

Traditional Knowledge, International Environmental Law, and Bangladesh

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Traditional knowledge (TK), which is orally passed down from older to newer generations, is of vital importance to local communities and indigenous people who own and apply it in their everyday lives. TK is used in numerous areas of daily life including agriculture, medicine, music, literature, and home decor. Because TK is owned by a local or indigenous community, as opposed to any individual person or legal entity, third-party entrepreneurs or corporations tend to exploit TK for commercial purposes without offering any benefit to the original owners.

While various areas of international law can potentially protect TK from such misuse or misappropriation, this Essay specifically examines the ability of international environmental law to do so. As a result, the discussion herein primarily covers the Convention on Biological Diversities and a subsequent international instrument: the Nagoya Protocol on Access and Benefit Sharing. Moreover, this Essay focuses on TK related to biodiversity and plant varieties, arguing that instead of offering any positive protection for TK per se, which would grant exclusive rights to the communities who own TK, international environmental law adopts a “win-win” approach by introducing two mandatory elements: “prior informed consent” and “benefit-sharing agreement.” Both of these components seek to ensure that any commercial gain deriving from the utilization of TK is proportionately shared with the relevant communities.

As an example of how these international agreements are implemented at the national level, this Essay assesses the protection of TK in Bangladesh, one of the most biodiversity-rich states in the world. Although Bangladesh recently enacted two national laws intended to protect TK related to biodiversity and plant varieties, significant problems have arisen with respect to their implementation. This Essay proposes that Bangladesh bring its domestic laws more in line with its international legal obligations and implement various supplementary provisions to bolster the implementation mechanisms of the relevant statutes.

Keywords: Traditional knowledge, Convention on Biological Diversity, Nagoya Protocol, benefit-sharing, prior informed consent, Bangladesh

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INTRODUCTION

Traditional knowledge (TK) “can be broadly defined as the knowledge that an indigenous (local) community accumulates over generations of living in a particular environment. This definition encompasses all forms of knowledge—technologies, skills, practices, and beliefs—that enable the community to achieve stable livelihoods in their environment.”¹ Although TK looks like a local knowledge system, it is, in fact, a symbiosis of diverse knowledge branches that complement the modern knowledge system.² By nature, it is not an essentially static or ancient source of knowledge.³ Rather, it is continuously being developed by local communities as they update their knowledge in response to newfound needs and experiences.⁴ Although it is orally transmitted from older to newer generations, and not formally documented, its importance is undeniable.⁵ Indeed, it has already “gained the status of a distinct set of knowledge,” and currently, there is a growing tendency towards documenting TK all over the world.⁶ Since TK is an interdisciplinary source of knowledge, it has wide-ranging societal importance. It includes not only a large source of literary and artistic works such as music, dances, songs, ceremonies, symbols and designs, narratives, and poetry, but a strong foundation of scientific, agricultural, and above all, ecological knowledge. Protecting TK is recognized as crucial for preserving the world’s

1. *What Is Indigenous Knowledge?*, U.N. ENV’T PROGRAMME, <https://archive.iwlearn.net/unesp.org/IK/default.htm> (last visited on June 29, 2023).

2. Kamrul Hossain & Rosa Maria Ballardini, *Protecting Indigenous Traditional Knowledge Through a Holistic Principle-Based Approach*, 39 NORDIC J. HUM. RTS. 51, 52 (2021).

3. Daniel J. Gervais, *Traditional Knowledge & Intellectual Property: A TRIPs-Compatible Approach*, 2005 MICH. STATE L. REV. 137, 140 (2005).

4. See Yovana Reyes Tagle, *The Protection of Traditional Knowledge Associates with Genetic Resources: The Role of Databases and Registers* 29 (Jan. 27, 2011) (Doctoral Dissertation, University of Helsinki).

5. See Hans Morten Haugen, *Traditional Knowledge and Human Rights*, 8 J. WORLD INTELL. PROP. 665, 665 (2005).

6. Hossain & Ballardini, *supra* note 2, at 55.

biodiversity,⁷ but perhaps the most important role of TK lies in its ability to assist in combatting climate change.⁸ The Fourth Assessment Report of the Intergovernmental Panel on Climate Change underscored the role of TK systems in both African and Arctic communities in adapting to climate change.⁹ The President of the United Nations General Assembly has also acknowledged the essential role of TK in climate change adaptation and mitigation.¹⁰ The protection, preservation, and promotion of TK are therefore not only essential for the survival of specific local communities, but the world.

The first legally binding international treaty relating to TK was the 1994 Convention on Biological Diversities (CBD).¹¹ This treaty obliges the states parties to protect TK related to biodiversity and introduced a benefit-sharing device to facilitate this. Through the work of the Conference of the Parties (COP), the CBD has subsequently yielded the Nagoya Protocol on Access and Benefit Sharing. Also binding, this agreement closed certain gaps emerging out of the benefit-sharing provisions set forth in the CBD.

This Essay aims to discuss the protection of TK under international environmental law, focusing particularly on TK related to biodiversity and plant varieties. Biodiversity-related TK consists of “knowledge, innovations[,] and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity.”¹² It further includes the “customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation or sustainable use requirements.”¹³ Plant variety-related TK includes “knowledge, innovations[,] and practices of indigenous and local communities” on plants as well as the “customary use” of plant resources that is associated with the rights of farmers.

This Essay focuses on biodiversity- and plant variety-related TK for two reasons. First, as emphasized above, the conservation and protection of these categories of TK are essential for combatting climate change. Second, these categories of TK are misappropriated at a particularly large scale by third

7. See Edwin Ogar, Greta Pecl & Tero Mustonen, *Science Must Embrace Traditional and Indigenous Knowledge to Solve Our Biodiversity Crisis*, 3 ONE EARTH 162, 162-65 (2020); Krystyna Swiderska, *Protecting Indigenous Cultures Is Crucial for Saving the World's Biodiversity*, INT'L INST. FOR ENV'T AND DEV. (Feb. 18, 2020), <https://www.iied.org/protecting-indigenous-cultures-crucial-for-saving-worlds-biodiversity>; Nadzirah Hosen, Hitoshi Nakamura & Amran Hamzah, *Adaptation to Climate Change: Does Traditional Ecological Knowledge Hold the Key?*, 12 SUSTAINABILITY 676, 677 (2020).

8. See Gleb Raygorodetsky, *Why Traditional Knowledge Holds the Key to Climate Change*, U.N. UNIV. (Dec. 13, 2011), <https://unu.edu/publications/articles/why-traditional-knowledge-holds-the-key-to-climate-change.html>.

