A CRITICAL ANALYSIS ON PATENT LAW AND ITS IMPLICATION IN BIODIVERSITY BEYOND THE NATIONAL JURISDICTION

Muthamizh Azhagi. J, Tamil Nadu Dr. Ambedkar Law University (SOEL)

Srisubashini. M, Tamil Nadu Dr. Ambedkar Law University (SOEL)

ABSTRACT

Patent law plays a crucial role in fostering innovation by granting inventors exclusive rights to their creations. However, its application to biodiversity, particularly Marine Genetic Resources (MGRs) in Areas Beyond National Jurisdiction (ABNJ), presents significant challenges. Beyond National Jurisdiction (BNJ), which includes the high seas and deep seabed, harbors vast biodiversity with immense potential for scientific research and commercial applications. The absence of a comprehensive legal framework for regulating patents and ensuring equitable Access and Benefit-Sharing (ABS) in these areas raises concerns about the monopolization of resources, biopiracy, environmental sustainability, and global equity. This paper critically examines the implications of patent law on biodiversity in Beyond National Jurisdiction (BNJ), focusing on the legal vacuum that allows companies to patent Marine Genetic Resources (MGRs) without clear obligations to share benefits or adhere to environmental standards. It explores the ethical and legal challenges of applying patent law to the global commons, the risks of bioprospecting without Access and Benefit-Sharing (ABS) mechanisms, and the environmental consequences of exploiting fragile marine ecosystems. The ongoing negotiations under the framework of Biodiversity Beyond National Jurisdiction (BBNJ) aim to establish a binding legal regime, but disagreements persist between developed and developing nations. Ultimately, this analysis highlights the need for an international legal framework that balances the promotion of innovation with biodiversity conservation and ensures equitable benefit-sharing. Without such a framework, the exploitation of Marine Genetic Resources (MGRs) in Beyond National Jurisdiction (BNJ) risks deepening global inequalities and undermining efforts to preserve marine biodiversity for future generations.

Keywords: patent law, biodiversity beyond national jurisdiction, marine genetic resources, access and benefit sharing, monopolization of resources, biopiracy, bioprospecting, environmental sustainability, and global equity

CHAPTER I OVERVIEW ON INTRODUCTION

1.1 INTRODUCTION

The intersection of patent law and biodiversity, particularly in areas beyond national jurisdiction (BNJ), is a complex and evolving issue. Patent law, designed to incentivize innovation by granting inventors exclusive rights to their creations, has expanded to cover not only technological inventions but also genetic resources, including those found in the high seas and deep seabed. These regions, which lie outside the sovereignty of any nation, are home to vast and unique marine genetic resources (MGRs). These resources hold immense potential for industries such as biotechnology, pharmaceuticals, and agriculture due to their unique biochemical properties. However, the legal landscape governing MGRs in BNJ is fragmented. While terrestrial biodiversity is governed by frameworks such as the Convention on Biological Diversity (CBD) and the Nagoya Protocol, there is no equivalent international regime to regulate access, benefit-sharing, and environmental protections for resources found in BNJ. The United Nations Convention on the Law of the Sea (UNCLOS) provides a general legal framework for marine areas beyond national jurisdiction, but it does not address the patenting of genetic resources or establish mechanisms for equitable benefit-sharing.

The lack of a comprehensive legal framework creates significant challenges. Companies and nations with the financial and technological capabilities to exploit MGRs can patent these resources, securing exclusive rights to their commercial use. This leads to the monopolization of global commons and raises concerns over equitable access, environmental sustainability, and the protection of biodiversity. Additionally, the absence of a legally binding access and benefit-sharing (ABS) mechanism for BNJ exacerbates global inequalities, as the wealth generated from bioprospecting in these areas disproportionately benefits developed nations. This paper critically examines the implications of patent law on biodiversity in BNJ. It explores the legal, ethical, and environmental challenges posed by the current regulatory framework, or lack thereof, and considers the ongoing international negotiations aimed at addressing these issues through the Biodiversity Beyond National Jurisdiction (BBNJ) agreement. In doing so, the paper highlights the need for a balanced approach that promotes innovation while ensuring the conservation of biodiversity and equitable benefit-sharing.

1.2 SIGNIFICANCE OF THE STUDY

The significance of studying the implications of patent law on biodiversity beyond national jurisdiction (BNJ) lies in its potential to influence global environmental governance, economic equity, and the conservation of marine resources. This research addresses a pressing issue at the intersection of intellectual property rights, environmental sustainability, and international law, with profound implications for both developed and developing nations. Conservation of Marine Biodiversity emphasizes the importance of protecting fragile marine ecosystems in BNJ from over-exploitation driven by patent-driven bioprospecting. Legal and Governance Challenges is the light on the gaps in current international law and the absence of ABS mechanisms for MGRs in BNJ, offering insights into global governance challenges. Equity and Global Justice explores how patent law exacerbates inequalities between developed and developing nations by allowing technologically advanced countries to monopolize Marine Genetic Resources (MGRs). Ethical Implications addresses ethical questions regarding the ownership and commercialization of genetic resources that exist in the global commons. Policy Recommendations for developing a comprehensive legal framework that balances innovation, conservation, and equitable benefit-sharing.

