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Biodiversity and Intellectual Property Rights: An Analytical Perusal

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ABSTRACT

This paper explores the intricate and often contentious relationship between biodiversity and Intellectual Property Rights (IPR), two legal frameworks that operate on fundamentally different principles. While biodiversity law, primarily governed by the Convention on Biological Diversity (CBD), emphasizes sovereign rights, collective heritage, and the equitable sharing of benefits, IPR systems focus on private ownership, individual innovation, and commercial exclusivity.

The core of the conflict lies in the transition of biological resources—such as genes, microbes, and medicinal plants—from "common heritage" to "intellectual property." As biotechnology and pharmaceutical industries in the Global North increasingly utilize the genetic resources and traditional knowledge (TK) found in the biodiversity-rich Global South, issues of "bio piracy" have emerged. This occurs when traditional medicinal practices or indigenous genetic materials are patented without the prior informed consent of the source communities or a mechanism for fair remuneration.

The paper further examines how the criteria for patentability—novelty, inventiveness, and industrial application—frequently fail to recognize the collective, oral, and intergenerational nature of traditional knowledge. This creates a legal loophole where ancient communal wisdom is rebranded as modern innovation. Additionally, the tension extends to agriculture, where plant variety protection can clash with farmers' traditional rights to save and exchange seeds.

Keywords: *Biodiversity, Intellectual Property Rights, The Convention on Biological Diversity, traditional knowledge.*

I. INTRODUCTION

Biodiversity and the concept of intellectual property rights are two great concepts that seem to be polar opposites; however, law is in the process of trying to combine the two in the modern world.Biodiversity is the diversity of life on earth: genes, species, ecosystems, microorganisms, plants and animals and the ecological relations that sustain them. Innovation can involve

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biological resources or genetic material, traditional knowledge, seeds, medicinal plants, microbes, or indigenous practices, making the relationship complex. According to the Convention on Biological Diversity[1], "Biological diversity is the variability among living organisms from human and animal health, terrestrial and marine ecosystems and the ecosystem components, including genetic diversity, species diversity and ecosystem diversity. It has key goals of conservation of biodiversity, sustainable use, and equitable and just sharing of benefits derived from genetic resources. These three objectives serve as the moral and legal basis for working together on biodiversity and IPR.[2]

The issue concerns: When a company or a researcher/inventor employs a plant, a gene, a seed, a microorganism or a traditional medicinal practice to create a commercial product, whose name should belong to the resulting innovation and who should benefit from the work? Whilst intellectual property law might give credit to the inventor, biodiversity law has its question as to whether the source country, indigenous community, farmer, healer or local knowledge-holder has made their contribution too. This tension has influenced international discussion of patent, plant variety protection, traditional knowledge and access and benefit sharing, biopiracy and digital sequence information.

II. MEANING OF BIODIVERSITY AND INTELLECTUAL PROPERTY RIGHTS

Biological diversity forms the life base of human society. It contributes to food security, medicine, agriculture, climate control, water purification, soil fertility, pollination, culture and balance. Conservation and sustainable use of biological diversity are essential for satisfying the growing needs of food, health and other services of a growing population, as acknowledged by the CBD itself.[3] Biodiversity goes way beyond the biodiversity of forests, animals or rare species; it is also the biodiversity of the genetic resources found in seeds, microbes, medicinal plants, crops and ecosystems.

Biodiversity has an ecological and an economic value. A compound that can be used in the treatment of disease is found in a wild plant. Rice could be drought resistance and be grown using a traditional variety. A soil microbe could be used to create a medicine, enzyme, cosmetics ingredient or a type of crop. Medicinal knowledge maintained by a tribe can be used to lead in

[1]The Convention on Biological Diversity is an important international legal instrument that focuses on the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising from genetic resources. For more detail see Convention on Biological Diversity, 1992, 1760 U.N.T.S. 79.
[2]Articles. 1 and 16(5),Convention on Biological Diversity.
[3]Convention on Biological Diversity, 1992, Preamble, 1760 U.N.T.S. 79.

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the discovery of new drugs.[4] Let's look at some examples of how IP has become thoroughly intertwined with biodiversity. Biological resources are no longer regarded as simply natural objects, but also as a source of innovation, research, trade, and commercial value. Biodiversity is not evenly distributed, however, throughout the world. Biodiversity-rich countries are in the Global South, and many biotechnology, pharmaceutical, seed and research companies are located in the technologically advanced countries. This has led to a long-standing worry that local communities and countries in developing nations could be "culturally appropriated," or their biological resources and traditional knowledge turned into a patented product and sold without any consent, recognition, or equitable remuneration. This is known as biopiracy.

