Nagoya Protocol.<sup>154</sup> DSI enables the digitization and online storage of genetic data from bioresources.<sup>155</sup> DSI has the advantage of offering:

[r]educed costs and increasing technical abilities now allow[ing] researchers to sequence DNA, share this digital sequence information (DSI) via online gene-banks or email, and then synthesise the sequence information back into physical DNA. . . . Vaults of material samples and databases of genetic information have become the next great frontier for exploration. While physical samples continue to be important to R&D,

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<sup>151</sup> See Greiber et al., *supra* note 150; see also *Background and the current situation*, *supra* note 150 (explaining that Switzerland proposed an amendment to the regulations of WIPO's Patent Cooperation Treaty so that domestic laws can ask inventors to disclose the source of genetic resources and traditional knowledge when applying for patents. Similarly, the EU proposed a requirement that all patent applications disclose the source or origin of genetic material, but with legal consequences if the requirement is not met. Further, the U.S. argued that the use of national legislation and contractual agreements would work to fulfil the obligations of the CBD.).

<sup>152</sup> *Background and the current situation*, *supra* note 150.

<sup>153</sup> *Id.*

<sup>154</sup> Salwa, *supra* note 113.

<sup>155</sup> Bullens, *supra* note 100.

increasingly bioprospectors can discover useful genetic materials without entering the field or negotiating local knowledge.<sup>156</sup>

Scientists are often required to disclose and upload their data, including DSI, into public databases.<sup>157</sup>

[29] This is causing biopiracy to become an even more complex issue.<sup>158</sup> While DSI stored in public online databases has been revolutionary for many reasons, including leading to the discovery of new HIV therapies, the creation of genetically modified organisms, and the creation of COVID-19 tests and vaccines,<sup>159</sup> “traceability becomes blurred” with DSI, and it has made coordinating benefit-sharing more complicated.<sup>160</sup> Countries from Africa, Latin America, and the Caribbean have argued that open-source DSI has become a loophole for big pharmaceutical companies, for example, to avoid sharing profits with the indigenous populations from whom they obtain the information necessary for their patents.<sup>161</sup>

[30] Advocates worry that genetic databases will “undercut hard-fought benefit sharing agreements like Nagoya.”<sup>162</sup> Benefit-sharing rules for digital DNA are hard to enforce and conflict with the open-access culture of

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<sup>156</sup> Molly R. Bond & Deborah Scott, *Digital Biopiracy and the (Dis)assembling of the Nagoya Protocol*, 117 GEOFORUM 24, 26 (2020) (citations omitted).

<sup>157</sup> *Id.*

<sup>158</sup> Bullens, *supra* note 100.

<sup>159</sup> *Id.*

<sup>160</sup> *Id.*

<sup>161</sup> *Id.*

<sup>162</sup> Kelly Servick, *Rise of digital DNA raises biopiracy fears*, SCI. INSIDER (Nov. 17, 2016), <https://www.science.org/content/article/rise-digital-dna-raises-biopiracy-fears> [<https://perma.cc/3WMS-945M>].

research.<sup>163</sup> Many public databases are huge,<sup>164</sup> and they do not trace a “clear path” back to a sample’s origin.<sup>165</sup> For example, the International Potato Center aims to release a genetically modified (GM) potato in East Africa, an area plagued by potato blight fungus.<sup>166</sup> The GM potato includes genes synthesized from DSI taken from GenBank, an international DSI database.<sup>167</sup>

[31] The genes are from potato relatives collected many years ago, and the origins of those genes are unclear.<sup>168</sup> While GM potatoes may turn out to be lucrative for U.S. and British companies, some argue that they are “bad news” for indigenous people and small farmers and that using them would set a bad precedent.<sup>169</sup>

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<sup>163</sup> See *id.*; see also Margo A. Bagley, “Just” Sharing: The Virtues of Digital Sequence Information Benefit-Sharing for the Common Good, 63 HARV. INT’L L.J. 1, 3 (2022) (explaining that Regeneron used West African genetic sequence data to create an Ebola drug; it used a sequence of Ebola that it found on a publicly accessible databank that required benefits agreements for physical samples of the virus, but not digital samples. Since Regeneron used digital samples, they are not required to share anything with the country of origin).

<sup>164</sup> Salwa, *supra* note 113.

<sup>165</sup> Servick, *supra* note 162.