9. *Indigenous Knowledge for Adaptation to Climate Change*, in IPCC 4TH ASSESSMENT, WORKING GROUP II: CROSS CHAPTER CASE STUDIES ¶¶ 864-67 (2007).

10. See Press Release, Economic and Social Council, Indigenous People's Traditional Knowledge Must Be Preserved, Valued Globally, Speakers Stress as Permanent Forum Opens Annual Session, U.N. Press Release HR/5431 (Apr. 22, 2019) <https://press.un.org/en/2019/hr5431.doc.htm> (“María Fernanda Espinosa (Ecuador), General Assembly President, stressed that traditional knowledge occupies a pivotal place in the range of actions needed to mitigate climate change.”).

11. Convention on Biological Diversity, June 5, 1992, 1760 U.N.T.S. 79 [hereinafter CBD].

12. Cf. *id.* at art. 8(j).

13. Cf. *id.* at art. 10(c).

parties worldwide.¹⁴ While biodiversity-related TK is mostly misappropriated by the pharmaceutical industry, plant variety-related TK is misappropriated for commercial purposes related to seeds and agriculture. Such misappropriation is popularly known as “biopiracy,” “the appropriation of the knowledge and genetic resources of farming and indigenous communities by individuals or institutions who seek exclusive monopoly control (patents or intellectual property) over these resources and knowledge.”¹⁵

In most cases, claimed misappropriations are conducted by third parties when they develop and receive a patent for a product developed on the basis of TK—without obtaining prior permission from, or offering any benefit to, the owners.¹⁶ Some famous examples of biopiracy that were challenged before courts¹⁷ involved quinoa,¹⁸ ayahuasca,¹⁹ turmeric,²⁰ neem,²¹ and hoodia.²² In the case involving quinoa, the Colorado State University abandoned its patent in 1998 as a response to the Andean farmers’ anti-patent campaign.²³ The ayahuasca patent was revoked²⁴ by the United States Patent Office after being challenged by the Center for International Environmental Law on behalf of the Coordinating Body of Indigenous Organizations of the Amazon Basin and the Coalition for Amazonian Peoples and Their Environment.²⁵ A patent granted to the University of Mississippi Medical Center for turmeric met a similar fate,²⁶ and a patent on the fungicidal properties of the neem tree secured by the United States Department of Agriculture was revoked by the European Patent Office.²⁷ The European body specifically emphasized that the fungicidal outcome of hydrophobic extracts of neem seeds was part of Indian TK and had been used

14. See generally Meera Nayak, *The Misappropriation of Traditional Knowledge*, DENVER J. INT’L L. & POL’Y, (Apr. 30, 2019), <http://djilp.org/the-misappropriation-of-traditional-knowledge>.

15. Nicola Ross, *Biopiracy*, 36 ALTS. J. 6, 22 (2010).

16. *Id.*

17. Mahatab Uddin, *Protection of Traditional Knowledge Under Intellectual Property Rights (IPR) System*, 20 BANGLADESH J. OF L. 1 (2022).

18. See *Quinoa Patent Dropped: Andean Farmers Defeat U.S. University*, RAFI GENOTYPE (May 22, 1998).

19. See *U.S. Cancels Patent on Sacred Ayahuasca Plant*, ENV’T NEWS SERV. (Nov. 5, 1999), https://erowid.org/plants/banisteriopsis/banisteriopsis_media1.shtml.

20. See Zenobia Ismail & Tashil Fakir, *Trademarks or Trade Barriers? Indigenous Knowledge and the Flaws in the Global IPR System*, 31 INT’L J. SOC. ECON. 173, 179 (2004).

21. See Vandana Shiva, *North-South Conflicts in Intellectual Property Rights*, 12 PEACE REV. 501, 503 (2000).

22. See *Of Patents and Pirates*, GRAIN (July 25, 2000), <https://grain.org/article/entries/53-of-patents-pirates?print=true> (last visited June 29, 2023).

23. Press Release, Rural Advancement Foundation International, *Quinoa Patent Dropped* (May 22, 1998), <https://www.etcgroup.org/sites/www.etcgroup.org/files/publication/411/01/rafigenoquinoa98.pdf>.

24. Press Release, Center for International Environmental Law, *U.S. Patent Office Cancels Patent of Sacred “Ayahuasca” Plant* (Nov. 4, 1999), <https://www.iatp.org/news/us-patent-office-cancels-patent-of-sacred-ayahuasca-plant>.

25. CTR. FOR INT’L ENV’T L., *LEGAL ELEMENTS OF THE “AYAHUASCA” PATENT CASE* (1999), <https://www.ciel.org/wp-content/uploads/2015/03/ayahuascalelements.pdf>.

26. Barbara A. Johnston & Ginger Webb, *Turmeric Patent Overturned in Legal Victory*, 41 HERBALGRAM 11 (1996).

27. *Background Paper on the NEEM Patent Challenge*, PLATFORM GENTECHNOLOGIE http://www.platformgentechnologie.nl/patents/euro_pat_office/parents/neem_final_backgroundunder_nl.shtml (last visited June 29, 2023).

for centuries both as a remedy for dermatological ailments and as a means of protecting crops from fungal infections.²⁸ A cactus-like plant indigenous to southern Africa, hoodia has traditionally been used by the San and Khoi shepherds to restrain hunger and thirst in the desert. Meanwhile, the Council for Scientific and Industrial Research (CSIR) in South Africa and the United Kingdom-based Phytopharm were granted an international patent in connection with its development of P57, an appetite suppressant derived from hoodia.²⁹ Although the stakeholders were reaping massive financial gains through the commercialization of the drug, these benefits were not shared with the original holders of the TK. Following extensive criticism, the CSIR in 2000 agreed to share potential profits with the San people³⁰ in the form of 8% of all milestone payments it obtained in the following three years and 6% of all royalties it received during the time of the patent.³¹

As the cases above demonstrate, protecting biodiversity- or plant variety-related TK is crucial for safeguarding the interests of the original owners of the TK. Notably, while biodiversity- and plant variety-related TK are distinct from other kinds of TK, measures like prior approval or benefit-sharing agreements introduced under international environmental law for protecting these particular categories of TK can arguably be useful for protecting TK more broadly as well. The implications of this Essay, then, extend beyond these two particular categories of TK.

This Essay will explore TK at both the international and national level. Part I will examine the role of the current international environmental regime in protecting TK and the way in which it offers benefits for the communities who own TK. Specifically, it will focus on the CBD and the Nagoya Protocol, assessing the collective strengths and weaknesses of these treaties in protecting TK. Part II will explore the protection of TK at the national level, taking Bangladesh as an example and examining whether the state's recently adopted Biodiversity Act (BBA)³² and Plant Variety Protection Act (PVPA)³³ have successfully incorporated the internationally agreed upon substantive rules and procedural mechanisms for protecting biodiversity- and plant variety-related TK. This part will also propose some policy recommendations for Bangladesh to strengthen protections for TK. Part III will then briefly conclude.

