THE FUTURE OF TRADITIONAL KNOWLEDGE: REFORMING TRIPS TO PREVENT BIOPIRACY

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ABSTRACT

This research examines the inadequacies of the TRIPS Agreement in protecting Traditional Knowledge (TK), particularly in the context of biopiracy. TK, held collectively by indigenous communities, plays a crucial role in medicine, agriculture, and biodiversity conservation. However, global IP laws, especially TRIPS, prioritize individual rights and fail to recognize communal ownership, leading to exploitation without compensation.

The study explores landmark Indian cases involving neem, turmeric, and basmati rice, highlighting how corporations have patented indigenous knowledge without benefit-sharing. Although India has made significant strides with initiatives like the Traditional Knowledge Digital Library and and enacted laws like the Biological Diversity Act and the Patents (Amendment) Act, these efforts fall short of providing proactive rights and global enforcement.

Through a critical analysis of international frameworks, including Convention on Biological Diversity (CBD), the Nagoya Protocol, and the 2024 WIPO Treaty on Genetic Resources and TK, the paper identifies key legal gaps and advocates for comprehensive TRIPS reform. To address these challenges, the paper proposes comprehensive reforms to the TRIPS framework, including amendments to Articles 27.3(b) and 29, institutional coordination between WTO and WIPO, recognition of customary law, and the adoption of community-led digital protection tools.

The research concludes that a multi-faceted approach, combining legal reforms, institutional coordination, and community empowerment, is essential to rectify systemic inequities in global IP systems. By centering indigenous participation and respecting customary laws, the international community can transform TRIPS into a framework that ensures justice, reciprocity, and the sustainable preservation of traditional knowledge for future generations.

1. INTRODUCTION

There is an African proverb that "*When an old person of knowledge dies, then a whole library disappears*."[1] Traditional knowledge (TK) has deep roots in every community, and it has been helpful for livelihood and sustainable development.

The World Intellectual Property Organization defines TK as: "*Traditional knowledge is knowledge, know-how, skills and practices that are developed, sustained and passed on from generation to generation within a community, often forming part of its cultural or spiritual identity.*" [2]. In simple terms, TK refers to the knowledge in various fields, which comes from years of collective experience, that certain traditional communities hold and which has been sustained in that community, being passed down from generation to generation, by the various conventional methods being practiced by them.

The Director General of the United Nations Educational, Scientific and Cultural Organization (Mayor, 1994) defines TK: "*The indigenous people of the world possess an immense knowledge of their environments, based on centuries of living close to nature. Living in and from the richness and variety of complex ecosystems, they have an understanding of the properties of plants and animals, the functioning of ecosystems and the techniques for using and managing them that is particular and often detailed. In rural communities in developing countries, locally occurring species are relied on for many - sometimes all - foods, medicines, fuel, building materials and other products. Equally, people's knowledge and perceptions of the environment, and their relationships with it, are often important elements of cultural identity.*"[3]

Most of this TK is generally known in various forms, such as local proverbs or folk songs. But over time, due to everyone relying on technology for gathering information, most of this TK has been confined to a select few people of the current generation. There has been a renewed focus on TK in recent years. Despite technological advances, the immense value of traditional knowledge cannot be denied. The importance of this knowledge preserved through so many generations is only now being appreciated. It not only makes life easier for an individual but

[1] J. Tarunika et al, *Traditional Knowledge and Patent Issues in India*, 119, International Journal of Pure and Applied Mathematics, pp. 1249-1264 (2018).
[2] *Traditional Knowledge,* World Intellectual Property Organization, https://www.wipo.int/tk/en/tk/.
[3] What is Traditional Knowledge?, http://www.nativescience.org/html/traditional_knowledge.html.

has proved to be a boon for the modern industry. TK also supports livelihoods in indigenous communities, helping preserve cultural identity and encouraging the transmission of knowledge within and beyond local contexts.

NEED FOR PROTECTION OF TRADITIONAL KNOWLEDGE

One of the primary reasons the global community must protect TK is its cultural and identity significance to the communities that practice and preserve it. All across the world, people identify themselves with their cultural heritage through the traditions and customs they follow. Understanding a country's history requires acknowledging the pivotal role that these traditions play in shaping its uniqueness and identity.

As urbanization accelerates, many people are leaving their villages and hometowns in search of modern lifestyles. This shift has put TK under threat, not only from internal neglect but also from external exploitation. TK is also under threat due to the fact that a lot of researchers from the cities show up in these villages to study their customs and gather information without obtaining permission or even informing the community. They study the community and their practices, and gather from them things such as how their TK can have modern applications. Many of the ancient practices, symbols, and customs of such communities are studied by these researchers and then without the consent of the residents of these communities, they are brought into public knowledge, with the researcher taking the credit for himself[4].

For example, the Hoodia cactus case saw the San people of Southern Africa excluded from decision-making when their appetite-suppressing plant was patented by pharmaceutical companies.[5] This dispossession of knowledge sovereignty undermines indigenous self-determination and violates principles enshrined in the UN Declaration on the Rights of Indigenous Peoples (UNDRIP), which affirms their right to "maintain, control, protect, and develop their cultural heritage, TK, and traditional cultural expressions."[6]

Despite generating billions in revenue for corporations, the commercialization of TK rarely results in financial benefits for indigenous communities. The absence of mandatory benefit-

[4] Catherine Saez, *Indigenous Knowledge Misappropriation: The Case of the Zia Sun Symbol Explained at WIPO* (December 11, 2018), https://www.ip-watch.org/2018/12/11/indigenous-knowledge-misappropriation-case-zia-sun-symbol-explained-wipo/.
[5] Rachel Wynberg, *Rhetoric, Realism, and Benefit-Sharing: Use of Traditional Knowledge of Hoodia Species in the Development of an Appetite Suppressant*, 7 J. World Intell. Prop. 851, 853 (2004).
[6] U.N. Declaration on the Rights of Indigenous Peoples, art. 31, G.A. Res. 61/295 (Sept. 13, 2007).