<sup>166</sup> JAY MCGOWN, GM POTATO PUSH IN EAST AFRICA: ANDEAN AND AFRICAN FARMERS CONDEMN DIGITAL SEQUENCE INFORMATION OF POTATOES FROM CENTRES OF ORIGIN – OPENS DOORS FOR BIOPIRACY 5 (2020), <https://acbio.org.za/wp-content/uploads/2022/04/andeanafrican-farmers-condemn-biopiracy-and-digital-sequence-information-gm-potatoes-and-centres.pdf> [<https://perma.cc/8VGA-4AC4>].

<sup>167</sup> *Id.* at 6.

<sup>168</sup> *Id.* at 1, 5.

<sup>169</sup> *Id.* at 1, 5–6.

## B. The COP15

[32] The 15<sup>th</sup> Conference of the Parties to the UN Convention on Biological Diversity (COP15) was held in Montreal, Canada in December 2022.<sup>170</sup> Governments from all over the world came together to come up with a plan to reverse the loss of nature.<sup>171</sup> Biopiracy and DSI were “hot topics” at the convention.<sup>172</sup> Ahead of the convention, countries from the Global South stated that they would not agree to a global diversity framework if a deal on getting benefits from DSI was not included.<sup>173</sup> However, on the last day of the negotiations, the countries agreed to adopt the Kunming-Montreal Global Biodiversity Framework (GBF).<sup>174</sup> The GBF strives to “address biodiversity loss, restore ecosystems and protect indigenous rights.”<sup>175</sup> Under the GBF, the parties agreed to create a multilateral fund where local farmers and indigenous communities would receive benefits from the genetic resources that they have “stewarded and conserved for millennia, as well as the traditional knowledge that has often helped point westerners to their multiple characteristics.”<sup>176</sup>

[33] Target 13 of the reached agreement states that contracting parties are to take effective legal, policy, administrative, and capacity-building

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<sup>170</sup> *UN Biodiversity Conference (COP 15)*, UN ENV'T PROGRAMME, <https://www.unep.org/un-biodiversity-conference-cop-15> [<https://perma.cc/C29J-FG7F>] (last visited Feb. 9, 2024).

<sup>171</sup> *Id.*

<sup>172</sup> Salwa, *supra* note 113.

<sup>173</sup> Bullens, *supra* note 100.

<sup>174</sup> *COP15 ends with landmark biodiversity agreement*, UN ENV'T PROGRAMME (Dec. 20, 2022), <https://www.unep.org/news-and-stories/story/cop15-ends-landmark-biodiversity-agreement> [<https://perma.cc/Q4HM-6JPP>].

<sup>175</sup> *Id.*

<sup>176</sup> Schapiro, *supra* note 47.

measures to ensure that the goal of achieving a significant increase in the sharing of benefits by 2030 is met.<sup>177</sup> Details on the multilateral fund will be finalized at the 16<sup>th</sup> session of the Conference of the Parties (COP16) in 2024.<sup>178</sup> While the U.S. is not a signatory to the CBD or Nagoya Protocol, the U.S. sent an observer delegation to the COP15, which was led by the veteran State Department diplomat Monica Medina.<sup>179</sup> Ms. Medina told journalists that she wished the U.S. was a member.<sup>180</sup> The U.S. is not bound by the COP15 deal and thus will not be required to implement its targets.<sup>181</sup>

## V. PROTECTING THE RIGHTS OF INDIGENOUS COMMUNITIES

[34] Biopiracy is a complex, multifaceted issue, and current Western patent systems do little to protect the rights of indigenous communities.<sup>182</sup> Similarly, international treaties are ineffective at protecting these communities in part because many powerful countries, such as the U.S.,

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<sup>177</sup> See *COP15: Final Text of Kunming-Montreal Global Biodiversity Framework*, CONVENTION ON BIOLOGICAL DIVERSITY (Dec. 22, 2022), <https://www.cbd.int/article/cop15-final-text-kunming-montreal-gbf-221222> [<https://perma.cc/4RHD-LMFY>].

<sup>178</sup> See *id.*; see also Markus Wyss & Dominic Muyltermans, *Biodiversity COP15 – A stepping stone towards effective access and benefit sharing*, OPEN ACCESS GOV'T (Apr. 12, 2023), <https://www.openaccessgovernment.org/article/biodiversity-cop15-stepping-stone-towards-effective-access-benefit-sharing/155253/> [<https://perma.cc/7GUC-6DNY>] (“The new multilateral mechanism could pave the way for a future ABS framework which safeguards the value creation from the use of DSI and, eventually, also genetic resources. It is, however, largely unclear how this mechanism shall work in practice, i.e. who will implement and govern it, who will contribute and how much, and how contributions will be allocated.”).