28. *Id.*

29. *See Of Patents and Pirates, supra* note 22.

30. *See* Graham Dutfield, *Protecting Traditional Knowledge and Folklore*, U.N. CONF. ON TRADE & DEV. (2003), https://unctad.org/system/files/official-document/ictsd2003ipd1_en.pdf.

31. *See* Roger Chennells, *Ethics and Practice in Ethnobiology: The Experience of the San Peoples of Southern Africa*, in *BIODIVERSITY & THE LAW* 413, 422 (Charles R. McManis ed., 2007).

32. Biodiversity Act, 2017 (Act No. 2/2017) [hereinafter Biodiversity Act].

33. Plant Variety Protection Act, 2019 (Act No. 6/2019) [hereinafter Plant Variety Protection Act].

I. INTERNATIONAL ENVIRONMENTAL LAW AND TRADITIONAL KNOWLEDGE

This part will explore how biodiversity-related TK is protected under current international environmental law provisions. Section A will provide a short overview of non-binding, soft-law instruments that have directly or indirectly referred to the protection of TK and the interests of the owners of TK. Section B will discuss the CBD, an international treaty that requires states to take measures to preserve their respective biodiversity as well as plant variety-related TK through “prior approval” and “benefit-sharing agreements.” This section will also cover how these provisions have been elaborated under the Nagoya Protocol.³⁴ Section C will then identify some open questions in the existing international legal framework governing TK and discuss a few other relevant international instruments.

A. Soft Law: Acknowledging the Necessity of Protecting Traditional Knowledge

Centuries of colonialism have inflicted significant environmental harm upon indigenous people.³⁵ The 1972 United Nations Conference on the Human Environment—out of which emerged the Stockholm Declaration, the first international document to recognize the right to a healthy environment³⁶—represented the beginning of an international consciousness towards the importance of protecting the planet against environmental degradation and the decline of biodiversity.³⁷ Although the Stockholm Declaration itself does not say anything about indigenous people or protecting biodiversity- or plant variety-related TK, it recommended the conservation of “[p]rimitive varieties of traditional pre-scientific agriculture (recognized as genetic treasures for plant improvement).”³⁸

In 1984, the World Commission on Environment and Development assembled for the first time, and three years later, it published the Brundtland Report.³⁹ This report referred directly to the circumstances of indigenous peoples: “[t]hese communities are the repositories of vast accumulations of traditional knowledge and experience that links humanity with its ancient origins. Their disappearance is a loss for the larger society[,] which could learn

34. 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, Oct. 12, 2014, 3008 U.N.T.S. 3 [hereinafter Nagoya Protocol].

35. See generally Joshua Castellino, *Colonial Crime, Environmental Destruction and Indigenous Peoples: A Roadmap to Accountability and Protection*, in COLONIAL WRONGS AND ACCESS TO INTERNATIONAL LAW 577 (Morten Bergsmo, Wolfgang Kaleck & Kyaw Yin Hlaing eds., 2020).

36. The Stockholm Declaration was the first international document to recognize the right to a healthy environment.

37. See generally *Report of the U.N. Conference on the Human Environment*, U.N. Doc. A/CONF.48/14/Rev.1 (June 1972).

38. *Id.* at Recommendation 43.

39. *Our Common Future* is a report from the United Nations World Commission on Environment and Development (WCED) and was published in 1987. Its targets were multilateralism and interdependence of nations in the search for a sustainable development path. The report sought to recapture the spirit of the United Nations Conference on the Human Environment—the Stockholm Conference—which had introduced environmental concerns to the formal political development sphere.

a great deal from their traditional skills in sustainably managing very complex ecological systems.”⁴⁰ The report further stated that “it is a terrible irony that as formal development reaches more deeply into rain forests, deserts, and other isolated environments, it tends to destroy the only cultures that have proved able to thrive in these environments.”⁴¹ However, it still did not refer directly to the protection of biodiversity- or plant variety-related TK.

The findings of the Brundtland Report led to the United Nations Conference on Environment and Development in June 1992.⁴² The conference resulted in the Rio Declaration on Environment and Development as well as an eight-hundred-page document entitled *Agenda 21*.⁴³ Principle 22 of the Rio Declaration expressly referred to indigenous peoples: “Indigenous people and their communities and other local communities have a vital role in environmental management and development because of *their knowledge and traditional practices*. States should recognize and duly hold up their distinctiveness, culture[,] and interests and enable their effective participation in the achievement of sustainable development.”⁴⁴ Yet even though the Rio Declaration urged states to duly recognize TK, it did not contain any text as to the method or mode of protecting it.

While various chapters of *Agenda 21* generally referred to the role of indigenous people, Chapter 26 specifically recognized the “historical relationship” between indigenous people and their lands and emphasized that they were “generally descendants of the original inhabitants of such lands.”⁴⁵ It also highlighted the necessity of documentation, deployment, and integration of TK to protect and promote human health; protect the oceans, seas, and coastal areas; and, above all, promote science for sustainable development.⁴⁶ Similar to the Rio Declaration, however, it still did not directly mention the protection of biodiversity- or plant variety-related TK.

40. World Commission on Environment and Development, *Our Common Future*, ¶ 74, U.N. Doc. A/42/427 (Aug. 4, 1987).

41. *Id.*

42. The United Nations Conference on Environment and Development, also known as the Rio Summit or Earth Summit, was a major United Nations conference held in Rio de Janeiro from June 3 to June 14, 1992.

43. *Agenda 21* is a program run by the United Nations related to sustainable development. It is a comprehensive blueprint of action to be taken globally, nationally, and locally by organizations of the United Nations, states, and major groups in every area in which humans impact on the environment. The number “21” refers to the twenty-first century.

44. U.N. Conference on Environment and Development, *Rio Declaration on Environment and Development*, U.N. Doc. A/CONF.151/26/Rev.1 (Vol. I), annex I, Principle 22 (Aug. 12, 1992) (emphasis added).

45. U.N. Conference on Environment and Development, *Agenda 21*, U.N. Doc. A/CONF.151/26(Vol. I), at ch. 26(1) (Jun. 1992).

46. *Id.* at chs. 6.5, 6.27, 17.74, 17.81, 17.94, 17.136, 35.7, 35.15. 5.

