

## THE POLICY DISCOURSE OF COMMUNITY BASED BIODIVERSITY CONSERVATION IN INDIA

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### *Abstract*

*The Conservation and sustainable use of bio-diversity is an integral part of India's ethos. Unprecedented geographical and cultural features have together contributed to this amazing diversity of fauna, in which immense biological diversity is seen at every level in India. It would not be an exaggeration to say that a biodiversity is a real tool or parameter of any healthy nation in terms of measuring its environmental policy and governance. Similarly, this study elaborates on the traditional knowledge and rights of the indigenous communities about the commercial utilization of biological resources. In this paper, the researcher has attempted to convey those objectives of which discusses the concept of biological diversity in India and its conservation along with the policy discourse.*

**Keywords:** *Intellectual Property Rights (IPRs), Cultural environmentalism, Community Resources, Game Theory, Tragedy of the Commons.*

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## 1. INTRODUCTION

In India since ancient times, there has been a tradition of worshipping various natural resources like rivers, mountains, forests, trees, and plants in the form of deities. In this context, Gautama Samhita also provides detailed information about biodiversity which specifically asserts three sub-themes like Dietary Biodiversity, Religious Biodiversity, and Conservation of Biodiversity<sup>1</sup> and it is also relevant in the modern era.

Similarly, the case of Sacred Groves<sup>2</sup> in India gives a better understanding of this discussion as these forests hold significant values in terms of biological, ecological, cultural, anthropological, and economic. These types of forests are mainly found in the North-East and Western Ghats of India. In this sense, sacred groves are those types of forests that are worshipped by the indigenous communities in the name of their local folk deities or ancestral and tree spirits.

As these forests are protected by the local people or tribes for many generations therefore their religious and traditional belief systems are very strong for all the biological resources such as multi-species, multi-tier primary forests, a clump of trees, etc. The local communities of this area believe that if anyone tampered with the natural resources available in these forests, then they must face the displeasure of the so-called forest deity in terms of famine, pestilence, destruction of crops, etc. as a result. So, they protect these forests from coming in contact with outsiders in every way.

## 2. RELIGIOUS BELIEF AND ECOLOGICAL TRADITIONS IN INDIGENOUS COMMUNITIES IN INDIA: COMMUNITY BASED BIODIVERSITY CONSERVATION

Moreover, it is interesting to note that there is always a symbiotic relationship between the habitats and cultures of humans especially in the central Himalayan state of Uttarakhand, and between ecosystems and cultural identity. The various religious rules and rituals associated with these forest areas often strengthen this relationship, which in the case of bio-resources only characterizes a conservation ethic. It is fair to say that the mountain communities of remote

<sup>1</sup> Priyadarsan Sensarma, "Biodiversity in Gautama-Samhita" 86 *Annals of the Bhandarkar Oriental Research Institute* 167–177 (2005) available at: <http://www.jstor.org/stable/41692395>.

<sup>2</sup> Anwesha Borthakur, "The Case of Sacred Groves in India" 48(41) *Economic and Political Weekly* 25-27 (2013) available at: <http://www.jstor.org/stable/23528432>.

Uttarakhand who depend on these forests, consider cultural teachings as a precondition for sustainable development<sup>3</sup>.

In other words, traditions and beliefs related to forests and biodiversity have been represented since ancient times by local and indigenous communities in India. It will not be an exaggeration to say that it is these communities that play an important role in achieving sustainable biodiversity-based on their cultural practices and beliefs and by making efforts based on their community. In this regard, there is also a harsh truth that sometimes government conservation policies ignore the link between the culture of local communities and their environment, which is a deterrent to the conservation of biodiversity. Therefore, it is necessary for the government to try as much as possible how through a better, effective, and sustainable conservation policy, cultural traditions and practices related to biodiversity can be saved for future generations through local communities.

In this sense, studies by Torri and Herrmann<sup>4</sup> show the reasons for serious consideration of the traditional practices of the local communities. Their studies examine the traditional practices of these communities in the Sariska region (Rajasthan, India) and their beliefs and values and further emphasize the community's role in conservation. In addition, this case study shows how indigenous and traditional knowledge contained in the local language is an important link between cultural diversity and biological diversity in general. It is also true that local cultures not only nurture the knowledge aspects of biological diversity but also represent the economic, socio-cultural, and spiritual life of indigenous peoples through their values and uses.

However, such a connection between community and biodiversity conservation strategies of the government seems to be missing to a large extent. The neglect of cultural values of the local stakeholders under government conservation policies of biodiversity also generates many conflicts, including economic and politically imposed disabilities which makes the region further fragile.

There is a need to bring two ideologies into coherence, i.e., one, which is anchored by the community on the name of faith for mythologies which is directly linked to the environment and

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<sup>3</sup> Chandra Singh Negi, "Traditional Culture and Biodiversity Conservation: Examples from Uttarakhand, Central Himalaya" 30(3) *Mountain Research and Development* 259–265. (2010) available at: <http://www.jstor.org/stable/mounresedeve.30.3.259>.

<sup>4</sup> M.C. Torri and T.M. Herrmann, "Spiritual Beliefs and Ecological Traditions in Indigenous Communities in India: Enhancing Community-Based Biodiversity Conservation" 6(2) *Nature and Culture* 168–191(2011) available at: <http://www.jstor.org/stable/43303901>.

hence protect it. And second, state response/ respect to these faiths and incorporation of these in their conservation strategies. The main goal of both is a biodiversity conservation and hence there should be no contestation between ideologies, rather one needs to build upon others to put checks and balances as a regulatory framework.