<sup>179</sup> Schapiro, *supra* note 47.

<sup>180</sup> *Id.*

<sup>181</sup> See Louise Guillot, *An outsider looking in: The US at global biodiversity talks*, POLITICO (Dec. 19, 2022, 8:43 AM), <https://www.politico.eu/article/an-outsider-looking-in-us-global-biodiversity-talks-montreal-cop15/> [<https://perma.cc/V72K-98LC>].

<sup>182</sup> Rabitz, *supra* note 15, at 30, 34.

have not signed or ratified them.<sup>183</sup> Instead, those countries adhere to the TRIPS Agreement, which allows biodiversity to be patented and does not require disclosing the source of genetic resources and TK.<sup>184</sup> The same is true for newer treaties such as the Nagoya Protocol.<sup>185</sup>

[35] While the Nagoya framework is promising, it is hard to enforce.<sup>186</sup> Further, regardless of treaty law, biopirates can still enter remote areas, extract samples, and patent those samples for themselves.<sup>187</sup> Accordingly, the best way to curb biopiracy and thus protect the rights of indigenous communities is for individual countries to create laws that adhere to the CBD and Nagoya Protocol, map genetic resources on the blockchain, and create TK libraries.

#### A. Domestic Laws

[36] Individual nations need to take charge and defend indigenous communities and their biodiversity. Individual countries must change their laws or create new laws reflecting the need for prior informed consent and compensation for indigenous communities when their knowledge or resources are used. Countries will be more likely to abide by the CBD and Nagoya Protocol if they implement their provisions into domestic law. Thus, domestic implementation is key to curbing biopiracy.

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<sup>183</sup> Mackey & Liang, *supra* note 44, at 1091–93.

<sup>184</sup> *Id.* at 1092.

<sup>185</sup> Rabitz, *supra* note 15, at 33, 48–49.

<sup>186</sup> Jeremy Hillpot, *Could Blockchain Technology Stop Biopiracy and Save the Rainforests?*, MEDIUM (May 17, 2019), <https://medium.com/swlh/could-blockchain-technology-stop-biopiracy-and-save-the-rainforests-1983c9829c9c> [<https://perma.cc/8AF5-RDA3>] (“Nobody knows where the assets come from; nobody knows how they’re used, and nobody knows how much money is being made.”).

<sup>187</sup> *Id.*

[37] A successful example of a country that has created its own anti-biopiracy program is Costa Rica.<sup>188</sup> Costa Rica, a party to the CBD, implemented many of the CBD provisions into its domestic law, including provisions on benefit-sharing.<sup>189</sup> In 1991, Costa Rica's National Biodiversity Institute (INBio) entered into a bioprospecting agreement with Merck, a U.S.-based pharmaceutical company.<sup>190</sup> The agreement provided that INBio would allow Merck access to chemical extracts from wild plants, insects, and micro-organisms in exchange for \$1 million and 3% royalties from worldwide sales of products developed under the agreement.<sup>191</sup> Merck also agreed to build a facility and fund the education and training of local scientists.<sup>192</sup> INBio would contribute 10% of the up-front fee and 50% of any future royalties to the National Parks Fund for wildlife conservation.<sup>193</sup> Drawing from Costa Rica's successful anti-biopiracy program, developing countries should create their own anti-biopiracy programs to protect their indigenous communities, genetic resources, and associated TK. Countries that implement this approach should ensure that indigenous communities are included in their agreements, and consent to having their knowledge used, and receive fair compensation.<sup>194</sup>

[38] Domestic laws should also regulate the use and access of DSI to thwart biopiracy. For example, Costa Rica's biodiversity law facilitates

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<sup>188</sup> Danley, *supra* note 108, at 293.

<sup>189</sup> *Id.* at 320.

<sup>190</sup> *Id.* at 321.

<sup>191</sup> *Id.*

<sup>192</sup> *Id.*

<sup>193</sup> Danley, *supra* note 108, at 321.

<sup>194</sup> *See id.* (explaining that the Merck-INBio agreement failed to take into consideration the role of traditional knowledge in obtaining the genetic material).



access to non-commercial uses of DSI, like research.<sup>195</sup> The country also has the authority to intervene to restrict the publication of genetic sequences in certain circumstances so as to prevent the information from entering the public domain and being used commercially without fair and equitable sharing of benefits.<sup>196</sup> Other countries should also regulate the publication of genetic resources and TK so that they cannot be used commercially without obtaining indigenous consent and agreeing to share benefits.