1.3 LITERATURE REVIEW:

Scholars like Boyle (2003) and Drahos (2006) argue that the extension of patent law to Marine Genetic Resources M(GRs) risks enclosing the global commons for private gain. They highlight how current intellectual property regimes contribute to the monopolization of resources that should belong to all humanity.

Researchers such as Morgera (2018) and Hubert (2020) explore the absence of a legal framework for Access and Benefit Sharing (ABS) in Beyond National Jurisdiction (BNJ), emphasizing the inequities faced by developing countries and the lack of mechanisms to ensure fair distribution of benefits from the exploitation of Marine Genetic Resources (MGRs).

Scholars like Scovazzi (2016) and Leary (2019) critique the inadequacies of existing international frameworks, particularly United Nations Convention on the Law Of the Sea (UNCLOS), in regulating patents and bioprospecting activities in Beyond National

Jurisdiction (BNJ). Scott (2018) and other environmental scholars point to the risks of bioprospecting on fragile ecosystems, arguing for stronger environmental protections in BNJ.

Vandana Shiva (1997) critiques the practice of patenting biodiversity as a form of biopiracy, highlighting how patent law facilitates the appropriation of resources by powerful entities without consideration of global equity.

Kongolo (2001) emphasizes the risks of biopiracy, where multinational corporations exploit genetic resources without compensating the source country or community. Pisupati and Bavikatte (2014) examine the challenges in implementing the Nagoya Protocol's provisions on access and benefit-sharing, particularly in areas beyond national jurisdiction.

Gibson (2012) critiques the Trade Related Intellectual Property Rights (TRIPS) Agreement for failing to address the complexities of patenting genetic resources and biodiversity. He argues that the Agreement's broad scope creates opportunities for companies to patent biological materials found in global commons, without ensuring equitable sharing of benefits.

Carvalho (2010) highlights the limitations of United Nations Convention on the Law Of the Sea (UNCLOS) in regulating bioprospecting in international waters, emphasizing the lack of a legal framework to govern patents for marine genetic resources.

Chiarolla (2011) focuses on the ethical dimensions of patenting biodiversity, particularly the challenges of protecting traditional knowledge and ensuring that indigenous communities are not marginalized in the patenting process.

1.4 RESEARCH GAP:

Despite the literature on biodiversity, patent law, and international agreements such as the CBD and UNCLOS, there is limited research specifically addressing the patentability of genetic resources beyond national jurisdictions. A significant gap in understanding how global commons, such as the deep sea and Antarctica, should be governed in terms of patents. Furthermore, there is a lack of comprehensive analysis on how existing frameworks

can be reformed to ensure equitable benefit-sharing and the protection of traditional knowledge.

1.5 RESEARCH PROBLEM:

The main problem is the ambiguity and inadequacy of existing international patent law frameworks in regulating the exploitation of biodiversity in areas beyond national jurisdiction. The current legal frameworks, such as the CBD, Nagoya Protocol, and UNCLOS, are insufficient to address the complexities of bioprospecting in global commons. Additionally, the lack of enforcement mechanisms for patents related to biodiversity found in these areas creates further legal challenges, particularly regarding benefit-sharing and the protection of traditional knowledge.

1.6 RESEARCH OBJECTIVES:

1. To analyse the implications of patent law on marine genetic resources in areas beyond national jurisdiction.

2. To examine the existing gaps in international legal frameworks concerning access, benefit- sharing, and environmental sustainability.

3. To propose recommendations for developing a balanced legal framework that promotes innovation, conserves biodiversity, and ensures equitable benefit-sharing.

1.7 HYPOTHESIS:

The current international patent law frameworks are insufficient to regulate the exploitation of biodiversity in areas beyond national jurisdiction. The absence of a global legal framework governing patents for genetic resources in global commons leads to imbalances in benefit-sharing, increases the risks of biopiracy, and undermines the protection of traditional knowledge.

1.8 RESEARCH METHODOLOGY:

This study is based on Doctrinal method. The work is relied upon the primary and secondary sources which includes various research articles, journals, books and newspaper.

1.9 SCOPE AND LIMITATIONS:

The scope of study focuses on the patenting of MGRs in BNJ, particularly the high seas and deep seabed. It considers legal, ethical, and environmental dimensions, with a particular emphasis on equity and benefit-sharing mechanisms. Limitation includes the ongoing nature of international negotiations, meaning that some findings may evolve as new agreements are reached.

CHAPTER II

BACKGROUND OF PATENT LAW AND BIODIVERSITY BEYOND NATIONAL JURISDICTION

2.1 HISTORICAL BACKGROUND OF PATENT LAW:

The earliest known patents were granted in the ***Republic of Venice*** in the 15th century. In ***1474***, Venice enacted a formal patent statute, which is widely regarded as one of the earliest examples of patent legislation. This statute provided inventors with exclusive rights to their inventions for a period of 10 years, reflecting a growing recognition of the value of innovation and the need to protect intellectual property. The Venetian system of patents was designed to encourage the development of new technologies, particularly in the fields of engineering and manufacturing, by offering inventors protection from unauthorized imitation. Patents from this period were granted on an individual basis, and the system varied greatly between different regions and countries. ***The Statute of Monopolies of 1624***, passed by the English Parliament, is often cited as one of the most important legal landmarks in the development of modern patent law. It restricted the Crown's power to grant monopolies, except for inventions that were considered new and useful, laying the foundation for the modern patent system.