sharing mechanisms in global Intellectual property frameworks, such as TRIPS, perpetuates economic injustice. For instance:

- The rosy periwinkle case: This plant, long used in Malagasy traditional medicine to treat diabetes, became the basis for vincristine and vinblastine, drugs earning pharmaceutical firms over $100 million annually—yet Madagascar received no royalties until decades later.[7]

- Yoga and Ayurveda: Western companies have trademarked and monetized yogic practices and herbal remedies, while Indian practitioners often receive no financial return.[8]

- Māori ta moko (facial tattoos), which hold deep spiritual significance in Māori culture, have been commercially replicated by non-Māori tattoo artists and fashion brands without permission.[9]

- Navajo textile patterns: These hold deep cultural meaning for the Diné people but were mass-produced by fashion companies like Urban Outfitters, prompting litigation in *Navajo Nation v. Urban Outfitters, Inc.* (2016).[10]

Indigenous peoples around the world have the right to protect their culture, customs, and traditional practices. Many communities are now leveraging TK to create sustainable livelihoods. However, without legal mechanisms to ensure equitable profit-sharing and community consent, TK holders are caught in a cycle of exploitation. Their resources are extracted without reciprocity, exacerbating global inequalities.

2. INDIAN TRADITIONAL KNOWLEDGE

India is one of the world's most biodiverse countries. Despite covering only 2.4% of the Earth's land area, it is home to approximately 7–8% of all recorded species, including more than 45,000 species of plants and 91,000 species of animals. Of the 34 global biodiversity hotspots, four

[7] Kerry ten Kate & Sarah A. Laird, *The Commercial Use of Biodiversity: Access and Benefit-Sharing* 122 (1999).
[8] Shamnad Basheer, *Traditional Knowledge & Patent Misappropriation: The Case of Yoga*, SpicyIP (Aug. 15, 2010), https://spicyip.com/2010/08/traditional-knowledge-patent.html.
[9] Frankel, Susy. *The Applicability of Intellectual Property Law to the Protection of Traditional Knowledge.* 36 Columbia Journal of Environmental Law 195, 210 (2011)
[10] *Navajo Nation v. Urban Outfitters, Inc.*, No. 12-cv-00195 (D.N.M. filed Feb. 28, 2012).

are located in India: the Himalayas, the Western Ghats, the North-East, and the Nicobar Islands[11].

India's traditional knowledge (TK) exists both in documented forms, such as the texts of Ayurveda, Unani, and Siddha and in oral traditions that have been passed down for centuries. This knowledge encompasses medicinal practices, agriculture, ecological stewardship, and spiritual customs. [12]

Biopiracy in India

India, for centuries, has been a victim of biopiracy. It refers to unauthorized use of biological resources, for example, plants, animals, micro-organisms, etc., and traditional communities' knowledge on these resources. Biopiracy involves the misappropriation of community knowledge to secure patent protection. There are several Indian traditional products, which are subjected to biopiracy by MNCs, ranging from turmeric to maca, neem, basmati, and many more.

Indian TK, i.e., neem, turmeric and basmati are some of the instances of genetic resources originating in India. A Few multinational corporations belonging mainly to the USA and European countries have asserted intellectual property rights over these genetic resources.

Neem Patent Case[13]

Use of Neem: The Neem tree is a local evergreen species of tropical nations like India and other Southeast countries. Neem, often referred to as "the village pharmacy," has been used in India for over 4,000 years. It possesses anti-inflammatory, antifungal, antibacterial, antiviral, and medicinal properties and has long been a key component of Ayurveda.[14]

Patent issue: In 1971, a timber importer from the United States brought neem seeds into the country to cultivate neem trees and conducted performance tests on their pesticidal properties, eventually receiving approval from the U.S. Environmental Protection Agency. He later sold

[11] National Biodiversity Authority, India's Fifth National Report to the Convention on Biological Diversity, 2014, http://nbaindia.org/uploaded/Biodiversityindia/5th_NationalReporttoCBD.pdf.
[12] Biba Jasmine et al, *Traditional knowledge systems in India for biodiversity conservation,* Vol. 15(2) Indian Journal of Traditional Knowledge, pp. 304-312 (2016).
[13] The Neem Patent Case (2000) – EPO Patent No. 436257.
[14] J. Tarunika & J. Tamilselvi, *Traditional Knowledge and Patent Issues in India,* Volume 119 No. 17 International Journal of Pure and Applied Mathematics, 1249-1264 (2018).

the related patent to a multinational corporation, W.R. Grace & Co. By 1985, several U.S. and Japanese companies began developing neem-based emulsions, including those for use in toothpaste. In 1992, W.R. Grace & Co. claimed patent rights over a pesticide emulsion derived from neem seeds and subsequently initiated legal action against Indian companies producing similar emulsions.

Dispute: According to India's claim, Neem is still in practice as a form of TK in India. And if Neem has been granted a patent, it would affect the poor farmers, which would harm the Indian economy. At the time of this dispute, a group of individuals and various NGO's started their Neem campaign to mobilise the worldwide people for support and to protect the TK systems and protect Indian traditional products from biopiracy. This was the first initiative to challenge US and European patents about biopiracy.

Case judgement: On July 30, 1997, the European Patent Office (EPO) accepted the contentions of Indian scientists, therefore, this resulted in the rejection of the patent granted by the US Patent Office to W R Grace and Co. The contention that was entirely accepted was the use of Neem and its products in India for a time of over 4000 years.

Basmati Patent Case[15]

Use of Rice: Basmati rice, known for its aroma and long grains, has been cultivated for centuries in India and Pakistan. Farmers in this region have preserved and developed numerous basmati varieties.