B. States Become Obligated to Protect Traditional Knowledge Under International Law

(i) The Convention on Biodiversity

The CBD,⁴⁷ concluded in 1992, is the first multilateral treaty negotiated between states that is responsive to environmental issues affecting indigenous heritage and knowledge. The most significant provision is Article 8(j), which states that each State Party “shall, as far as possible and as appropriate”:

Subject to its national legislation, respect, preserve[,] and maintain knowledge, innovations[,] and practices of indigenous and local communities embodying traditional lifestyles relevant *for the conservation and sustainable use of biological diversity and promote their wider application* with the approval and involvement of the holders of such knowledge, innovations[,] and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations[,] and practices.”⁴⁸

Article 8(j) requires all states parties to the CBD to take three essential steps. First, each state party must preserve TK within its national territory. Second, each state party must ensure that any use of TK within its territory is accompanied by the prior approval of the holders of such TK. Third, each state party must take necessary steps to ensure that the TK holders will receive a share of the benefits generated from the use of TK that they own. While the first element of Article 8(j) aims to ensure the conservation of TK, the second and third elements aim to ensure the “sustainable use” of TK as long as there is prior approval and equitable sharing of the benefits. In short, the protection of TK under the CBD does not prevent third-party access to TK, but rather protects the interests of the TK holders by preventing third parties from freely accessing TK. However, the CBD has not elaborated on equitable benefit-sharing, particularly with regards to how to measure whether the shared benefit is equitable or not.

Articles 10(c), 17(2), and 18(4) of the CBD also addressed issues affecting indigenous and local communities. Article 10(c) addresses the sustainable use of components of biological diversity. States are assumed to defend and promote the “customary use of biological resources in accordance with traditional cultural practices that are compatible with preservation or sustainable use requirements.” Article 17(2) obliges states parties to “facilitate the exchange of information” on “indigenous and traditional knowledge as such and in combination with the technologies referred to” elsewhere in the CBD.⁴⁹

47. CBD, *supra* note 11. As of June 12, 2023, the CBD has 193 parties; this represents near universal participation.

48. *Id.* at art. 8(j) (emphasis added).

49. Secretariat of the Convention on Biological Diversity, *What the Convention Says about Traditional Knowledge, Innovations and Practices*, <https://www.cbd.int/traditional/what.shtml> (last visited June 29, 2023). Article 16(1) of the CBD states: “Each Contracting Party, recognizing that technology includes biotechnology, and that both access to and transfer of technology among Contracting Parties are essential elements for the attainment of the objectives of this Convention, undertakes subject to the provisions of this Article to provide and/or facilitate access for and transfer to other Contracting Parties of technologies that are relevant to the conservation and sustainable use of biological diversity or make use of genetic resources and do not cause significant damage to the

Article 18(4) requires states parties to undertake to “encourage and develop methods of cooperation for the development and use of technologies, including indigenous and traditional technologies.”⁵⁰ It further requires them “to promote cooperation in the training of personnel and exchange of experts.”⁵¹

It is notable that the notion of common heritage as reflected in the CBD is similar to many indigenous normative notions of their connection with the Earth. Yet the CBD is still firmly anchored in the normative idea of an anthropocentric organization of environmental protection. The preamble establishes that environmental initiatives are justified on the basis that biological health is centered on ensuring the welfare of human beings: “[U]ltimately, the conservation and sustainable use of biological diversity will strengthen friendly relations among States and contribute to peace for humankind.”⁵² This is in contrast to the approach by indigenous peoples, many of whom believe in a symbiotic connection between humans and the environment.⁵³

As biological diversity and cultural diversity are closely related, any initiatives affecting biological diversity, through the form of environmental law initiatives, affect indigenous cultural diversity and heritage as well.⁵⁴ This is why it is concerning that indigenous peoples were simply not involved in the negotiating and drafting of the provisions pertaining to them in the CBD. Relatedly, the rules under the CBD restrict indigenous involvement to that of observers or non-governmental organizations.⁵⁵ Nevertheless, the formation of both hard law and soft law on the protection of TK under international environmental law has been a positive development.

(ii) *The Nagoya Protocol*

In 2011, nearly twenty years after the adoption of the CBD, the COP adopted the Nagoya Protocol.⁵⁶ This agreement obliges states parties that either host or use TK to protect the rights of holders of TK, including the rights of benefit-sharing and prior informed consent. It clearly states that access to genetic resources “shall be subject to the prior informed consent of the Party providing such resources that is the country of origin of such resources or a Party that has acquired the genetic resources in accordance with the Convention.”⁵⁷ In this regard, it requires states parties to adopt a set of specific

environment.”

50. CBD, *supra* note 11, at art. 18(4).

51. *Id.*

52. *Id.* at pmb1.

53. See SHARON H. VENNE, OUR ELDERS UNDERSTAND OUR RIGHTS — EVOLVING INTERNATIONAL LAW REGARDING INDIGENOUS PEOPLES 119 (1998).

54. See generally Henrietta Fourmile, *Indigenous Peoples, the Conservation of Traditional Ecological Knowledge, and Global Governance*, in GLOBAL ETHICS AND ENVIRONMENT 254 (Nicholas Low ed., 1999).

55. *See id.*

56. Nagoya Protocol, *supra* note 34.

57. *Id.* at art. 6(1) (emphasis added).

legal provisions for defining and determining prior informed consent.⁵⁸ The scope of the Protocol makes it clear that it is also applicable to “traditional knowledge associated with genetic resources within the scope of the Convention and to the benefits arising from the utilization of such knowledge.”⁵⁹

The Nagoya Protocol makes three issues clear. First, the shareable benefits will not only include those that arise from the initial utilization of genetic resources but also include the benefits that arise from the subsequent utilization and commercialization thereof.⁶⁰ Second, the benefits will be shared only with the Party that provides the genetic resources at issue, meaning “the country of origin of such resources or a Party that has acquired the genetic resources in accordance with the Convention.”⁶¹ Third, the specific benefit-sharing arrangements need to be based on terms to which the provider and user of the concerned genetic resources mutually agreed.⁶²

Like the CBD, the Nagoya Protocol is a legally binding instrument. In connection with the implementation of access and benefit-sharing, the Protocol requires states parties to establish a “National Focal Point,”⁶³ adopt “Model Contractual Clauses,”⁶⁴ and institute measures for monitoring the utilization of genetic resources.⁶⁵ In fact, the Nagoya Protocol refers to two different national legislative documents to deal with access and benefits sharing issues—one for the source country and another for the user country. The source-country measure needs to cover access procedures to be enumerated on the basis of sovereign rights, while the user-country measures need to address the users’ responsibilities like prevention of misappropriation of genetic resources or TK coming from other countries.⁶⁶