The Industrial Revolution in the 18th and 19th centuries greatly accelerated the development of patent law, as new inventions in machinery, textiles, and transportation transformed industries and economies across Europe and North America. Patent law became increasingly standardized, with countries enacting formal patent statutes to promote innovation and regulate the rights of inventors. The development of modern patent law was the establishment of the United States patent system. The U.S. Constitution, adopted in

1787, specifically granted Congress the power to promote the "***Progress of Science and useful Arts***" by securing exclusive rights for inventors. This led to the passage of the first U.S. Patent Act in 1790, which created a system for granting patents to inventors who could demonstrate that their inventions were novel and useful. The act established the United States Patent Office and formalized the process for patent applications. Similarly, in ***Europe, France's Patent Act of 1791*** and ***Germany's Patent Act of 1877*** reflected the growing importance of protecting intellectual property during a period of rapid technological advancement. By the late 19th century, most industrialized nations had formal patent systems in place, providing inventors with a legal framework to protect their innovations from unauthorized use.

The first major international agreement on patent law was the ***Paris Convention for the Protection of Industrial Property***, adopted in ***1883***. The Paris Convention established the principle of "**national treatment**," meaning that foreign inventors would receive the same rights as domestic inventors in member countries. This agreement laid the groundwork for the international patent system and remains one of the cornerstones of intellectual property law. In the 20th century, efforts to further harmonize patent law at the international level continued with the establishment of the ***World Intellectual Property Organization (WIPO)*** in ***1967***. WIPO, a specialized agency of the United Nations, was created to promote the protection of intellectual property globally and to facilitate cooperation between countries on patent and trademark issues. WIPO administers several international treaties, including the ***Patent Cooperation Treaty (PCT)*** of ***1970***, which simplifies the process of filing patents in multiple countries by allowing inventors to file a single international patent application. The most significant development in recent years has been the ***Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS)***, which was adopted as part of the ***World Trade Organization (WTO)*** agreements in ***1994***. TRIPS established minimum standards for intellectual property protection, including patents, and required all WTO member states to implement these standards in their national laws. TRIPS has had a profound impact on global patent law by setting out guidelines for the protection of inventions in various fields, including biotechnology, pharmaceuticals, and software.

With the rise of biotechnology in the late 20th century, patent law expanded to cover genetic resources, microorganisms, and biological materials. This development has generated considerable debate over the scope of patentable subject matter, especially

regarding the patenting of life forms. The landmark case of ***Diamond v. Chakrabarty (1980)*** in the United States Supreme Court held that genetically modified organisms could be patented, setting a precedent for the patenting of living organisms and opening the door for biotechnology patents. This trend has had significant implications for the patenting of marine genetic resources and biodiversity beyond national jurisdiction. As bioprospecting of marine organisms has become more widespread, questions have arisen about how to regulate access to genetic resources found in the high seas and how to ensure that the benefits of such resources are shared equitably.

2.2 HISTOTOCAL BACKGROUNG OF BIODIVERSITY BEYOND NATIONAL JURISDICTION:

Biodiversity beyond national jurisdiction (BBNJ) refers to the biological diversity found in areas that fall outside the control of any individual country, notably the high seas and the deep seabed. These regions, covering approximately 64% of the ocean's surface, are home to a vast array of marine species and ecosystems, many of which remain largely unexplored and understudied. The importance of protecting and sustainably managing these resources has become increasingly recognized due to their potential contributions to ecological balance, scientific research, and biotechnological innovation. The concept of biodiversity beyond national jurisdiction has developed the evolution of international environmental law, driven by advances in marine science, growing awareness of environmental degradation, and the challenges of governing the global commons.

The high seas and deep seabed were once thought to be largely devoid of life, with marine biodiversity primarily studied in coastal regions. During the early days of ocean exploration, the deep ocean was considered an inhospitable environment for life, due to its extreme conditions such as high pressure, low temperatures, and lack of light. This perception changes in the 19th century with notable expeditions such as the British ***Challenger Expedition*** (1872–1876), which discovered an astonishing variety of marine life even in the deepest parts of the ocean. The scientific community gradually realized that the deep ocean was home to unique ecosystems, including hydrothermal vents, seamounts, and cold-water coral reefs, which harbour specialized organisms with unique genetic traits.

These discoveries laid the foundation for research and conservation efforts in areas beyond national jurisdiction.