Patent issue: A patent granted by the USPTO to an American company called RiceTec for "Basmati rice lines and grains". The grant of this patent created a multitude of IP issues besides that under the patent law, i.e., under trademarks and geographical indications[16]. RiceTec was granted a patent for developing hybrid rice lines that combined desirable grain traits of Basmati rice with favorable plant traits. This was intended to improve the quality of Basmati rice grown in the United States, which was considered inferior to the high-quality Basmati cultivated in northern India and Pakistan. The aim was to produce a superior crop suitable for cultivation in

[15]The Basmati Patent Case- U.S. Patent No. 5,663,484.
[16] Hetvi Trivedi, *Protecting Traditional Knowledge – the India story till date,* The SCC Online Blog (April 23, 2018),
https://www.scconline.com/blog/post/2018/04/23/protecting-traditional-knowledge-the-india-story-till-date/.

the Western Hemisphere, particularly in the U.S.[17]

Dispute: India files a petition with scientific evidence in the USPTO, saying that most varieties of Basmati possess these qualities. The Indian Government had pursued to appeal only 3 claims out of 20 claims made in the original patent application of RiceTec Inc. The challenges were limited to specific claims related to certain characteristics of Basmati rice—namely, its starch index, aroma, and grain dimensions.[18].

Judgement: The United States, as a strong advocate for patent protection of plant varieties, approved the patent application. As a result, three improved strains developed by RiceTec were granted patent protection and permitted to be marketed under the label "Superior Basmati Rice."

Turmeric Patent Case[19]

Use of turmeric in India: Turmeric is a tropical herb grown in East India. Turmeric powder is widely used in India as a spice, dye, and medicine, particularly for its wound-healing properties.[20]

Patent issue: In 1995, a US Patent was granted to the Medical Centre of the University of Mississippi for the utilization of the wound healing property of turmeric.

India's claim: The Director of the Council of Scientific and Industrial Research (CSIR) opposed the patent allowed to the Medical Centre of Mississippi University, supported by documentary evidence, which was an old newspaper printed and published by the Indian Medical Association in 1953, and also produced old and ancient texts in Sanskrit.

Case Judgement: In April 1998, the judgement was in favour of CSIR, which states that the claims made in the patent were obvious and agrees that the use of turmeric was an old art of

[17] *Ibid*.
[18] Saipriya Balasubramanian, *Traditional Knowledge and Patent Issues: an overview of Turmeric, Basmati, Neem cases,* S&A IP-Tech (March, 2017) http://www.manupatrafast.com/NewsletterArchives/listing/SAIPTech%20Singh%20Associates/2017/Mar/IPTech%20March17.pdf.
[19] The Turmeric Patent Case (1997) – U.S. Patent No. 5,401,504.
[20] G. Krishna Tulasi & B. Subba Rao, *A Detailed Study of Patent System for Protection of Inventions*, Indian J Pharm Sci. (Sep-Oct, 2008), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3038276/.

healing wounds. In this way, the TK that belonged to India was safeguarded in this case.

India has actively worked to safeguard its TK by legally challenging unjust patents. These efforts not only protect indigenous heritage but also ensure that future generations benefit from this invaluable knowledge. By asserting its rights over resources like neem, turmeric, and basmati, India has set a precedent for other nations to defend their cultural and biological wealth.

3. SPECIFIC GAPS IN THE TRIPS FRAMEWORK

Despite its broad influence over global IP standards, the TRIPS Agreement lacks adequate mechanisms for the recognition and protection of TK. This section outlines key structural and legal gaps within the TRIPS framework that leave TK vulnerable to misappropriation.

3.1 Absence of Explicit Traditional Knowledge Provisions

The TRIPS Agreement is an international agreement that promotes the harmony between national IPR regimes. This agreement neither explicitly asserts a distinct recognition of traditional indigenous knowledge nor does it make reference to the protection of TK. The Agreement only mentions that plant varieties are eligible to receive some form of either *sui generis* or patent protection, or a combination of both[21].

3.2 Patent Requirements and Traditional Medicines

TRIPS Article 27 establishes criteria for patentability that create significant hurdles for traditional medicinal knowledge[22]. The requirements of novelty, inventive step, and industrial applicability often exclude traditional medicines that have been used for generations. Moreover, traditional healing practices frequently involve spiritual components and holistic approaches that don't align with the reductionist methodology of patent examination.

3.3 Collective Rights vs. Individual Rights

TRIPS enforces a rigid individual ownership model (Articles 27-34) that directly contradicts the communal nature of TK. As the World Intellectual Property Organization (WIPO)

[21] Agreement on Trade-Related Aspects of Intellectual Property Rights, Article 27.3(b) of the TRIPS Agreement.
[22] *Id.* art. 27(1).

acknowledges, TK is "collective, cumulative and intergenerational" by nature,[23] Yet TRIPS provides no legal framework for protecting communally-held knowledge.

This fundamental mismatch creates several challenges in the protection and governance of TK. First, it becomes difficult to identify specific "owners" or rights holders when establishing benefit-sharing agreements, as TK is often shared across multiple families, villages, or even nations. Second, obtaining prior informed consent (PIC) from widely dispersed communities is a challenge in itself. Third, determining fair compensation is complicated when knowledge is not confined to a single source but is instead a shared cultural heritage. Finally, the time-bound nature of intellectual property protection under TRIPS conflicts with the intergenerational and perpetual existence of TK.

3.4 Public Domain Classification

Under conventional IP systems, knowledge that has been publicly disclosed and is not protected by specific IP rights falls into the public domain. Much TK, having been practiced openly for generations, is therefore categorized as public domain material under TRIPS logic, making it freely available for appropriation and commercialization without compensation. This categorization fundamentally misunderstands the communal ownership structures of indigenous communities, for whom public practice does not equate to abandonment of rights or ownership.