Intellectual Property Rights are the legal rights pertaining to the creations of the mind. These comprise patents, copyrights, trademarks, geographical indications, industrial designs, trade secrets and plant variety protection.[5] For the purposes of biodiversity, the most relevant ones are patents, plant breeders' rights, trade secrets, trademarks and geographical indications. Patents cover new inventions with an inventive step and which can be industrially applied. For biotechnology, patents can be granted on isolated compounds, genetic engineering techniques, pharmaceutical compositions, microorganisms, diagnostic assays, enzymes or processes using biological material. Plant variety protection is a scheme for protecting new plant varieties that have been bred.[6] Confidential commercial know-how is protected under trade secrets, for instance, formulas or research data. Geographical indications may be used to safeguard products that are geographically associated with other products, like tea from Darjeeling, or biological products of origin.[7] The goal of IPR is to motivate innovation by giving temporary exclusive rights. This is what enables inventors or companies to recover research and development costs.

However, if the raw material of innovation is drawn from nature or traditional knowledge IPR can be controversial. A patent might seem to be granting an individual inventor while overlooking collectively acquired, prior knowledge for centuries. A plant variety right can give a commercial seed protection and limit the farmers' traditional use of the seed.[8] There may be hidden use of genetic resources in a trade secret and benefit sharing could be complicated. Therefore, IPR must take into account the conservation, equity, rights of the farmers, rights of

[4]Convention on Biological Diversity, 1992, art. 8(j); World Intellectual Property Organization, Intellectual Property and Traditional Knowledge 3-4 (2015).
[5]World Intellectual Property Organization, What is Intellectual Property?, WIPO Publication No. 450(E), Geneva, available at: https://www.wipo.int/about-ip/en/ (last visited on May 7, 2026).
[6]Sections 15, 28, The Protection of Plant Varieties and Farmers' Rights Act, 2001 (Act 53 of 2001).
[7]Section. 2(1)(e); The Geographical Indications of Goods (Registration and Protection) Act, 1999 (Act 48 of 1999), Tea Board of India, "Country Regulations", available at https://www.teaboard.gov.in/TEABOARDCSM/NzI%3D (last visited on May 7, 2026).
[8]Section 28 and 39(1)(iv), The Protection of Plant Varieties and Farmers' Rights Act, 2001.

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the indigenous people and public interest.

III. THE CORE CONFLICT BETWEEN BIODIVERSITY AND IPR

Biodiversity vs. IPR is a conflict of ideas behind laws. The principles of biodiversity law are: conservation, sustainability, sovereignty of natural resources, community participation and equitable benefit-sharing. The principles of intellectual property law are rooted in the concepts of private rights, exclusivity, novelty, inventiveness and commercial exploitation. Collective and intergenerational knowledge are generally prioritised by the Biodiversity law, whereas individual or corporate innovation is generally protected by IPR. One of the primary reasons of conflict is traditional knowledge.[9] Over the years, many indigenous and local communities have acquired knowledge regarding the medicinal use of plants, seeds, ecological ideas, and healing systems. This knowledge is sometimes in the form of oral, collective, evolving and cultural knowledge. Rather, patent law typically requires an invention to be "novel", "non-obvious" and "disclosed in a written description or technically available form. Traditional knowledge will not be considered prior act if it has not been documented in a patent examination format. This may result in the award of patents for knowledge that is already known to a community.In the past, genetic resources were considered as common heritage or as freely available raw materials.[10]

The CBD has altered this by creating the principle that states have sovereign rights over their biological resources and access must be tied to benefit-sharing.[11] The concept of fair and equitable benefit-sharing from genetic resources has become a core element of biodiversity governance, having originally been the goal of the CBD.Fair and equitable benefit-sharing from genetic resources is now at the centre of biodiversity governance, originally as a goal of the CBD. A third conflict is related to conservation. IPR can be used to promote commercial exploitation of biological resources, but high levels of harvesting can lead to damage of ecosystems. A plant may become commercially valuable following research under a patent and this may lead to increased demand. This can pose a threat to wild populations and livelihoods if not regulated. Hence, IPR policy for biodiversity must not only consider ownership of the invention, but also whether or not commercialization encourages sustainable use.

IV. INTERNATIONAL LEGAL FRAMEWORK

The Convention on Biological Diversity is the starting point. It is associated with conservation

[9]Convention on Biological Diversity, 1992, article. 8(j); Agreement on Trade-Related Aspects of Intellectual Property Rights, 1994, article. 27.
[10]World Intellectual Property Organization, *Documenting Traditional Knowledge: A Toolkit* 15 (WIPO, Geneva, 2017)
[11]Article. 3 and 15, Convention on Biological Diversity, 1992.