58. *Id.* at art. 6(3): “Pursuant to paragraph 1 above, each Party requiring prior informed consent shall take the necessary legislative, administrative[,] or policy measures, as appropriate, to: (a) Provide for legal certainty, clarity[,] and transparency of their domestic access and benefit-sharing legislation or regulatory requirements; (b) Provide for fair and non-arbitrary rules and procedures on accessing genetic resources; (c) Provide information on how to apply for prior informed consent; (d) Provide for a clear and transparent written decision by a competent national authority, in a cost-effective manner and within a reasonable period of time; (e) Provide for the issuance at the time of access of a permit or its equivalent as evidence of the decision to grant prior informed consent and of the establishment of mutually agreed terms, and notify the Access and Benefit sharing Clearing-House accordingly; (f) Where applicable, and subject to domestic legislation, set out criteria and/or processes for obtaining prior informed consent or approval and involvement of indigenous and local communities for access to genetic resources; and (g) Establish clear rules and procedures for requiring and establishing mutually agreed terms. Such terms shall be set out in writing and may include, inter alia: (i) A dispute settlement clause; (ii) Terms on benefit-sharing, including in relation to intellectual property rights; (iii) Terms on subsequent third-party use, if any; and (iv) Terms on changes of intent, where applicable.”

59. *Id.* at art. 3.

60. *Id.* at art. 5(1).

61. *Id.*

62. THOMAS GREIBER ET AL., AN EXPLANATORY GUIDE TO THE NAGOYA PROTOCOL ON ACCESS AND BENEFIT-SHARING 28 (2012).

63. Nagoya Protocol, *supra* note 34, at art. 13.

64. *Id.* at art. 19.

65. *Id.* at art. 17.

66. *See id.* at arts. 5(2), 5(5), 6(3).

C. Summary of International Environmental Law and Traditional Knowledge

The CBD states that all biodiversity-related genetic resources are subject to national legislation, meaning that states parties have the authority to set conditions and limits on the access to genetic resources. But the CBD neither defined how states can limit admittance to its genetic resources nor determined how TK related to genetic resources can be protected if admittance is granted. Moreover, the CBD did not address how, if admittance is granted, a fair share of the benefits from any products derived from genetic resources may be returned to home communities. With respect to consent, it did not define what constitutes consent and participation or specify who should be authorized to present consent; whether consent should be required from individuals, the governing body of the local area, or both; or whether states can provide consent on behalf of local people or not.

Some of these limitations of the CBD were addressed by the Bonn Guidelines, which noted the basic principles of prior informed consent, including legal certainty and clarity and consent of the relevant competent national authorities in the provider state.⁶⁷ The Guidelines also clarified that prior informed consent should be in line with relevant traditional practice and national policies for accessing benefits as well as related domestic laws.⁶⁸ Importantly, though, these Guidelines are non-binding, and the Nagoya Protocol limits indigenous people's rights of prior informed consent by merely requiring states parties to take measures "as appropriate" for the purpose of providing "information on how to apply for prior informed consent" and requiring the measures to be "in accordance with domestic law."⁶⁹

Regarding benefit-sharing, the Bonn Guidelines advocate for "mutually agreed terms," which must cover the "conditions, obligations, procedures, types, timing, distribution, and mechanisms of benefits to be shared." The Guidelines do not specify the conditions as it acknowledges that these "will vary depending on what is regarded as fair and equitable in light of the circumstances."⁷⁰ In line with this, the Guidelines propose a flexible mechanism that "will vary on a case-by-case basis."⁷¹

Again, although the CBD and Nagoya Protocol affirm the sovereignty of

67. Bonn Guidelines on Access to Genetic Resources and Fair and Equitable Sharing of the Benefits Arising out of their Utilization, Secretariat of the Convention on Biological Diversity ¶ 26, 2002 [hereinafter Bonn Guidelines].

68. *Id.* ¶ 31.

69. See Nagoya Protocol, *supra* note 34, at arts. 6(2), 6(3) ("In accordance with domestic law, each Party shall take measures, as appropriate, with the aim of ensuring that the prior informed consent or approval and involvement of indigenous and local communities is obtained for access to genetic resources where they have the established right to grant access to such resources."); *see also id.* at art. 7 ("In accordance with domestic law, each Party shall take measures, as appropriate, with the aim of ensuring that traditional knowledge associated with genetic resources that is held by indigenous and local communities is accessed with the prior and informed consent or approval and involvement of these indigenous and local communities, and that mutually agreed terms have been established.").

70. Bonn Guidelines, *supra* note 67, ¶ 45.

71. *Id.* ¶ 49.

nations over their biological resources, they also encourage mutual arrangements between those who want access to resources and knowledge (for instance, companies and governments). A shortfall of the CBD and the Nagoya Protocol is that they do not describe protection at the level of the community, thereby provoking intercommunity conflicts or conflicts between a government and its communities. Moreover, while Article 5(5) of the Nagoya Protocol upholds TK holders' rights of benefit-sharing through requiring the states parties to "take legislative, administrative[,] or policy measures," the scope of the rights is curtailed by the "as appropriate" language.

Admittedly, the importance of protecting indigenous or traditional knowledge has been acknowledged beyond the CBD, Nagoya Protocol, and Bonn Guidelines, including in the *Our Common Future* report⁷² and the *Agenda 21* action plan.⁷³ However, the CBD and Nagoya Protocol remain the main legal mechanisms of relevance to TK because of their binding nature.

III. CASE STUDY: BANGLADESH AND TRADITIONAL KNOWLEDGE

The CBD and Nagoya Protocol have had a tangible effect on the creation of mechanisms for protecting, preserving, and managing biodiversity-related and plant variety-related TK. For example, as a result of these international agreements, Bangladesh has taken a number of legal steps to protect its TK. Since Bangladesh is one of the most biodiversity-rich states in the world,⁷⁴ its mechanisms of protecting biodiversity- and plant variety-related TK deserve scholarly attention. Assessing the adequacy of the protection of biodiversity- and plant variety-related TK is pivotal in Bangladesh for two other important reasons as well. First, Bangladesh is at the forefront of some of the most devastating effects of climate change,⁷⁵ and protecting TK may help ensure stronger adaptation and mitigation measures in this regard.⁷⁶ It helps climate change adaptation through "observing changing climates" and "adapting to impacts,"⁷⁷ and it facilitates climate change mitigation through adopting low-carbon' traditional lifestyles of the indigenous people.⁷⁸ Second, the communities that own TK in Bangladesh are extremely poor, and protecting

72. WORLD COMM'N ON ENV'T & DEV., *OUR COMMON FUTURE* 32-33, 114-15 (1987).

73. U.N. Conference on Environment and Development, *Agenda 21*, U.N. Doc. A/CONF.151/26(Vol. I), at ch. 26(1) (Jun. 1992).