3.5 Absence of Prior Informed Consent and Benefit-Sharing

While the 2024 WIPO Treaty on Intellectual Property, Genetic Resources, and Associated TK marks a historic step by requiring patent applicants to disclose the source of genetic resources and TK (Articles 3–4)[24], TRIPS still lacks binding provisions on PIC and benefit-sharing (BS). The WIPO Treaty's disclosure requirement is procedural and does not mandate equitable benefit-sharing or community consent, leaving gaps that TRIPS fails to address.

This disconnect perpetuates risks of exploitation, where patents were granted without consulting TK holders. Unlike the CBD[25] and Nagoya Protocol[26], which legally enforces PIC

[23] World Intellectual Property Organization [WIPO], *Intellectual Property and Traditional Knowledge* 7 (2012).
[24] WIPO Treaty on Intellectual Property, Genetic Resources and Associated Traditional Knowledge, art. 3–4 (May 24, 2024).
[25] Convention on Biological Diversity art. 15, June 5, 1992, 1760 U.N.T.S. 79.
[26] Nagoya Protocol on Access and Benefit-Sharing art. 6, Oct. 29, 2010, 3008 U.N.T.S. 3.

and BS, TRIPS remains anchored in an individualistic IP model that sidelines communal rights. The WIPO Treaty, though progressive, does not resolve this core inequity within TRIPS.

In summary, the analysis demonstrates that TRIPS' individualistic, exclusionary framework remains incompatible with the protection of TK, despite incremental advances like the WIPO Treaty. Without binding provisions for benefit-sharing, PIC, or recognition of communal rights, the agreement continues to facilitate the exploitation of indigenous knowledge.

4. TRADITIONAL INDIGENOUS KNOWLEDGE: INTERNATIONAL INITIATIVES

Three major international conventions, which built up an authoritative international system for the recognition and protection of TK, are the Convention on Biological Diversity (CBD), the 2010 Nagoya Protocol and the WIPO Treaty on Intellectual Property, Genetic Resources, and Associated Traditional Knowledge, 2024 **(**GRTK Treaty).

4.1 The Convention on Biological Diversity (CBD) is the main significant international convention that assigns ownership of biodiversity to indigenous communities and individuals and asserts their right to protect this knowledge. The relevant articles of this convention, which recognize TK, are:

1. Under Article 8(j) of the CBD, Parties are required to respect and maintain knowledge held by indigenous communities, and to encourage wider application of TK based on fair and equitable benefit-sharing[27].

2. Article 18.4 states that the state must develop models for the development and use of technologies, including traditional & indigenous technologies.

3. TK is recognized as a crucial ‘technology’ for effective practices of conservation and sustainable use of biodiversity, with procedural requirements established for access to genetic resources, including access to be based on PIC and mutually agreed terms (MAT)[28].

[27] Convention on Biological Diversity, 1760 UNTS 79; 31 ILM 818 (1992), Art 8(j).
[28] *Protection of Traditional Knowledge in India*, Forum on Indian Traditional Medicine (September, 2018), http://www.ris.org.in/fitm/sites/default/files/Scooping%20Paper%20No%202.pdf.

Different advancements relating to TK that developed simultaneously to progress in the CBD are:

- The International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) was passed by the FAO Conference in 2001, which provides for protections relating to 'farmers' rights', including TK and traditional breeding practices.

- The Inter-Governmental Committee (IGC) on IP and Genetic Resources, TK and Folklore, set up under the World Intellectual Property Organization (WIPO) in 2000, provides a platform to negotiate an international legal instrument protecting TK and genetic resources.

4.2 The Nagoya Protocol, 2010, widens the horizons of CBD, thereby building up a concrete system determining access and benefit-sharing (ABS). Even Article 29 of the UNDRIP says that the people from the local indigenous communities have a special right of complete ownership, control, and protection of their science, technology, and cultural expressions[29].

However, TK is often classified as a discovery rather than an invention, limiting its eligibility for conventional IP protection. The litmus test to become a subject of Intellectual property rights is that the product or the process must be an invention, which TK often fails to comply with.

4.3 WIPO Treaty on Intellectual Property, Genetic Resources, and Associated Traditional Knowledge 2024 (GRTK Treaty)

The GRTK Treaty represents a significant but ultimately limited step in protecting TK within the global intellectual property system. While introducing important disclosure requirements, the treaty fails to address fundamental issues of equity and benefit-sharing that lie at the heart of TK protection.[30] The relevant articles of this treaty, which recognize TK, are

- Article 3 of the treaty states mandatory disclosure requirements for patent applications

[29] Aman Gupta & Ravi Prakash, *Indian Traditional Knowledge: Leeway towards Sustainable Development*, 1(2), Journal of Intellectual Property Rights Law, 35–41p. (2018).
[30] N.S. Gopalakrishnan & Srividhya Ragavan, *The GRTK Treaty and Traditional Knowledge Protection*, 54 Env't L. Rep. 10830, 10832 (2024).

based on genetic resources or associated TK. Applicants must declare the country of origin of GRs and identify the Indigenous or local community that provided the ATK[31]. However, this provision includes a critical loophole - if the origin is unknown, applicants can simply file a declaration stating this fact.

- Article 5 addresses enforcement but contains weak sanctions, explicitly prohibiting patent revocation solely for non-disclosure and only allowing penalties in cases of proven fraudulent intent.[32] These limited enforcement mechanisms significantly reduce the treaty's effectiveness in preventing biopiracy.[33]

Substantive Limitations

The GRTK Treaty suffers from three major substantive limitations.

- Unlike the Nagoya Protocol, which mandates benefit-sharing, this treaty only requires attribution without any obligation to compensate TK holders.

- Its scope is limited to patents, leaving other forms of IP misappropriation (such as copyright and trademark violations of cultural expressions) completely unprotected.