The legal concept of "***areas beyond national jurisdiction***" first emerged in the context of international maritime law. The high seas, as defined by the ***United Nations Convention on the Law of the Sea (UNCLOS)***, encompass all parts of the sea not included in a country's exclusive economic zone (EEZ), territorial sea, or internal waters. These areas are governed by the principle of the ***freedom of the seas***, which allows all states to navigate, fish, and lay submarine cables, but also imposes the obligation to use these areas responsibly. The seabed beyond national jurisdiction, referred to as "***the Area***," is designated under UNCLOS as the ***common heritage of mankind***. This concept, first introduced by **Malta's Arvid Pardo in 1967** during a speech at the United Nations, emphasized that the deep seabed and its resources should be managed for the benefit of all humanity, particularly for the equitable sharing of benefits between developed and developing nations. UNCLOS, adopted in 1982, represents the most comprehensive legal framework governing the use of the oceans, including areas beyond national jurisdiction. It formalized the principles of freedom on the high seas and the common heritage of mankind in the Area, but did not fully address the conservation of marine biodiversity or the sustainable use of marine genetic resources (MGRs) in these areas. While UNCLOS did provide a framework for resource extraction and environmental protection, the governance of marine biodiversity remained incomplete, creating a legal gap that has become increasingly evident in the 21st century.

In the latter half of the 20th century, environmental concerns related to biodiversity beyond national jurisdiction began to emerge, particularly as human activities such as deep-sea fishing, mining, and marine pollution started to impact fragile marine ecosystems. The depletion of fish stocks, destruction of deep-sea habitats, and increasing interest in seabed mining for minerals and metals highlighted the vulnerability of these areas to unsustainable exploitation. The increasing use of MGRs in biotechnology also brought the issue of equitable access and benefit-sharing to the forefront of international discussions. Deep-sea organisms have evolved unique adaptations to extreme conditions, making their genetic material valuable for research in pharmaceuticals, industrial enzymes, and biotechnology. However, the question of who owns these resources, and how benefits derived from their use

should be shared, became a central issue, particularly for developing countries that lacked the capacity to exploit these resources.

The adoption of the ***Convention on Biological Diversity (CBD)*** in ***1992*** was international efforts to conserve and sustainably use biodiversity. The CBD recognized the importance of conserving biological diversity, ensuring the sustainable use of its components, and promoting the fair and equitable sharing of benefits arising from the utilization of genetic resources. However, the CBD only applies to areas within national jurisdiction, leaving a significant gap in the protection of biodiversity in the high seas and deep seabed. The Nagoya Protocol, adopted in 2010 as a supplementary agreement to the CBD, further developed the framework for access and benefit-sharing (ABS) of genetic resources. It established mechanisms for the fair distribution of benefits arising from the use of genetic resources within national jurisdictions, but once again did not extend to biodiversity beyond national jurisdiction. This highlighted the need for an international framework to govern MGRs in the high seas and ensure equitable benefit-sharing between developed and developing nations.

In recognition of the growing need for comprehensive governance of marine biodiversity beyond national jurisdiction, the United Nations launched negotiations in 2017 to develop a new international treaty on the conservation and sustainable use of BBNJ. Known as the ***Biodiversity Beyond National Jurisdiction (BBNJ) Agreement***, this treaty is intended to address gaps in the existing legal framework by establishing mechanisms for the conservation and sustainable use of MGRs, including access and benefit-sharing, marine protected areas, environmental impact assessments, and capacity-building for developing nations.

CHAPTER III

LEGAL FRAMEWORKS GOVERNING PATENT LAW AND BIODIVERSITY BEYOND NATIONAL JURISDICTION

3.1 UNITED NATIONAL CONVENTION ON THE LAW OF THE SEA (UNCLOS):

The ***United Nations Convention on the Law of the Sea*** (UNCLOS), adopted in 1982, provides the primary legal framework governing the use of the oceans, including areas beyond national jurisdiction. It establishes the legal regime for the high seas and the deep seabed, also referred to as "**the Area**."

- **High Seas and MGRs**: United Nations Convention on the Law of the Sea (UNCLOS) defines the high seas as areas beyond the exclusive economic zone (EEZ) of coastal states. All states have the freedom to conduct activities such as fishing and scientific research in the high seas, but the extraction and exploitation of marine genetic resources (MGRs) from these areas are not explicitly regulated by the convention. The principle of ***freedom of the high seas*** allows states to access and utilize marine resources without specific mechanisms for regulating patents or benefit-sharing from the use of Marine Genetic Resources (MGRs).

- **The Area**: Under United Nations Convention on the Law of the Sea (UNCLOS), the deep seabed beyond national jurisdiction is designated as "***the common heritage of mankind.***" Activities in the Area, including the exploration and exploitation of mineral resources, are regulated by the **International Seabed Authority** (ISA). However, United Nations Convention on the Law of the Sea (UNCLOS) does not address the exploitation or patenting of Marine Genetic Resources (MGRs) from the Area, leaving this legal gap unregulated. UNCLOS emphasizes conservation but does not provide clear rules for accessing or patenting MGRs from BBNJ.

3.2 CONVENTION ON BIOLOGICAL DIVERSITY (CBD) AND THE NAGOYA PROTOCOL:

The ***Convention on Biological Diversity*** (CBD), adopted in ***1992***, is one of the primary international frameworks aimed at the conservation of biodiversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising from the utilization of genetic resources. However, the CBD's scope is limited to areas within national jurisdiction.

- **Access and Benefit-Sharing (ABS)**: The Convention on Biological Diversity (CBD) promotes the idea that access to genetic resources should be granted with the

prior informed consent of the country of origin and that benefits arising from their use should be shared fairly. However, the convention does not extend to the high seas or the deep seabed, leaving the legal governance of Marine Genetic Resources (MGRs) beyond national jurisdiction unresolved.