74. *Bangladesh — Main Details*, CONVENTION ON BIOLOGICAL DIVERSITY, <https://www.cbd.int/countries/profile/?country=bd#:~:text=Bangladesh%20is%20one%20of%20the,and%20man%2Dmade%20homestead%20ecosystems> (last visited June 29, 2023).

75. Arastoo Khan, *Bangladesh — The Most Climate Vulnerable Country*, WORLD BANK BLOG (Nov. 21, 2013), <https://blogs.worldbank.org/endpovertyinsouthasia/bangladesh-most-climate-vulnerable-country>.

76. Gleb Raygorodetsky, *Why Traditional Knowledge Holds the Key to Climate Change*, U.N. UNIV. (Dec. 13, 2011), <https://unu.edu/publications/articles/why-traditional-knowledge-holds-the-key-to-climate-change.html>.

77. Climate Change, U.N. Educ., Sci. & Cultural Org., <https://www.unesco.org/en/links/climate-change#:~:text=Local%20and%20indigenous%20knowledge%20systems,contributing%20to%20global%20mitigation%20efforts> (last visited June 29, 2023).

78. Gleb Raygorodetsky, *Why Traditional Knowledge Holds the Key to Climate Change*, U.N. UNIV. (Dec. 13, 2011), <https://unu.edu/publications/articles/why-traditional-knowledge-holds-the-key-to-climate-change.html>.

TK will promote social justice by ensuring that the owners of TK receive the resources they deserve. Both reasons are worth expanding upon in slightly more detail. While the idea of social justice calls for “the fair and compassionate distribution of the fruits of economic growth,”⁷⁹ legal measures for protecting TK can ensure fair and compassionate distribution of benefits (to be generated from biodiversity-related TK) through introducing access and benefit-sharing mechanisms, as detailed under the Nagoya Protocol.

As to the first, Bangladesh is considered one of the states most affected by climate change; indeed, it is predicted that by 2025, the country will suffer more from climate change than any other country.⁸⁰ Based on data from the Climate Risk Index 2021, Bangladesh between 2000 and 2019 experienced 185 extreme weather events due to climate change. Approximately 11,450 people were killed, and the state also suffered economic losses of \$3.72 billion.⁸¹ As global temperatures continue to rise, the human and economic costs for Bangladesh will only continue to rise. It is thereby essential that Bangladesh does everything it can to mitigate the risks posed by climate change, including protecting its biodiversity. Since biodiversity-related and plant variety-related TK are considered essential for protecting biodiversity,⁸² safeguarding these categories of TK is crucial for Bangladesh and its ability to limit the most devastating effects of climate change.⁸³

On the second point, Bangladesh is a low-income country as well as the sixth-most densely populated country in the world.⁸⁴ Approximately 61% of the population of Bangladesh resides in rural areas,⁸⁵ and the majority of these people are dependent on agriculture for their livelihoods.⁸⁶ Like many other states, tribal populations of Bangladesh are also dependent on agricultural and biological resources for their livelihoods.⁸⁷ The protection of biodiversity- and

79. INT’L FORUM FOR SOC. DEV., *SOCIAL JUSTICE IN AN OPEN WORLD: THE ROLE OF THE UNITED NATIONS* 7 (2006).

80. *Bangladesh Rated World’s Most Vulnerable Country to Climate Change*, CLIMATE HOME NEWS (Oct. 30, 2018, 10:48 AM), <https://climatechangenews.com/2013/10/30/bangladesh-rated-worlds-most-vulnerable-country-to-climate-change/>.

81. Mehedi Al Amin, *Bangladesh Remains 7th Most Vulnerable to Climate Change*, BUS. STANDARD (Jan. 25, 2021, 12:01 PM), <https://www.tbsnews.net/environment/climate-change/bangladesh-remains-7th-most-vulnerable-climate-change-191044>.

82. Cf. UNITED NATIONS, *PROTECTING AND PROMOTING TRADITIONAL KNOWLEDGE: SYSTEMS, NATIONAL EXPERIENCES AND INTERNATIONAL DIMENSIONS* (Sophia Twarog & Promila Kapoor eds., 2004).

83. Cf. *Biodiversity and Climate Change*, EUROPEAN COMM’N, https://ec.europa.eu/environment/nature/climatechange/index_en.htm (last visited June 29, 2023); *Biodiversity – Our Strongest Natural Defense Against Climate Change*, UNITED NATIONS, <https://www.uncclearn.org/wp-content/uploads/library/unep248.pdf/> (last visited June 29, 2023); *Facts About the Nature Crisis*, U.N. ENV’T PROGRAMME, <https://www.un.org/en/climatechange/science/climate-issues/biodiversity> (last visited June 29, 2023).

84. *Countries by Population Density 2022*, WORLD POPULATION REV., <https://worldpopulationreview.com/country-rankings/countries-by-density> (last visited June 29, 2023).

85. Leander von Kameke, *Share of Rural Population Bangladesh 2012-2021*, STATISTA (Oct. 19, 2022), <https://www.statista.com/statistics/760934/bangladesh-share-of-rural-population/>.

86. BANGLADESH BUREAU OF STATISTICS, *REPORT ON AGRICULTURE AND RURAL STATISTICS* 4 (2018).

87. Aliyu Akilu Barau, Safiul Islam Afrad, Sadekur Rahman & Abiar Rahman, *Indigenous Peoples’ Livelihood Practices in South-eastern Bangladesh and the Question of Sustainability*, 27

plant variety-related TK is pivotal to ensure their livelihoods.

The remainder of this Part will examine the extent to which national law in Bangladesh complies with relevant provisions of international law to protect local biodiversity-related and plant variety-related TK as well as the interests of TK holders. The discussion mainly examines nationally adopted legal standards related to “prior approval” or “prior informed consent” and “equitable share of benefit.” However, the discussion will also explore the overall strengths and weaknesses of Bangladesh’s legal mechanisms for biodiversity-related TK protection, which will, of course, be relevant for other states with similar conditions.

Bangladesh has a wide variety of TK, including farming practices like the flood-plain production system⁸⁸ and fishing system practices⁸⁹ and local environmental management procedures.⁹⁰ Most of this TK is undocumented, and there is a threat that it may be lost.⁹¹ Among all available TK in Bangladesh, only genetic resources,⁹² traditional farming practices,⁹³ Unani and Ayurvedic medicines or medicine plants,⁹⁴ and culinary goods such as turmeric, desi ghee, and rice of diverse varieties⁹⁵ can be brought under the auspices of national laws such as the 2017 BBA and the 2019 PVPA.