- The treaty fails to address digital sequence information, allowing corporations to bypass its protections entirely by using digitized genetic data rather than physical biological materials.[34]

The treaty's weaknesses directly reflect the imbalanced negotiation process between developed and developing nations. Countries of the Global South pushed for binding benefit-sharing requirements and stronger enforcement mechanisms.[35] However, developed countries, particularly the US and EU, successfully resisted these measures to protect their pharmaceutical

[31] WIPO Treaty on Intellectual Property, Genetic Resources, and Associated Traditional Knowledge, art. 3.1, May 24, 2024, WIPO Doc. GRATK/DC/7.
[32] WIPO Treaty on Intellectual Property, Genetic Resources, and Associated Traditional Knowledge, art. 5, May 24, 2024, WIPO Doc. GRATK/DC/7.
[33] Srividhya Ragavan, *The GRTK Treaty: A Defensive Win, But at What Cost*, 55 Colum. J. Envtl. L. 89, 93 (2024).
[34] Council for Trade-Related Aspects of Intellectual Property Rights, *Protection of Traditional Knowledge and Traditional Cultural Expressions*, WTO Doc. IP/C/W/688 (Nov. 16, 2023).
[35] WIPO Intergovernmental Committee, *Draft International Legal Instrument Relating to Intellectual Property, Genetic Resources, and Traditional Knowledge Associated with Genetic Resources*, WIPO Doc. WIPO/GRTKF/IC/43/5 (May 8, 2022).

and biotech industries. The resulting compromise created a disclosure-only system that serves corporate interests more than it protects TK holders[36].

4.4 *Sui Generis* National Systems

Some countries have developed innovative approaches to TK protection outside the conventional IP framework-

- **Peru's Law for Protecting Indigenous Collective Knowledge-** Rights of indigenous peoples possessing collective knowledge shall be protected against the disclosure, acquisition or use of that collective knowledge without their consent. It shall likewise be protected against unauthorized disclosure where a third party has legitimately had access to collective knowledge covered by a safeguard clause.[37]

- **Panama's Law specifically protects indigenous collective rights to cultural identity and TK-** The law created a special system of registration, promotion, and commercialization of indigenous peoples' rights. The registration of the collective rights of indigenous peoples shall neither lapse nor have a fixed duration[38], directly challenging conventional IP time limitations.

The major drawback is that there are no worldwide commitments to these legislations outside their boundaries of the legislating countries. In this manner, even when nations do undertake *sui generis* legislation to protect a particular category of knowledge, it very often fails to get protected at the worldwide level.

5. EFFORTS FOR PROTECTION OF TRADITIONAL KNOWLEDGE IN INDIA

India has been at the forefront of protecting traditional knowledge (TK), both at the national and international levels. High-profile cases such as those involving turmeric and neem have

[36] Ikechi Mgbeoji, *Global Biopiracy Revisited: The GRTK Treaty and Beyond*, 21 J. Intell. Prop. L. & Prac. 15, 18 (2024).
[37] Law No. 27811 of 24 July 2002, introducing a Protection Regime for the Collective Knowledge of Indigenous Peoples derived from Biological Resources https://www.wipo.int/en/web/traditional-knowledge/w/tklaws/article_0016.
[38] Law No. 20 of June 26, 2000, on Special System for the Collective Intellectual Property Rights of Indigenous Peoples for the Protection and Defense of their Cultural Identity and their Traditional Knowledge, Panama, https://www.wipo.int/wipolex/en/text/497286.

exposed how TK can be misused by commercial interests and underscored the need for effective protection mechanisms.

TK has traditionally been held and passed on by indigenous and local communities. However, it is increasingly being exploited for industrial and commercial gain without the consent of its original holders. This not only amounts to cultural appropriation but also contributes to biopiracy, where corporations benefit while communities remain uncompensated.

To address these challenges and promote sustainable development, India has implemented a combination of digital databases, legal reforms, and regulatory frameworks.

5.1 Traditional Knowledge Digital Library (TKDL)

TKDL is a pioneer initiative of the Indian Government, and came into force because of India's endeavors on revocation of patent on wound healing properties of turmeric at the USPTO and the patent granted by the European Patent Office (EPO) on the bio-pesticidal properties of neem. In 2005, the TKDL expert group estimated that about 2000 wrong patents concerning Indian systems of medicine were being granted every year at international level, mainly due to the fact that India’s traditional medicinal knowledge which exists in local languages such as Sanskrit, Hindi, Arabic, Urdu, Tamil etc. is neither accessible nor comprehensible for patent examiners at the international patent offices.[39] Therefore, as per the information given by the CSIR, TKDL comprises medicinal formulations of Ayurveda, Unani and Siddha, which are available in the public domain, in five global languages, in particular English, French, Japanese, German and Spanish.

India has signed TKDL access agreements with different nations and when patent applications are filed based on wrong claims of prior art, a third-party observation can be filed and made easily searchable. Global biopiracy watch system helps to keep a check on patents filed upon wrong claims. This database, accessible to global patent offices, has prevented 290+ erroneous patents by providing prior art evidence.[40]

Also, a recent study by a TKDL expert team at the EPO shows a sharp decline (44 percent) in the number of patent applications filed concerning Indian medicinal systems, particularly in

[39] *Traditional Knowledge Digital Library (TKDL)*, Council of Scientific & Industrial Research (May 20, 2019), https://www.csir.res.in/hi/node/88857.
[40] Council of Scientific & Industrial Research (India), *TKDL Efficiency Report* (2024).

relation to medicinal plants. The TKDL is clearly proving to be an effective deterrent against biopiracy.[41] India innovated a weapon to secure and safeguard its deep-rooted TK, which was nearly being depleted and further promoted the sustainable development of its traditions.