- **Nagoya Protocol**: The ***Nagoya Protocol (2010)*** supplements the Convention on Biological Diversity (CBD) and establishes a framework for access and benefit-sharing of genetic resources within national jurisdictions. The protocol mandates that users of genetic resources share the benefits of their use, particularly with developing nations. However, similar to the Convention on Biological Diversity (CBD), the Nagoya Protocol does not cover genetic resources from areas beyond national jurisdiction.

3.3 AGREEMENT ON TRADE RELATED OF INTELLECTUAL PROPERTY RIGHT (TRIPS):

The ***Agreement on Trade-Related Aspects of Intellectual Property Rights*** (TRIPS), negotiated under the ***World Trade Organization*** (WTO), is a global framework that governs intellectual property rights, including patents. TRIPS establishes minimum standards for the protection of intellectual property rights, allowing member states to patent biotechnological inventions, including those derived from genetic resources.

- **Patentability of Marine Genetic Resources (MGRs)**: Under Trade-Related Aspects of Intellectual Property Rights (TRIPS), member states are required to grant patents for inventions that are new, involve an inventive step, and are capable of industrial application. This framework enables the patenting of MGRs once they have been isolated and characterized, even if they originate from areas beyond national jurisdiction. However, TRIPS do not specifically address the legal status of MGRs from BBNJ, nor does it include provisions for equitable benefit-sharing.

- **Disclosure of Origin**: One of the contentious issues in Trade-Related Aspects of Intellectual Property Rights (TRIPS) is whether patent applicants should be required to disclose the origin of the genetic resources used in their inventions. Several developing countries have argued for mandatory disclosure to ensure that the benefits

of MGRs are shared fairly, but this has not yet been made a formal requirement under TRIPS.

3.4 WORLD INTELLECTUAL PROPERTY ORGANIZATION (WIPO) AND PATENT COOPERATION TREATY (PCT):

The ***World Intellectual Property Organization*** (WIPO) oversees international intellectual property rights, including the administration of the ***Patent Cooperation Treaty*** (PCT), which facilitates the filing of patents across multiple jurisdictions. While the Patent Cooperation Treaty (PCT) simplifies the patent application process, it does not provide specific guidance on patenting Marine Genetic Resources (MGRs) from Biodiversity Beyond National Jurisdiction (BBNJ). World Intellectual Property Organization (WIPO) has been engaged in discussions regarding the intellectual property rights associated with genetic resources and traditional knowledge. The WIPO ***Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore*** has discussed these issues, but significant progress is still pending.

3.5 BIODIVERSITY BEYOND NATIONAL JURISDICTION (BBNJ) AGREEMENT

In recognition of the legal and governance gaps concerning the exploitation of Marine Genetic Resources (MGRs) from areas beyond national jurisdiction, the United Nations launched negotiations in 2017 to create a new, legally binding agreement on the conservation and sustainable use of Biodiversity Beyond National Jurisdiction (BBNJ). These negotiations, often referred to as the ***BBNJ Agreement***, seek to fill the gaps left by United Nations Convention on the Law of the Sea (UNCLOS), Convention on Biological Diversity (CBD).

- **Marine Genetic Resources (MGRs) and Access and Benefit-Sharing**: A central issue in the Biodiversity Beyond National Jurisdiction (BBNJ) negotiations is the development of a legal framework for accessing (MGRs) in areas beyond national jurisdiction and ensuring equitable benefit-sharing from their use. The agreement aims to address how states and private entities can access (MGRs), whether patents can be granted, and how benefits should be shared, particularly with developing

nations.

- **Environmental Impact Assessments (EIAs)**: The (BBNJ) Agreement is also expected to establish rules for conducting environmental impact assessments (EIAs) before activities such as bioprospecting are allowed. This is crucial for ensuring that the exploitation of (MGRs) does not harm marine ecosystems in areas beyond national jurisdiction.

- **Capacity Building and Technology Transfer**: Developing countries have advocated for provisions in the BBNJ Agreement that would support capacity-building and the transfer of marine technology, ensuring that they can benefit from the scientific and commercial potential of (MGRs). These provisions aim to reduce the disparity between developed and developing nations in accessing and using Marine Genetic Resources (MGRs).

CHAPTER IV

IMPLICATIONS OF PATENT LAW ON BIODIVERSITY BEYOND NATIONAL JURISDICTION

Patent law and its interaction with Biodiversity Beyond National Jurisdiction (BBNJ) is an area of growing concern and legal complexity. The exploitation of Marine Genetic Resources (MGRs) from the high seas and the deep seabed has significant scientific and commercial potential, especially in the biotechnology and pharmaceutical industries. However, the legal framework surrounding the use of these resources, particularly the application of Intellectual Property Rights (IPRs) such as patents, raises important questions about equity, conservation, and sustainability. The absence of a comprehensive legal regime for patenting Marine Genetic Resources (MGRs) in Biodiversity Beyond National Jurisdiction (BBNJ) exacerbates issues related to bioprospecting, equitable benefit-sharing, and the preservation of marine ecosystems.