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and sustainable use and benefit-sharing. It also acknowledges the importance of the participation of indigenous and local communities and the need for sharing the benefits derived from traditional knowledge for biodiversity conservation and sustainable use.[12] The CBD does not oppose intellectual property rights but holds that access to the genetic resources and associated knowledge shared under the CBD must be fair, regulated and beneficial to the providers. The Nagoya Protocol enhances the access and benefit sharing provisions of the CBD. It includes elements concerning traditional knowledge related to genetic resources and obligations to show prior informed consent of indigenous and local communities with respect to their rights. The principle being that users of genetic resources should seek permission before using and agree to terms of benefit-sharing. Benefits can take the form of monetary, e.g. royalties and license fees, or non-monetary, e.g. technology transfer, research cooperation, capacity building, training and community development.[13]

Another important instrument is the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) within the WTO. The TRIPS establishes minimum requirements for IP protection for members of the WTO. In particular, Article 27.3(b) specifies the patentability or non-patentability of plants, animals and essentially biological processes and protection of plant varieties, which is significant. According to the WTO this provision has been under review and is linked to the discussion on traditional knowledge and biodiversity. For agricultural biodiversity, the FAO managed International Treaty on Plant Genetic Resources for Food and Agriculture is important. It aims at conservation and sustainable use of plant genetic resources for food and agriculture and equitable and just sharing of benefits derived from their use.[14] This agreement is particularly significant in the context of seeds, farmer's rights, crop diversity and food security.

One of the latest developments is WIPO Treaty on Intellectual Property in the field of Genetic Resources and Associated Traditional Knowledge that was signed on 24 May 2024. The treaty requires the disclosure of origin of genetic resources and/or indigenous peoples or local communities in cases where the claimed invention relies on them. The move is a key change in international IP law as it directly links patent applications with the disclosure of origin of biodiversity and traditional knowledge.

[12]Article 8(j), Convention on Biological Diversity, 1992.
[13]Article 5(1), 5(4), 6(1) and Annex,Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization, 2010.
[14]Food and Agriculture Organization, International Treaty on Plant Genetic Resources for Food and Agriculture, available at: https://www.fao.org/plant-treaty/en/ (last visited on May 7, 2026).

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V. ACCESS AND BENEFIT-SHARING

The legal instrument to achieve a fairer use of biodiversity is called access and benefit-sharing, or ABS. Access is about the acquisition of the biological or genetic resources.[15] Benefit sharing is the principle of returning a just and equitable share to the country, community or knowledge-holder who gave the resource or knowledge. ABS is not against science; it is about doing science and science-based and science-informed research and products ethically, transparently and mutually beneficially. ABS typically follows three principles: informed consent, negotiated consent and equitable and fair benefits sharing.[16]

Prior informed consent refers to the permission of the provider before the access. The conditions of use are specified in mutually agreed terms. Benefit-sharing involves sharing benefits among users and non-users, not just with the user. There are a number of ways in which benefits may be provided. Monetary compensation can include upfront payments, milestone payments, royalties, contribution to biodiversity funds, and license fees, and may include joint ventures. Sometimes it may be more important to local communities to have a benefits package rather than just a one-off payment. ABS is particularly significant as biodiversity-rich countries and indigenous peoples have historically been underpaid for its knowledge and resources in the international industries. ABS otherwise these contributions can be withheld from sight.

VI. BIOPIRACY AND MISAPPROPRIATION

The term biopiracy is used for any unauthorized or inappropriate use of biological resources or TK, particularly when it involves patenting or commercializing biological resources or TK without consent or without benefits sharing. It is not necessarily a law/technical term, but it is a very strong ethics/politics concept. It echoes a worry that biodiversity-rich communities could lose their control over what they have to offer. Turmeric was patented in the USA for wound healing in 1995.[17] The Council of Scientific and Industrial Research, India, has filed a challenge to the patent citing prior art records, in which the wound healing activity of turmeric was already known in traditional and published sources. Because of the case, traditional knowledge was identified as a potential area of misappropriation, when the patent offices lacked access to non-Western and non-English prior art. The other most talked about is the neem case. A patent for

[15]Convention on Biological Diversity, 1992, article 15; 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, 2010, article 5-6.

[16]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, article 5, 6 & 7, Oct. 29, 2010.