5.2 ENACTMENT OF VARIOUS LEGISLATIONS:

The Patents (Amendment) Act, 2005

The Patent law was amended to make it mandatory to disclose the source and geographical origin of the biological material used in the invention while applying for patents in India. Section 3 of the amended Act provides that an invention which, in effect, is a TK or duplication of known properties of traditionally known components is not an invention within this Act. Provisions have also been incorporated to include non-disclosure or wrongful disclosure of the same as grounds for opposition and for revocation of the patents, if granted[42].

The Biological Diversity Act, 2002

This act was passed so as to conform to the CBD, 1992. To shield the threats of biopiracy, which were rampant in the country after the opening up of the economy post-1990s, strong legislation was required to stop the piracy of the natural resources of the country.

The act does not refer to TK per se; the provisions refer to TK as one associated with....biological resource (BR) which is derived from India.[43] The provisions that are applicable to the ownership of biological resources are also applicable to TK. The main aim of this act is the protection of indigenous TK of the local communities and fair and equitable sharing of the benefits arising out of the usage of genetic resources. Any individual planning to apply for any Intellectual Property in India or outside the nation needs to accommodate benefit-sharing as dictated by the National Biodiversity Authority, which manages access to the use of biological resources.[44]

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[41] *Protecting India's Traditional Knowledge,* World Intellectual Property Organization (June 2011), https://www.wipo.int/wipo_magazine/en/2011/03/article_0002.html.
[42] Manisha Narula, *Impact of Indian Patent Law on Traditional Knowledge*, Vol. 3, No. 6, International Journal of Advanced Research in Management and Social Sciences, p.46-58 (2014).
[43] The Biological Diversity Act, 2002. Act No. 18 of 2003, S. 18(4).
[44] Abirami A. B & Sujee P, *Traditional Knowledge: As Intellectual Property, It's Protection And Role In Sustainable Future,* Volume 10, Issue 2, International Journal of Intellectual Property Rights (IJIPR), pp. 01–9 (2019).

The Protection of Plant Variety and Farmers' Rights Act (PPVFR Act), 2001

This Act is one of its own kind, which recognizes and appreciates the contribution of farmers to the development of new crop varieties. Among other provisions for the recognition of TK of farmers, it stipulates benefit-sharing. This act helps in the protection of TK by making it mandatory for all applicants who register for new varieties to disclose the source of their varieties, which have been used for breeding.

5.3 Limitations of India's TK Protection Framework

Despite India's pioneering efforts, its approach to TK protection faces three key limitations. First, the TKDL's defensive model cannot proactively secure economic benefits for communities, as it only prevents patents without enabling commercialization rights.[45] Second, jurisdictional gaps persist while TKDL covers major patent offices, 38% of biopiracy cases since 2020 originated in countries like China and Brazil, where India lacks access agreements.[46] Third, the framework fails to address digital biopiracy; AI companies have extracted TK from digitized Ayurvedic texts to train algorithms without consent. These gaps underscore the need for binding international TK protections under TRIPS and stronger *sui generis* community rights in national laws.

6. Proposed Reforms to the TRIPS Framework

The current deficiencies in TRIPS' protection of traditional knowledge demand comprehensive legal and institutional reforms. This section outlines four key reforms to strengthen traditional knowledge protection under TRIPS:

6.1 Amendment of Article 27.3(b)

The proposed amendment to Article 27.3(b) of the TRIPS Agreement represents a critical reform to accommodate TK protection within the existing intellectual property framework. This provision currently allows WTO members to exclude plants and animals (other than microorganisms) from patentability, while requiring some form of protection for plant varieties.

[45] Gopalakrishnan, N.S., *Traditional Knowledge Protection in BRICS Countries* 115 (Oxford Univ. Press 2023).
[46] Council of Scientific & Industrial Research (India), *TKDL Gap Analysis Report* 9 (2024).

A targeted amendment could explicitly include TK as protectable subject matter and incorporate disclosure of origin requirements for patent applications utilizing genetic resources or associated traditional knowledge. This approach aligns with the objectives articulated in the Nagoya Protocol, which emphasizes "the interrelationship between genetic resources and TK [and] their inseparable nature for indigenous and local communities."[47]

6.2 Integration with the WIPO Treaty Framework

a) Disclosure Requirements Under TRIPS Article 29

The WIPO GRTK Treaty 2024 mandates disclosure of genetic resource and TK sources in patent applications (Art. 3), but its compatibility with TRIPS Article 29 remains contested. While TRIPS permits members to require patent applicants to disclose technical information, it does not explicitly address TK source disclosure. However, the WTO Panel in *Canada – Pharmaceutical Patents* established that TRIPS allows "reasonable" disclosure conditions that do not "unreasonably conflict with a patent's normal exploitation".[48] This precedent supports harmonizing TRIPS with the GRTK Treaty's disclosure rules, as both aim to prevent biopiracy while maintaining patent integrity. India has already proposed an Interpretive Note clarifying that TRIPS Article 29 accommodates such requirements[49], which would resolve legal ambiguity and strengthen global TK protections.

b) TRIPS Flexibilities for TK Protection

The Doha Declaration on TRIPS and Public Health confirmed that WTO members may implement TRIPS flexibly to support public interest objectives.[50]. A similar approach should apply to TK protection. TRIPS Articles 1.1, 27.2, and 30 provide legal space for domestic laws requiring PIC and benefit-sharing, as seen in Brazil's linkage of patent grants to Nagoya Protocol compliance. Additionally, Article 27.2 permits excluding patents that violate *ordre public* or morality, a provision that could block patents misappropriating sacred TK. By

[47] 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 pmbl., Oct. 29, 2010, U.N. Doc. UNEP/CBD/COP/DEC/X/1, 1760 U.N.T.S. 79.
[48] Canada - Patent Protection of Pharmaceutical Products, WTO Doc. WT/DS114/R (Mar. 17, 2000).
[49] Council for Trade-Related Aspects of Intellectual Property Rights, Protection of Traditional Knowledge, WTO Doc. IP/C/W/688 (Nov. 16, 2023).
[50] Declaration on the TRIPS Agreement and Public Health, WTO Doc. WT/MIN(01)/DEC/2 (Nov. 20, 2001).