A. Protecting Traditional Knowledge Related to Biodiversity and Plant Varieties in Bangladesh

Bangladesh is a state party to the CBD,⁹⁶ but only a signatory to the Nagoya Protocol.⁹⁷ Therefore, while Bangladesh is obliged to comply with the entirety of the CBD provisions, its obligations under the Nagoya Protocol, at present, are only to refrain, in good faith, from acts that would defeat the object

SUSTAINABLE DEV. 809, 810 (2019).

88. See Mursaleena Islam & John B. Barden, *Bio-economic Development of Floodplains: Farming Versus Fishing in Bangladesh*, 11 ENV'T AND DEV. ECON. 95, 96 (2006).

89. Razidur Rahaman, *Protection of Traditional Knowledge and Traditional Cultural Expressions in Bangladesh*, 20 J. INTELL. PROP. RTS. 164, 164 (2015).

90. See generally Mahatab Uddin & Saleemul Huq, *Protecting Soft Adaptation Technologies under Intellectual Property Rights Systems*, 25 INTELL. PROP. & TECH. L.J. 19 (2021).

91. Rahaman, *supra* note 89.

92. A.K. FAZLUL HAQUE BHUIYAN, FARM ANIMAL GENETIC DIVERSITY COUNTRY REPORT — BANGLADESH 1, 8 (2013).

93. See Islam & Barden, *supra* note 88.

94. Bangladesh has more than five hundred varieties of plants having medicinal value. See M. YUSUF, J.U. CHOWDHURY, M.A. WAHAB, & J. BEGUM, MEDICINAL PLANTS OF BANGLADESH (1994); see also Zubair Khalid Jabu, Khurshid Jahan & Farhina Rahman, *Current Official Status of Traditional Medicine and Their Used as in Chronic Diseases: Bangladesh*, 1 J. OF DRUG DISCOVERY & THERAPEUTICS 93, 93 (2013).

95. Diverse indigenous rice varieties of Bangladesh include chinigura, kalijira, kataribhog, nenia, and basmati. EAM Asaduzzaman & Andrew Eagle, *Aromatic Rice, Sweet Scent of Success*, DAILY STAR (Apr. 5, 2018), <https://www.thedailystar.net/country/aromatic-rice-sweet-scent-success-1558123>.

96. *List of Parties*, CONVENTION ON BIOLOGICAL DIVERSITY, <https://www.cbd.int/information/parties.shtml> (last visited June 29, 2023).

97. *Parties to the Nagoya Protocol*, CONVENTION ON BIOLOGICAL DIVERSITY, <https://www.cbd.int/abs/nagoya-protocol/signatories/> (last visited June 29, 2023).

and purpose of the treaty.⁹⁸ Additionally, ratification of the CBD does not mean that the treaty is legally enforceable within Bangladesh because Bangladesh is a dualist country, meaning that relevant international law must be adopted at the national level to be enforceable domestically.

As such, Bangladesh adopted the BBA in 2017 and the PVPA in 2019 for the purpose of fulfilling its international law obligations as well as national constitutional obligations. The BBA seeks to protect TK associated with biodiversity, and the PVPA offers protection for TK associated with plant varieties. Both laws, of course, deal with biodiversity-related TK, as plant varieties are an essential component of biodiversity.

In line with the CBD,⁹⁹ the BBA is aimed to conserve biodiversity as well as ensure fair and equitable access to the benefits of biotechnological innovation derived from the utilization of biodiversity and genetic resources.¹⁰⁰ The BBA confers protection to TK in three ways. First, it institutes a nationwide registration and documentation system of biodiversity that includes TK. Second, it contains a provision for fair and equitable access to benefits deriving from the utilization of elements of biodiversity and genetic resources, including TK. Third, it upholds TK holders' rights by requiring their prior approval or prior informed consent as a precondition for third-party access to the TK at issue. The first measure adopted by the BBA complies with Articles 10(c) and 8(j) of the CBD as well as Article 6(a), which requires states parties to adopt a national strategy for "programmes for the conservation and sustainable use of biological diversity," and Article 7, which requires them to identify and monitor their biological diversities.¹⁰¹ The second measure directly reflects Article 8(j) of the CBD, which urges for adopting national measures for "the equitable sharing of the benefits arising from the utilization" of TK.¹⁰² The third measure seems to incorporate Article 15(5), which requires the prior informed consent of resource-offering parties.¹⁰³

The BBA also forms a National Committee on Biodiversity (NCB) for overseeing the conservation of biodiversity (including TK) as well as the issue of sharing benefits generated from the plant genetic resources or TK associated with the plant genetic resources.¹⁰⁴

In connection with conservation of TK, the BBA prevents any non-citizen, non-resident citizen, or any organization not incorporated in Bangladesh from accessing any biodiversity or biological resource, including

98. Vienna Convention on the Law of Treaties art. 18, May 23, 1969, 1155 U.N.T.S. 331 (1969).

99. "The objectives of this Convention, to be pursued in accordance with its relevant provisions, are the conservation of biological diversity, the sustainable use of its components[,] and 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." CBD, *supra* note 11, at art. 1.

100. Biodiversity Act, *supra* note 32.

101. CBD, *supra* note 11, at arts. 6-7.

102. *Id.* at art. 8.

103. *Id.* at art. 15.5.

104. Biodiversity Act, *supra* note 32, § 8.

TK, for the purpose of research or commercial utilization unless they obtain permission from the NCB.¹⁰⁵ Moreover, citizens or entities within Bangladesh are not allowed to transfer any research related to biodiversity or biological resources to the above-stated non-Bangladeshi entities without prior approval of the NCB.¹⁰⁶ This provision is in accordance with Article 15.5 of the CBD, which obliges all contracting Parties to get “prior informed consent” of the parties who own or are offering the resources.¹⁰⁷

The BBA also requires that any application for a patent or any other kind of intellectual property right (IPR) for any invention that is based on biological resources of Bangladesh must obtain the prior approval of the NCB.¹⁰⁸ This provision is applicable for any applicant—regardless of citizenship status. This provision of the BBA has arguably been adopted to enjoy the benefits of the flexibility offered to IPRs under Article 15(5) of the CBD.¹⁰⁹

The NCB is also entitled to apply diverse modes of ownership in line with providing access to fair and equitable benefits: sole ownership (if it is possible to identify the specific owner) or joint ownership in favor of the community that owns the biodiversity or genetic resources, including any associated TK. Relatedly, it can ensure that the research outcome or technological innovation improves the quality of life for the applicable community, assures the engagement of Bangladeshi scientists, benefit claimants, and local communities in the relevant research or development, and ensures monetary or non-monetary compensation to affected parties.¹¹⁰ Though the BBA empowers the NCB to advise the government to formulate rules for ensuring equitable distribution of benefits derived from genetic resources or biodiversity,¹¹¹ which should necessarily include TK associated with biodiversity, such rules have not yet been adopted in Bangladesh.