[17]Suman K. Das and Hari Har P. Cohly, Use of Turmeric in Wound Healing, U.S. Patent No. 5,401,504, granted on March 28, 1995, assigned to University of Mississippi Medical Center; later revoked after re-examination initiated by CSIR on the ground of existing Indian traditional knowledge.

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a fungicidal product using neem was revoked by the European Patent Office after opposition filed by the patent owner, which resulted in a biopiracy controversy over biological knowledge of India and neem's traditional usage.[18] As these cases show, wrongful patents can be eliminated, just after a lengthy and expensive challenge.

Biopiracy does not apply to medicines only. It can be found in agriculture, cosmetics, biotechnology, nutraceuticals, perfumes, enzymes, seeds and even in digital genetic data.[19] With increased data-based research, misappropriation may happen without taking the actual plants or seeds. A researcher can view a genetic sequence data from an online database, then create a product without having to go back to the source country or community. This is why digital sequence information is one of the key concerns in biodiversity law.

VII. TRADITIONAL KNOWLEDGE AND DEFENSIVE PROTECTION

Traditional knowledge is knowledge that is acquired by indigenous peoples, local communities, farmers, healers, pastoralists, forestry inhabitants and fishing communities through long interaction with nature. Can consist of medicines, seed selection, conservation, weather forecasting, animal breeding, ecological management, food processing and culture or culture. This knowledge can be shared, transmitted orally, and be sacred and integral to a community's identity. Traditional IPR systems have often failed to provide protection for TK, since a traditional knowledge is likely to fall short of these elements of authorship, novelty, limited duration, fixation and individual ownership. Traditional knowledge is potentially very old, shared knowledge, and knowledge that is transmitted orally and fluidly. Consequently, it might not be easily protected by patents, copyrights or trade secrets.

Defensive protection is one way of protection. Defensive protection does not provide communities with a positive monopoly right, but with protection against third parties claiming to have IPR over the traditional knowledge already in existence. The Traditional Knowledge Digital Library, India, is one such example. According to WIPO, the TKDL is a mechanism that will be providing information on Indian traditional knowledge in language and format that is accessible to patent examiners, including information on publication details for prior art searches and will also help to reduce the likelihood of granting incorrect patents.[20] According

[18]Third World Network, "Neem Patent Revoked by European Patent Office," available at Third World Network website, last visited on May 7, 2026.
[19]Vandana Shiva, *Biopiracy: The Plunder of Nature and Knowledge* 5-12 (South End Press, Cambridge, 1997); Kerry ten Kate and Sarah A. Laird, *The Commercial Use of Biodiversity: Access to Genetic Resources and Benefit-Sharing* 7-14 (Earthscan, London, 1999).
[20]World Intellectual Property Organization, "About the Traditional Knowledge Digital Library", available at: https://www.wipo.int/meetings/en/2011/wipo_tkdl_del_11/about_tkdl.html (last visited on May 7, 2026).

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to Press Information Bureau, India, TKDL was launched in 2001 by CSIR and the then Department of Indian Systems of Medicine and Homeopathy which is now under the aegis of AYUSH, and has digitised knowledge of Ayurveda, Unani, Siddha, Sowa Rigpa and Yoga in five international languages.[21] With the traditional knowledge documented, questions arise regarding access control, community consent, cultural sensitivity and that documentation might reveal sacred or confidential knowledge. As such, community rights, customary law, consent and equitable benefit-sharing are all essential components to defensive databases.

VIII. PATENTS AND GENETIC RESOURCES

The patent has been the most talked-about IPRs with regards to biodiversity. Patents are not normally awarded for discoveries in nature. In many jurisdictions, however, an isolated compound, a modified microorganism, a method of genetic engineering that involves biological material, a pharmaceutical formulation or a technical process that involves biological material may all be patentable if they meet the patentability criteria.[22] The difference between discovery and invention is fundamental, yet hard to put into practice.The process of isolating an active compound, finding a new therapeutic application, making a new synthetic derivative, or a new extraction process could be patented, depending on national legislation.[23] The controversy is raised when the "inventive" step relies on knowledge of locals or biological material provided by the local population. Under these circumstances, it might seem like an unfair moral win if the patent is still valid. One solution that is proposed is disclosure of origin. It mandates that patent applicants declare the source/ country of origin of the genetic resources and associated traditional knowledge that are used in the invention.