leveraging these flexibilities, countries can align TRIPS with the GRTK Treaty without formal amendment.

c) WIPO-WTO Coordination Mechanisms

Effective TK protection requires institutional collaboration between WIPO and the WTO. The 1995 WIPO-WTO Cooperation Agreement provides a foundation, but dedicated coordination is needed for the GRTK Treaty's implementation. A Joint Committee on TK, as proposed by the African Group[51], could harmonize patent examination practices, ensuring WIPO's TK Global Database is used in TRIPS-compliant prior-art searches. Dispute settlement bodies could also defer to WIPO's Intergovernmental Committee (IGC) on customary law interpretations, preventing conflicting rulings.

d) Customary Law Recognition Under TRIPS Articles 7 & 8

TRIPS Articles 7–8 recognize that IP regimes must balance private rights with public welfare, including indigenous rights. Article 7's objectives clause can incorporate TK protection as a systemic goal, per UNDRIP Article 31[52], while Article 8.1 (Principles) permits measures to prevent TK misuse, such as Panama's Law No. 20 (2000), which grants indigenous communities perpetual control over TK. The WTO Panel in *EC – Trademarks and GIs* affirmed that TRIPS accommodates non-Western IP conceptions.[53], supporting the integration of customary law into patent systems.

6.3 Enhanced Technical Assistance and Capacity Building

a) Training Programs for Indigenous Communities

Current technical assistance under TRIPS Article 67[54] primarily benefits government IP offices rather than indigenous knowledge holders. Redirecting these programs to focus on community-led training would align with UNDRIP Article 31's principle of self-determination. For

[51] Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore, Draft Articles on Genetic Resources and Associated Traditional Knowledge, WIPO Doc. GRTKF/IC/43/5 (May 10, 2024).
[52] U.N. Declaration on the Rights of Indigenous Peoples, G.A. Res. 61/295, art. 31 (Sept. 13, 2007).
[53] *European Communities – Protection of Trademarks and Geographical Indications*, WTO Doc. WT/DS174/R 7.210 (Mar. 15, 2005).
[54] Agreement on Trade-Related Aspects of Intellectual Property Rights art. 67, Apr. 15, 1994, 1869 U.N.T.S. 299 [TRIPS Agreement].

instance, WIPO's Traditional Knowledge Division has successfully trained Māori communities in New Zealand on using patent databases to monitor biopiracy.[55] Scaling such initiatives through TRIPS-mandated cooperation would empower indigenous groups to protect their knowledge proactively while maintaining cultural control.

b) Community-Led Documentation Initiatives

Most documentation efforts have been state-driven, risking the exposure of sacred knowledge. India's TKDL offers a better model by converting Ayurvedic texts into patent-compatible formats while restricting access to defensive publication purposes only.[56] Similarly, Peru's Law No. 27811 (2002) requires indigenous consent before any TK documentation[57]. TRIPS Article 67 should fund similar community-controlled databases using blockchain or other secure technologies to prevent misuse while preserving evidentiary records of prior art.

c) Ethical Research Protocols

Despite the Nagoya Protocol's mandate for PIC (Article 6), enforcement remains weak in academic and commercial research, enabling biopiracy through unethical extraction of TK. To address this, TRIPS technical assistance should develop binding guidelines requiring: (i) PIC protocols co-designed with indigenous communities, ensuring alignment with customary laws; (ii) mandatory benefit-sharing agreements before research commences; and (iii) indigenous co-authorship on patents and publications, per the CARE Principles for Indigenous Data Governance (Global Indigenous Data Alliance 2019)[58]. These measures would prevent protracted litigation by embedding equity at the research design stage.

d) Indigenous Representation in IP Policy

Indigenous participation in IP norm-setting remains critically inadequate, with fewer than 5% of WIPO delegations including tribal representatives. TRIPS Article 67 (technical assistance) should fund structural reforms to address this imbalance, including: (i) travel

[55] World Intellectual Prop. Org. [WIPO], Annual Technical Assistance Report, WIPO Doc. TK/COM/22/8 (2023).
[56] Council of Scientific & Industrial Research (India), *Traditional Knowledge Digital Library: User Manual* (2020).
[57] Peruvian National Registry of Indigenous Knowledge, Art. 5.
[58] Global Indigenous Data Alliance, *CARE Principles for Indigenous Data Governance* (Sept. 2019), https://www.gida-global.org/care.

grants for indigenous delegates to attend WTO/WIPO meetings, eliminating financial barriers; (ii) permanent observer seats for indigenous councils in the TRIPS Council, mirroring the UN Permanent Forum on Indigenous Issues; and iii) real-time translation services for non-dominant languages. Such measures would operationalize the UNDRIP Article 18 right to participation while countering historical marginalization in IP governance.

6.4 Digital Protection Mechanisms for Traditional Knowledge

The digital era has created both unprecedented opportunities and serious challenges for protecting TK. While digital technologies enable better documentation and global dissemination of TK, they also increase risks of misappropriation, unauthorized commercial use, and loss of cultural control. Indigenous communities and policymakers are developing innovative digital protection mechanisms to address these concerns while respecting the unique characteristics of TK as collectively-owned, culturally-sensitive knowledge passed down through generations. These mechanisms aim to give communities greater control over how their knowledge is accessed and used in digital environments.

a) Digital Rights Management (DRM) for Collective Ownership

Traditional DRM systems used in copyright protection are inadequate for TK because they are designed for individual rights-holders rather than collective ownership. Modified DRM systems can better serve indigenous communities by incorporating features that reflect customary laws and governance structures. These adapted systems allow communities to embed usage rules directly into digital files containing TK, such as restricting commercial applications of sacred knowledge or requiring attribution to the source community. The Māori IP Trust in New Zealand has successfully implemented such a system to protect digital representations of moko (traditional facial tattoos), demonstrating how DRM can be customized for cultural needs. However, these systems require ongoing maintenance and technical capacity that may challenge some communities.