[39] Also, countries in the Global North will need to alter their laws to incorporate the goals of the CBD and Nagoya Protocol. For instance, the U.S. should make changes to their patent laws and require patent applicants to disclose the source of any genetic resources or associated TK. If the “invention” is already in use in another country, the patent should be rejected. The TK of indigenous communities, oral or written, should be treated as prior art when determining patentability. Once a patent is rejected, the corporations and researchers should attempt to cooperate with the developing nations and indigenous communities to commercialize the resource or TK. Any agreement made should prioritize benefit-sharing.

## B. Blockchain Technology

[40] Next, biodiverse countries should each use the blockchain to map and record the assets and associated TK in their territories, using the Amazon Bank of Codes as a model. The Amazon Bank of Codes is a collaboration between the World Economic Forum, the Earth Bank of Codes, and the Earth Biogenome Project.<sup>197</sup> The project aims to assign and

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<sup>195</sup> *Synthesis of Views and Information Related to Digital Sequence Information on Genetic Resources*, CONVENTION ON BIOLOGICAL DIVERSITY (Mar. 3, 2020), <https://www.cbd.int/doc/c/3e5b/6c2b/ac32a5d0a0a0a746f0964a0f/dsi-ahteg-2020-01-02-en.pdf> [<https://perma.cc/F4AY-C487>].

<sup>196</sup> *Id.*

<sup>197</sup> *Amazon Bank of Codes*, SMART EARTH PROJECT, <https://smarteearthproject.com/entries/amazon-bank-of-codes/> [<https://perma.cc/5MR5-56YU>] (last visited Feb. 9, 2024).

classify biological data from every species of plant and animal in the Amazon Basin and then log the genetic sequences on the blockchain.<sup>198</sup>

[41] The blockchain is a “distributed ledger that duplicates and distributes transactions across the network of computers . . . .”<sup>199</sup> This method of recording information makes it difficult or sometimes impossible for the system to be changed, hacked, or manipulated.<sup>200</sup> Blockchain is best known for enabling the existence of cryptocurrencies such as Bitcoin.<sup>201</sup> The blockchain is beneficial because it provides increased transparency and accurate tracking.<sup>202</sup> With that in mind, the blockchain would be especially well-suited to prevent biopiracy because of its ability to provide accurate tracking. Registering these assets on the blockchain would make it possible to record and track the resources’ origins and uses.<sup>203</sup> For example, implementing a more transactional approach to benefit-sharing modeled on the Banks of Codes would make it possible to trace where these resources go and create a platform for the fair sharing of the benefits with the country of origin.<sup>204</sup> This database of biological data would then be available for scientific or commercial use.<sup>205</sup> Any money made from a resource would be

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<sup>198</sup> *Id.*

<sup>199</sup> Ravikiran A S, *What is Blockchain Technology? How Does Blockchain Work?*, SIMPLILEARN, <https://www.simplilearn.com/tutorials/blockchain-tutorial/blockchain-technology> [<https://perma.cc/LB75-FMR6>] (last updated Oct. 18, 2023).

<sup>200</sup> *Id.*

<sup>201</sup> *Making sense of bitcoin, cryptocurrency and blockchain*, PWC, <https://www.pwc.com/us/en/industries/financial-services/fintech/bitcoin-blockchain-cryptocurrency.html> [<https://perma.cc/L7ZQ-HG7Z>] (last visited Feb. 4, 2024).

<sup>202</sup> *Id.*

<sup>203</sup> *Amazon Bank of Codes*, *supra* note 197.

<sup>204</sup> *Id.*

<sup>205</sup> *Can Blockchain Save the Amazon?*, *supra* note 22.

equally shared with the country of origin.<sup>206</sup> Whenever data is used or sold, the transactions would be recorded on the blockchain for all to see.<sup>207</sup> Accordingly, the blockchain, combined with technologies such as satellite imagery and drones, would help nations track their valuable assets.<sup>208</sup> However, it would still be important that countries ensure that indigenous communities give their informed consent for their resources and associated knowledge to be placed on the blockchain. Additionally, since the databases use genetic sequences, physical samples would not be needed.<sup>209</sup> This would preserve the habitats of these resources and ensure that the environments in which indigenous communities reside are not depleted.<sup>210</sup>

### C. Traditional Knowledge Libraries

[42] Lastly, biodiverse countries should create libraries that document the indigenous knowledge of their communities. These countries should try to emulate India's Traditional Knowledge Digital Library (TKDL), which was created in 2001.<sup>211</sup> It contains over 34 million pages on TK existing in India.<sup>212</sup>

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<sup>206</sup> *Id.*

<sup>207</sup> *Id.*

<sup>208</sup> Faisal Yusuf, *The need for blockchain in fighting bio-piracy in forest rich countries*, BLOCKCHAIN & CLIMATE INST. (Feb. 2, 2021), <https://blockchainclimate.org/the-need-for-using-blockchain-technology-for-fighting-bio-piracy-in-forest-rich-countries/> [<https://perma.cc/7ZHA-EURS>].