The WIPO 2024 treaty is important because it creates an international patent disclosure requirement for inventions based on genetic resources or associated traditional knowledge.[24] There is no obligation to share the benefits of disclosure, but disclosure makes them more transparent. It assists Patent Offices in finding prior art and assists Bioversity authorities in monitoring use and compliance with the ABS laws. Prior art searches should be enhanced in patent systems, too. Many bad patents are due to the fact that the examiner is not familiar with

[21]Press Information Bureau, Government of India, Traditional Knowledge Digital Library, Ministry of AYUSH, available at: https://pib.gov.in/ (last visited on May 7, 2026).
[22]World Intellectual Property Organization, *Genetic Resources, Traditional Knowledge and Traditional Cultural Expressions*, WIPO; Agreement on Trade-Related Aspects of Intellectual Property Rights, 1994, arts. 27(1) and 27(3)(b).
[23]Sections 3(c), 3(d), The Patents Act, 1970, *Novartis AG v Union of India*, (2013) 6 SCC 1.
[24]World Intellectual Property Organization, *WIPO Treaty on Intellectual Property, Genetic Resources and Associated Traditional Knowledge*, adopted on May 24, 2024, art. 3, available at WIPO official website, last visited on May 7, 2026.

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traditional knowledge in the local language, in ancient texts, in community records and oral knowledge. Databases, such as TKDL, can help fill this gap, but should not be viewed as an alternative to community consent.

IX. INDIA'S LEGAL APPROACH

India is one of the biodiversity rich countries of the world and has a robust legal framework which links both the biodiversity and IPR.[25] The Biological Diversity Act, 2002 (as amended in 2023) covers access to biological resources and associated knowledge, institutional mechanisms and benefit sharing.[26] The Act establishes a National Biodiversity Authority, State Biodiversity Boards and Biodiversity Management Committees. As amended by India, under the said framework, persons seeking to obtain an IPR based on biological resources, the information about which was obtained from India, including from outside India under the guise of a repository, would have to register with the National Biodiversity Authority for the grant of the IPR, and in certain cases, prior approval would have to be obtained before commercialisation.

The National Biodiversity Authority may charge benefit-sharing fees or royalties or impose financial conditions for commercial utilization. The law also allows for sharing the benefits through various other mechanisms, such as joint ownership of intellectual property rights, technology transfer, locating the production or research centers in the benefit-claiming territories, involving Indian scientists and local people in R&D, venture capital and monetary or non-monetary compensation. It's crucial, as it acknowledges the need to go beyond royalty payments for benefit sharing. This can be knowledge, infrastructure, participation and long-term development. The approach of the Indian government has been reform the regulations as well. In 2026, the Press Information Bureau said that the Biological Diversity Amendment Act, 2023, with its provisions on prior registration for IPR associated with biological resources and improved procedures for approvals aims to strike a balance between science and conservation interests and equitable sharing.[27] This is consistent with the policy challenge of how to make compliance easier for researchers and businesses, but maintain protection for biodiversity and communities.

[25]Section 6, The Biological Diversity Act, 2002,
[26]The Biological Diversity Act, 2002, ss. 3, 8, 21, 22 and 41; The Biological Diversity (Amendment) Act, 2023.
[27]Press Information Bureau, Ministry of Environment, Forest and Climate Change, Government of India, "Regulatory Reforms under Biological Diversity (Amendment) Act, 2023 Lead to Surge in IPR Filings" Apr. 1, 2026, available on PIB website, last visited on May 7, 2026; see also The Biological Diversity (Amendment) Act, 2023, Act No. 10 of 2023.

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X. Conclusion

Biodiversity is in a nexus of nature, knowledge, law, science and justice. Biodiversity is the source of many innovations, due to the genetic and ecological resource. Intellectual property rights offer incentives to research and commercialization. However, if innovation is based on biological resources and traditional knowledge, exclusive ownership is not the only issue to consider. Community rights, benefit sharing, conservation, origin and consent should also be important. The world is gradually heading toward a more integrated legal regime as seen in the CBD, Nagoya Protocol, TRIPS debates, FAO Plant Treaty, India's Biological Diversity Act, TKDL, and WIPO 2024 treaty. The message is clear: innovation based on biodiversity should be open, fair and honest. Whether this relationship is sustainable going forward will be determined by whether legal systems can encourage true invention while not permitting misappropriation of nature and traditional knowledge. No 'just system' will allow biodiversity to be used as raw material or traditional knowledge as unowned information. It will acknowledge the role of communities, farmers, indigenous peoples, research organisations, states and businesses. IP should work in favor of biodiversity conservation, not against it. Biodiversity law should facilitate responsible innovation and not impede it. The best way is to do a balance: safeguard inventions, respect communities, save ecosystems, and fairly share benefits.

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