4.1 OWNERSHIP OF GENETIC RESOURCES:

One of the key implications of patent law in ABNJ is the question of ***ownership***. Genetic resources in areas beyond national jurisdiction are considered part of the global

commons, meaning they should be accessible to all nations. However, when companies or research institutions patent genetic materials derived from ABNJ, they effectively claim ownership over these resources, excluding others from accessing or commercializing them without permission This raises ethical concerns about the privatization of global commons. Should genetic resources that are part of the common heritage of humanity be subject to private ownership through patents? Critics argue that patenting these resources could lead to monopolization by a few corporations or nations, preventing equitable access to the benefits of biodiversity

Patent law gives exclusive rights to the patent holder, allowing them to control access to the patented genetic materials for a specified period. In the context of BNJ, this can lead to the monopolization of Marine Genetic Resources (MGRs) by private entities or research institutions from technologically advanced countries. The patenting of genetic materials derived from Beyond National Jurisdiction (BNJ) prevents other entities from using or developing products from these resources without paying licensing fees or royalties, potentially stifling innovation and further research.

This monopolization disproportionately benefits developed nations with the technological and financial resources to engage in deep-sea exploration and bioprospecting, while developing countries are excluded from these opportunities. The commercialization of MGRs from BNJ, without any obligation to share benefits or knowledge, exacerbates global inequality. The absence of an Access and Benefit Sharing (ABS) regime for Beyond National Jurisdiction (BNJ) also means that there are no mechanisms to ensure that the benefits of bioprospecting are equitably distributed, further marginalizing countries that lack the resources to exploit these genetic materials.

4.2 BIOPROSPECTING AND BIOPIRACY:

Bioprospecting in areas beyond national jurisdiction can lead to biopiracy—the appropriation of genetic resources without fair compensation or benefit-sharing. While the Convention on Biological Diversity (CBD) and Nagoya Protocol govern Access and Benefit Sharing (ABS) for genetic resources within national boundaries, they do not extend to BNJ, leaving these resources vulnerable to exploitation. Companies and research institutions from developed nations often extract genetic materials from Beyond National Jurisdiction (BNJ)

for commercial purposes, patent them, and profit from their use without any obligation to share the benefits with the global community.

This lack of regulation raises ethical concerns about the fairness of bioprospecting in Beyond National Jurisdiction (BNJ), particularly when it comes to sharing the benefits of genetic resources that belong to the global commons. The high seas and deep seabed are not owned by any single nation, and their resources should, in theory, be managed for the benefit of all humankind. However, the current legal framework allows wealthier nations and companies to extract and commercialize these resources without compensating the global community or contributing to conservation efforts.

4.3 ENVIRONMENTAL IMPACT AND SUSTAINABILITY CONCERNS:

The exploitation of Marine Genetic Resources (MGRs) in Beyond National Jurisdiction (BNJ) raises serious environmental concerns. The deep sea is one of the planet's most fragile ecosystems, home to unique and often undiscovered species. Extracting genetic materials for commercial use can disrupt these ecosystems, leading to biodiversity loss and the degradation of marine environments. The commercial interest in MGRs could also drive unsustainable bioprospecting practices, where the focus on profitability overshadows the need for environmental stewardship.

Furthermore, the lack of regulatory frameworks for the conservation and sustainable use of Marine Genetic Resources (MGRs) in Beyond National Jurisdiction (BNJ) makes it difficult to monitor and manage the environmental impact of bioprospecting activities. The Biodiversity Beyond National Jurisdiction (BBNJ) negotiations aim to address these concerns by establishing mechanisms for environmental impact assessments, marine protected areas, and guidelines for the sustainable use of marine biodiversity. However, these negotiations are still ongoing, and it remains to be seen whether they will provide the necessary protections for marine ecosystems.

4.4 EQUITY AND ACCESS AND BENEFIT SHARING (ABS):

One of the core principles of biodiversity governance is Access and Benefit-Sharing (ABS), which aims to ensure that countries providing genetic resources receive a fair share of the benefits derived from their use. However, in Beyond National Jurisdiction (BNJ),

there is currently no Access and Benefit-Sharing (ABS) regime, meaning that companies and institutions can extract and patent Marine Genetic Resources (MGRs) without sharing the benefits with the global community. The lack of Access and Benefit-Sharing (ABS) in Beyond National Jurisdiction (BNJ) disproportionately affects developing nations, which often lack the technological capacity to explore or exploit marine genetic resources.

These countries are effectively excluded from the benefits of bioprospecting, while developed nations continue to profit from the global commons. The ongoing Biodiversity Beyond National Jurisdiction (BBNJ) negotiations are critical in addressing this imbalance by creating a legally binding framework for Access and Benefit-Sharing (ABS) in Beyond National Jurisdiction (BNJ), but reaching consensus on this issue has been challenging. Developed countries, which lead in marine biotechnology, argue that stringent Access and Benefit-Sharing (ABS) requirements could stifle innovation, while developing countries advocate for fairer benefit-sharing mechanisms.

A key idea in international environmental and biodiversity legislation is equity and access and benefit sharing, or ABS, which aims to guarantee a just and equitable distribution of the advantages resulting from the exploitation of genetic resources. This idea is ingrained in the Convention on Biological Diversity (CBD) and expanded upon in the Nagoya Protocol, which aims to strike a balance between the rights of those who donate genetic resources and those who use them for commercialization, research, and development, among other uses.