One downside of the BBA is that it does not use the term “indigenous.” Additionally, it is arguably not possible for the NCB to be a co-owner of any biological resource or associated knowledge—notwithstanding provisions in the law. Perhaps most importantly, it remains silent as to whether individual or community rights should be prioritized in determining access to biological resources and TK.

In contrast, the PVP Act acknowledges community rights in the form of farmers’ rights. For instance, under Section 23 of the PVP Act, government authorities are required to protect a litany of rights: to receive recognition for preserving TK associated with plant genetic resources used for food, agriculture, and medical purposes;¹¹² to benefit from any protected plant

105. *Id.* at § 4.

106. *Id.*

107. CBD, *supra* note 11, at art. 15.5.

108. Biodiversity Act, *supra* note 32, § 6(1).

109. CBD, *supra* note 11, at art. 16.5.

110. Biodiversity Act, *supra* note 32, § 30.

111. *Id.*, § 10(f).

112. Plant Variety Protection Act, *supra* note 33, § 23(1)(d).

variety that has been developed using the genetic resources they own;¹¹³ and to participate in making decisions regarding the preservation and sustainable use of plant genetic resources.¹¹⁴ The government must also invalidate the registration of those plant varieties that have been registered for any government or non-government breeder, but have traditionally been used by the communities of farmers.¹¹⁵

In addition, the PVPA also provides a comprehensive definition of TK that includes all kinds of knowledge and professional practices and cultures related to biodiversity, which may be prevalent in written, oral, folklore, or story form and which can be rational, real, metaphorical, symbolic, or graphical—as long as the product is not the result of any individual invention or effort.¹¹⁶ The PVPA also establishes the Plant Variety Protection Authority for the purpose of ensuring farmers' right of access to benefits that result from the use of plant genetic resources.¹¹⁷ Unfortunately, one major weakness of the PVPA is that it does not define a method of benefit-sharing.

Both the BBA and PVPA also share another important drawback: they are silent as to TK that is shared by other states. In this regard, the Nagoya Protocol clearly states:

Where the same traditional knowledge associated with genetic resources is shared by one or more indigenous and local communities in several Parties, those Parties shall endeavor to cooperate, as appropriate, with the involvement of the indigenous and local communities concerned, with a view to implementing the objective of this Protocol.¹¹⁸

Although Bangladesh has not yet ratified Nagoya Protocol, it is urgent that a national legal provision akin to the just-mentioned Nagoya Protocol provision be adopted soon given that Bangladesh shares ownership of much biodiversity-related TK with neighboring states.

Although it has not been mentioned in legal documents like the CBD or Nagoya Protocol, it is also possible to protect others from using unauthorized TK through building a documented depository, library, or database of TK found within a specific state. In this regard, the BBA urges the preparation and preservation of a national biodiversity register through the Department of Environment, in coordination with the register prepared and preserved by the District Committee.¹¹⁹ While no reference to TK is found in the provisions of the BBA calling for such a register, it can be implied that such register must also necessarily include biodiversity-related TK. In addition, the BBA clearly mentions that the tasks of the NCB include showing due respect to local communities' knowledge of biodiversity: to recognize it and to advise the

113. *Id.* § 23(1)(e).

114. *Id.*, § 23(1)(f).

115. *Id.*, § 23(1)(g).

116. *Id.*, § 23.

117. *Id.* § 4.

118. Nagoya Protocol, *supra* note 34, at art. 11(2).

119. Biodiversity Act, *supra* note 32, § 10(b).

government to preserve that knowledge.¹²⁰

B. Policy Recommendations

As long as rules regarding equitable distribution are not adopted, the adoption of BBA and PVPA cannot benefit the actual owners of biodiversity- and plant variety-related TK. For this, it is recommended that Bangladesh should adopt such rules as soon as possible. Since the poor and marginal communities who own biodiversity- and plant variety-related TK have limited bargaining capacity, the NCB should take care to account for their interests by including them in the rulemaking process.

Because biodiversity- and plant variety-related TK likely also exists in neighboring states, both the BBA and PVPA need to be supplemented with provisions regarding the possibility of cooperation and benefit-sharing in the context of trans-boundary local communities.

Adoption of the BBA and PVPA will have limited effect unless a national biodiversity and plant-variety register is built. Bangladesh should take necessary initiatives to establish such a database.

Finally, although the BBA and PVPA have penalties for violating the biodiversity- and plant variety-related TK provisions,¹²¹ the implementation of those provisions is very weak due to a fragile monitoring system. The government of Bangladesh should devote resources towards building a proper monitoring system and ensuring robust implementation mechanisms for the BBA and PVPA.

III. CONCLUSION

Although protection of TK is of grave necessity, international binding instruments for the protection of TK have been concluded within the auspices of international environmental law, which confers protection to only biodiversity- and plant variety-related TK. The protection conferred by the CBD is composed of two main elements: a right to TK holders to gain access to the benefits of the innovation generated therefrom and an obligation to the third-party users to obtain the prior informed consent of the relevant TK holders. These two elements were further supported and elaborated through other international instruments: the binding Nagoya Protocol and the non-binding Bonn Guidelines. Accordingly, states parties to the CBD and Nagoya Protocol are required to design their national laws such that the elements of protection of TK are properly implemented.

One important flaw of the CBD and Nagoya Protocol is that they do not offer protection of TK at the community level, increasing the chance of inter-community conflicts or conflicts between governments and communities. In

120. *Id.*, § 10(h).

121. The Biodiversity Act also assesses penalties for undertaking unauthorized activities related to biodiversity and transfer of researched results without prior approval.

fact, instead of conferring sole ownership to the TK to the communities, the protection of TK under international environmental law intends to benefit both TK holders and the outsiders who intend to use TK for commercial purposes. Although the agreements intend to allow third parties access to TK only if they share benefits and receive prior approval or informed consent, not all states parties can implement these elements in a sound manner. Indeed, as this Essay has demonstrated, Bangladesh, despite enacting the BBA and PVPA in an attempt to adhere to its international law obligations, is still not doing enough to protect biodiversity- and plant-variety related TK. Bangladesh should consider improving its existing laws by adopting rules regarding equitable distribution, supplementing them with provisions related to trans-boundary local communities, establishing a national biodiversity and plant-variety register, and building a more robust monitoring system. All of this has implications for the protection of TK generally, the importance of which cannot be overstated.