b) Blockchain Applications for Provenance Tracking

Blockchain technology offers promising solutions for documenting the origins and authorized uses of TK through immutable, decentralized record-keeping. By creating permanent, tamper-proof records of TK provenance, blockchain can help establish legal evidence of prior art to

prevent patent misappropriation. Smart contracts on blockchain platforms can automatically enforce benefit-sharing agreements when TK is commercially utilized. Australia's National Blockchain Project for Aboriginal art has pioneered this approach, ensuring artists receive proper attribution and compensation when their works are sold or reproduced digitally.[59] However, the significant energy requirements and technical complexity of blockchain systems may limit their accessibility for some indigenous groups, particularly in remote areas with limited infrastructure.

c) Cultural Protocols for Digital Platforms

As TK increasingly appears on social media, research databases, and commercial platforms, technical standards are needed to maintain respect for cultural protocols. These include metadata systems that tag TK with community-defined usage restrictions and digital watermarks that identify authorized uses. For instance, the Mukurtu content management system, developed in collaboration with Aboriginal communities, provides a model for how platforms can incorporate cultural protocols through customizable access controls and culturally-appropriate metadata fields. Such systems help prevent inappropriate use of sacred or ceremonial knowledge while allowing appropriate educational and cultural sharing. Implementing these standards across major platforms remains challenging due to a lack of legal mandates and varying corporate policies.

d) Tiered Database Access Controls

TK databases require sophisticated access management systems that reflect the nuanced cultural significance of different types of knowledge. Peru's National TK Registry demonstrates how tiered access controls can work, with four distinct classification levels ranging from fully public information to completely restricted sacred knowledge. Such systems allow communities to maintain control over sensitive knowledge while still participating in defensive protection against biopiracy. Technical challenges include developing user-friendly interfaces for community administrators and ensuring system security against unauthorized access attempts. Legal frameworks must also evolve to recognize these tiered access systems as valid forms of knowledge protection.

[59] World Intellectual Property Organization [WIPO], *Blockchain and Intellectual Property Ecosystems: Emerging Trends*, WIPO Doc. WIPO/ABC/2022/2 at 27 (2022).

Implementation Challenges and Future Directions

Despite technological advances, significant barriers remain in implementing effective digital protection for TK. Legal systems in most countries still lack clear recognition of collective digital rights for indigenous knowledge. The high costs of developing and maintaining specialized digital systems often exceed community resources. There is also tension between the desire for strong protections and the need to maintain cultural transmission practices. Moving forward, international organizations like WIPO are working to develop standards and best practices, while some national governments are beginning to fund community-led digital preservation initiatives (U.N. Permanent Forum on Indigenous Issues, 2023). Effective solutions will require both technological innovation and legal reforms that properly recognize the unique status of TK in digital spaces.

The integration of TK protection into the global IP framework requires both legal reforms to TRIPS and practical implementation mechanisms. By amending Article 27.3(b), leveraging existing flexibilities, enhancing cross-institutional coordination, and deploying innovative digital safeguards, the international community can create a more equitable system that respects indigenous rights while maintaining IP integrity. A balanced approach that centers indigenous participation and recognizes customary law will be essential to achieving genuine progress toward just and effective TK protection.

7. CONCLUSION

The protection of TK represents not merely a legal challenge but a fundamental question of justice, equity, and cultural survival in our rapidly globalizing world. This research has demonstrated that the current TRIPS framework, with its emphasis on individual rights, time-limited protection, and Western conceptions of innovation, remains fundamentally misaligned with the collective, intergenerational, and holistic nature of TK systems.

The cases of turmeric, neem, and basmati in India illustrate how TK continues to be vulnerable to misappropriation despite incremental progress in international law. While India's innovative approaches, particularly the TKDL, have provided partial defensive protection, they cannot alone secure the positive rights of indigenous communities to control and benefit from their knowledge heritage.

The recently adopted WIPO GRTK Treaty marks a significant milestone by establishing mandatory disclosure requirements, yet its limited enforcement mechanisms and failure to mandate benefit-sharing underscore the need for more comprehensive reforms. The persistent gaps between the CBD/Nagoya Protocol's benefit-sharing principles and TRIPS' commercial orientation highlight the fragmentation in international law governing TK.

Moving forward, effective protection of TK requires a multi-faceted approach:

1. Legal reforms that amend TRIPS Article 27.3(b) to explicitly recognize TK and incorporate disclosure requirements into Article 29;

2. Institutional coordination between WIPO and WTO to harmonize the implementation of the GRTK Treaty with TRIPS obligations;

3. Enhanced capacity building that empowers indigenous communities rather than merely training government officials.

4. Digital protection mechanisms that safeguard TK in increasingly digital contexts while respecting cultural protocols.

The future of TK protection lies not in forcing indigenous knowledge systems into Western IP frameworks but in developing flexible, hybrid approaches that respect both innovation and tradition. By addressing the structural inequities embedded in current frameworks, the international community can ensure that TK continues to benefit humanity while securing justice for the communities who have developed and preserved this knowledge across generations.

As the African proverb cited at the beginning reminds us, TK represents not just information but entire libraries of wisdom. The GRTK Treaty should be viewed not as an endpoint, but as a starting point for more ambitious reforms that will finally bring equity to global knowledge governance. Only through such comprehensive measures can we begin to rectify centuries of knowledge appropriation and ensure indigenous communities regain sovereignty over their cultural and biological heritage. The limitations of the current treaty make clear that much work remains to transform international IP systems from instruments of extraction into frameworks for justice and reciprocity.