<sup>209</sup> Chris Arsenault, *Battling 'biopiracy', scientists catalog the Amazon's genetic wealth*, REUTERS (Dec. 19, 2018, 8:13 PM), <https://www.reuters.com/article/idUSKCN1OJ02Y/> [<https://perma.cc/87QL-F9EL>].

<sup>210</sup> *Id.*

<sup>211</sup> *About the Traditional Knowledge Digital Library*, WORLD INTELL. PROP. ORG., [https://www.wipo.int/meetings/en/2011/wipo\\_tkdl\\_del\\_11/about\\_tkdl.html](https://www.wipo.int/meetings/en/2011/wipo_tkdl_del_11/about_tkdl.html) [<https://perma.cc/MS3K-XHA5>] (last visited Apr. 2, 2023).

<sup>212</sup> *Id.*

[43] The digital library translates information recorded in ancient languages such as Sanskrit to five languages: English, German, French, Japanese, and Spanish.<sup>213</sup> Patent offices in other countries have been granted access to the TKDL for carrying out prior art searches.<sup>214</sup> The aim is to prevent the grant of patents for products developed utilizing Indian TK.<sup>215</sup>

[44] The TKDL has been successful so far in curbing biopiracy in India. Several patents in other countries have been rejected or withdrawn since the TKDL was made public to patent examiners.<sup>216</sup> For example, the European Patent Office provided a notice of grant for a patent to a Spanish corporation for the use of the watery extract of the Kharbooza melon as an anti-vitiligo cream.<sup>217</sup> However, after evidence was submitted by the TKDL showing the extract's origins in TK, the EPO decided to set aside its earlier intention to grant the patent.<sup>218</sup>

[45] If biodiverse countries implement TK libraries, other countries should then be required to search these libraries before granting a patent. Countries such as the U.S. receive hundreds of thousands of patent applications every year.<sup>219</sup> This makes it difficult for patent examiners to

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<sup>213</sup> *Id.*

<sup>214</sup> *Id.*

<sup>215</sup> *Id.*

<sup>216</sup> *Examples of EPO applications set aside, modified or withdrawn based on TKDL evidence*, WORLD INTELL. PROP. ORG., [https://www.wipo.int/meetings/en/2011/wipo\\_tkdl\\_del\\_11/epo\\_examples.html](https://www.wipo.int/meetings/en/2011/wipo_tkdl_del_11/epo_examples.html) [<https://perma.cc/MQK3-XZTQ>] (last visited Jan. 28, 2024).

<sup>217</sup> *Id.*

<sup>218</sup> *Id.*

<sup>219</sup> *See New Jersey-based company get patent rights on karela, brinjal, supra note 89.*

confirm whether the inventions are already disclosed or in use.<sup>220</sup> If countries that create these databases make them available to patent examiners worldwide, examiners will be able to search the database to find out if an invention is already in use elsewhere in the globe. Thus, other countries should adopt India's model and create TK libraries so that they can adequately preserve and control the TK of their own indigenous communities.

## VI. CONCLUSION

[46] Indigenous communities deserve the right to control and profit from the resources in their territories. Biopiracy is an issue that impacts indigenous communities financially, environmentally, and culturally. While international treaties on biodiversity focus on consent and compensation,<sup>221</sup> achieving these objectives is up to individual countries. Individual countries must take charge and protect indigenous communities so that their biological resources and TK are not misappropriated.

[47] Curbing biopiracy will likely include the combination of laws and innovative technologies. First, I recommend that countries in both the Global South and North create national laws that adhere to the CBD and Nagoya Protocol. This includes requiring patent applicants in the Global North to disclose the geographic source of the resources contained within their applications and the TK associated with their patent claims. Second, countries should map genetic resources on the blockchain to make tracking and benefit-sharing easier. Third, countries should create TK libraries to prevent the granting of erroneous patents.

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<sup>220</sup> *Id.*

<sup>221</sup> See Mackey & Liang, *supra* note 44.