Within ABS, the notion of equity highlights the equitable sharing of benefits between those who supply resources—typically local and indigenous communities—and those who use them, including researchers, pharmaceutical corporations, and the agriculture sector. Equity makes ensuring that these groups, who have traditionally protected biodiversity, are acknowledged and given credit for their input. This payment can be made in a number of ways, such as cash transfers, technology transfers, capacity-building programs, and access to scientific data. In ABS, "access" refers to the circumstances surrounding the acquisition of genetic resources. It entails getting the resource providers' prior informed consent (PIC), which verifies that they understand and consent to the use of their resources. Access agreements ought to be open, mutually agreed upon, and respectful of local and indigenous groups' rights as well as national sovereignty over natural resources.

The process by which the advantages obtained from the use of genetic resources are dispersed is called benefit-sharing. This covers rewards that are both monetary and non-monetary. Royalties, licensing fees, and other financial contributions are examples of monetary advantages; non-monetary benefits might

CHAPTER V

CASE STUDIES ON PATENT LAW IN BIODIVERSITY BEYOND NATIONAL JURISDICTION (BBNJ)

5.1 THE CASE OF MARINE GENETIC RESOURCES AND PHARMACEUTICALS

In the 1990s, pharmaceutical companies began to explore Marine Genetic Resources (MGRs) for their potential to yield new drugs. For example, the discovery of the anti-cancer compound ***Ziconotide***, derived from the venom of the cone snail (***Conus magus***), has been pivotal in the pharmaceutical industry. The extraction and patenting of this genetic resource raised questions about the rights to access and utilize MGRs found in international waters.

The case illustrates the lack of a comprehensive legal framework governing access to Marine Genetic Resources (MGRs) in areas beyond national jurisdiction. There were concerns regarding bioprospecting activities that could lead to over-exploitation of marine biodiversity without proper consent or benefit-sharing arrangements. The challenge is balancing the rights of companies to patent their discoveries with the ethical obligation to protect marine ecosystems and ensure equitable benefits for all stakeholders.

This case emphasized the need for international governance and frameworks, such as the ongoing negotiations under the United Nations for a new treaty to regulate the conservation and sustainable use of BBNJ. The necessity of incorporating fair benefit-sharing mechanisms into patent law was highlighted, as well as the importance of safeguarding the rights of coastal states and indigenous communities.

5.2 THE CASE OF THE ANTARCTIC TOOTHFISH

The Antarctic toothfish (***Dissostichus mawsoni***), found in the Southern Ocean, is a valuable fish species targeted for its meat. In 2002, a patent application was filed in the U.S.

for a specific method of cultivating the fish, which raised concerns over patenting a natural resource from international waters.

The patent application drew criticism from environmentalists and stakeholders who argued that it could set a precedent for patenting marine species based on genetic resources. The Antarctic toothfish is part of a fragile ecosystem, and over-exploitation could lead to severe ecological consequences.

The case underscored the potential conflicts between patent rights and environmental conservation. While the patent was ultimately not granted, this case served as a cautionary tale, reinforcing the need for stricter regulations regarding the patenting of marine species and the importance of sustainable practices in BBNJ. It highlighted the gaps in international law governing the sustainable use of marine resources and the need for integrated approaches that consider both conservation and commercial interests.

5.3 THE CASE OF CORAL GENETIC RESOURCES ("PATENTING OF NATURE" CONTROVERSY):

Coral reefs, rich in biodiversity, are increasingly being studied for their genetic resources, particularly for pharmaceutical applications. Researchers have sought patents on specific genetic traits or biochemical compounds derived from coral species found in international waters. The controversy arises from the ethical implications of patenting what many consider "***nature***."

Critics argue that patents on coral genetic resources could hinder scientific research and conservation efforts. The concern is that patenting could monopolize access to these resources, limiting the ability of researchers and conservationists to study and protect coral ecosystems. Ongoing debates regarding coral patents have prompted discussions about creating a more equitable framework for managing access to genetic resources.

This case underscores the urgent need for international legal mechanisms that address the unique challenges of patenting marine biodiversity, particularly in light of climate change and biodiversity loss.

5.4 THE CASE OF HOODIA GORDONII (2003) (AFRICAN BIO-PIRACY):

Hoodia gordonii is a succulent plant indigenous to Southern Africa, traditionally used by the San people for its appetite-suppressing properties. In the early 1990s, researchers from the ***Council for Scientific and Industrial Research*** (CSIR) in South Africa discovered the appetite-suppressing compound in Hoodia and licensed the patent to the pharmaceutical company Phytopharm.

The patenting of Hoodia raised significant ethical concerns regarding the rights of indigenous peoples and the appropriation of traditional knowledge. The San people argued that they had not given consent for their traditional knowledge to be used commercially. In 2003, an agreement was reached to share benefits derived from Hoodia commercialization with the San people.

The case illustrates the importance of benefit-sharing agreements and the need for legal frameworks that recognize indigenous rights in the context of genetic resources.

CHAPTER VI

CHALLENGES IN PATENTING BIODIVERSITY BEYOND NATIONAL JURISDICTION

6.1 ABSENCE OF COMPREHENSIVE LEGAL FRAMEWORK:

The governance of MGRs in BNJ is fragmented and incomplete. While UNCLOS provides a legal framework for activities in the high seas, it does not address the patenting of genetic resources or the sharing of benefits from their use. The CBD and Nagoya Protocol, which govern genetic resources within national boundaries, do not extend to BNJ, leaving a regulatory vacuum. This legal gap allows private entities to patent MGRs without any obligation to share benefits or adhere to international standards of equity and sustainability.

The ongoing BBNJ negotiations aim to create a legally binding instrument that addresses these governance gaps, including ABS, environmental protection, and the sustainable use of marine biodiversity. However, the negotiations have been slow, and consensus on key issues remains elusive. The challenge lies in balancing the interests of developed nations, which lead in marine biotechnological research, with those of

developing countries and conservation advocates, who seek equitable benefit-sharing and environmental protections.

6.2 FRAGMENTATION OF INTERNATIONAL LAW:

The ***fragmentation of international law*** further complicates the regulation of patent law in ABNJ. While the TRIPS Agreement provides a global framework for intellectual property rights, it does not address the specific challenges of biodiversity and genetic resources. Similarly, UNCLOS focuses on the management of marine resources but does not regulate bioprospecting or the patenting of genetic materials. This fragmented legal landscape creates opportunities for companies to exploit legal loopholes, patenting genetic resources from ABNJ without being subject to benefit-sharing obligations or environmental safeguards. It also hinders efforts to develop a comprehensive international framework that addresses the intersection of patent law, biodiversity, and global commons.

The patenting of life forms, particularly genetic materials derived from marine organisms, raises ethical questions about the commodification of nature. Critics argue that patenting genetic resources from BNJ—areas that are part of the global commons—violates the principle of shared ownership and equity. Should private entities have exclusive rights to genetic resources that belong to all of humanity? This ethical dilemma challenges the foundations of patent law, which traditionally applies to human-made inventions, not naturally occurring biological materials. The ethical concerns surrounding the patenting of MGRs in BNJ are compounded by the lack of benefit-sharing mechanisms.

6.3 THE PRINCIPLE OF COMMON HERITAGE OF MANKIND:

One potential approach to governing MGRs in BNJ is to apply the principle of the "***common heritage of mankind,***" which is enshrined in UNCLOS for mineral resources in the deep seabed. This principle mandates that resources in areas beyond national jurisdiction should be managed for the benefit of all humankind, with a focus on equity and sustainability. Extending this principle to MGRs could provide a framework for more equitable benefit- sharing and responsible management of biodiversity in the high seas.[38] However, implementing this principle for MGRs would require significant international cooperation and political will, and there is no consensus on how it should be applied to genetic resources.

6.4 JURISDICTION GAPS:

One of the primary challenges in regulating patent law in ABNJ is the ***lack of jurisdictional clarity***. International treaties, such as UNCLOS and the Antarctic Treaty, do not provide specific guidelines on the patenting of genetic resources. As a result, companies and institutions that engage in bioprospecting in ABNJ often operate in a legal grey area, where no clear rules govern the ownership, use, or commercialization of genetic resources. Furthermore, while the CBD and Nagoya Protocol establish frameworks for access to genetic resources and benefit-sharing, they do not apply to ABNJ. This leaves a significant regulatory gap in the governance of genetic resources in global commons, allowing companies to exploit these resources without being subject to international oversight.

CHAPTER VII

CONCLUSION

This paper critically examines the implications of patent law on biodiversity beyond natural jurisdiction, focusing on issues such as ownership of genetic resources, bioprospecting and biopiracy, the environmental impact and sustainable concerns, and equitable access benefit-sharing. It analyses the existing international legal frameworks, such as the United Nations Convention on the Law of the Sea (UNCLOS), the Convention on Biological Diversity (CBD), and the Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement, and explores the gaps in these frameworks that fail to regulate genetic resources in ABNJ. Patent law, when applied to biodiversity beyond natural jurisdiction, presents a range of legal, ethical, and environmental challenges. The lack of clear ownership rules, benefit-sharing mechanisms, and environmental safeguards creates opportunities for the exploitation of genetic resources in global commons without equitable compensation or conservation measures. As bioprospecting in areas beyond national jurisdiction increases, there is an urgent need for international legal reforms that address the unique challenges of patenting biodiversity in global commons. A comprehensive international framework is required to ensure that the benefits of genetic resource exploitation are shared equitably and that biodiversity in Area Beyond National Jurisprudence (ABNJ) is conserved for future generations. This could include extending the principles of the Nagoya Protocol to cover ABNJ, creating mandatory benefit-sharing agreements, and implementing environmental

safeguards in patent applications related to genetic resources from global commons. The implications of patent law on biodiversity beyond national jurisdiction present significant challenges that require a comprehensive understanding of legal frameworks, ethical considerations, and sustainable practices. Ongoing international negotiations and the development of robust legal mechanisms are crucial for ensuring equitable access and benefit-sharing, protecting marine biodiversity, and safeguarding the rights of indigenous communities.