There is a set of scholars who also argue that degradation of biodiversity also takes place by anthropogenic activities of indigenous communities. The researcher agrees to this to a certain degree. It can be argued that exploitation of biodiversity carried out by indigenous communities is not at a large scale or for commercial purposes, it is always for their sustenance. It should be not forgotten that indigenous communities do not have modern equipment/tools for exploitation and that they only have those natural resources for their livelihoods. Compared to this, commercial traders, and big private/ government corporations are equipped with all modern technologies for the exploitation and commercialization of natural resources. Thus, they have the potential to deteriorating biodiversity at a faster pace. In this regard, there is a need to provide other livelihood alternatives to these communities so that they can reduce their dependency on natural resources and remain their true protector.

### **3. ACCESS TO INDIA'S BIODIVERSITY AND SHARING ITS BENEFITS**

Gadgil & Rao<sup>5</sup> emphasized taking a strong initiative for the conservation of biodiversity at the local level specifically to readdress its challenges of it and integrate traditional conservation practices of local communities. Undoubtedly the traditional community-based systems were adversely affected by the government in some past decades. Therefore, there is a need for a new paradigm in the true sense that couples sustainable use of biological resources with conservation of biodiversity not only in protected areas but also addresses the entire geographical area in the country because all over India various types of biodiversity are found with its numerous traditional values. However, in the 1990s the Indian bureaucracy also did not acknowledge the importance of biodiversity conservation sincerely because of their friendly nexus with the unscrupulous politicians and business interests. In addition, the centralized approach based on regulation was also prevalent during that period. This atmosphere only changed after the 73rd Constitutional Amendment Act in the year 1993 which emerged as a boon for rural or local communities to some extent. Some scholars like Prof. Madhav Gadgil<sup>6</sup> believe that the idea of decentralization or local governance such as Panchayat advocated safeguarding the rights of the

<sup>5</sup> Madhav Gadgil and P. R. Seshagiri Rao, "A System of Positive Incentives to Conserve Biodiversity"29(32) *Economic and Political Weekly* 2103–2107 (1994) available at: <http://www.jstor.org/stable/4401596>.

<sup>6</sup> Interview with Madhav Gadgil, Professor, *South Asia Network on Dams, Rivers and People (SANDRP)*, July 7, 2013.

indigenous communities and their traditional knowledge, but it seemed that they did not avail a proper benefit sharing in exchange. It is an irony of Indian environmental policy and governance that the National Biodiversity Fund still does not acknowledge the significant contribution of the local communities and has no proper mechanism for access to benefit sharing. These communities struggle a lot for their equal representation and recognition in terms of their traditional knowledge, innovations and sustainable usage, and conservation practices towards biodiversity. According to the data from National Biodiversity Authority, between 2017-2021 only 11 states of India entered into the Access and Benefits agreement and earned benefits but in most cases, this money has not been shared with the community<sup>7</sup>. Also, there are no guidelines on how this money should be spent by the Biodiversity Management Committees (Down To Earth, 2022)<sup>8</sup>.

No doubt Indian biodiversity has different combinations of ecosystems which is most of the time connected with traditional knowledge and practices. In this regard, there is a proper need for the protection of all the bioresources and associated knowledge for the prevention of the loss of biodiversity and excessive commercialization of natural resources. IPRs lead to monopoly because they do not provide space to indigenous communities, and in the context of India biodiversity and indigenous communities are entangled. Both of them will be endangered if separated.

Since the inception of the Convention of Biological Diversity (CBD), 1992 there have been many negotiations at the international and national levels organized for the protection of traditional knowledge and biodiversity. The CBD claims three major objectives: Conservation of biological diversity, sustainable use of the diversity, and ensuring fair and equitable sharing of benefits from this use. India has also ratified the CBD and became a part of it, showing its honest commitment to biodiversity conservation by enacting the Biological Diversity Act, 2002. However, this legislation adopted a three-tiered institutional mechanism, but it does not depict clear guidelines on benefit-sharing, especially in the context of indigenous people.

The CBD has empowered all nations to move beyond the traditional Intellectual Property Rights (IPRs) regime to exercise their sovereign rights over their biodiversity resources. In this way, they also got an opportunity to share the benefits of commercial applications of traditional knowledge of sustainable use of their biodiversity resources which for the first time was an important

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<sup>7</sup> See, Year –wise details of Biodiversity Management Committees (BMC) available at: [http://nbaindia.org/uploaded/pdf/YearwisedetailsofBMCs\\_1.pdf](http://nbaindia.org/uploaded/pdf/YearwisedetailsofBMCs_1.pdf).

<sup>8</sup> Webinar: *Down To Earth* available at: <https://youtu.be/1zZOn3t4M4M>.

international initiative in the development of local communities. In this context, India should also take advantage of these provisions judiciously in its legislative framework as the scope of Intellectual Property Rights (IPRs) is expanding day by day. Since India has always been a rich nation in biodiversity, it is expected that it should set a model for other developing countries with its unprecedented efforts<sup>9</sup>.

Moreover, the discussion of Biodiversity related traditional knowledge and IPRs is now one of the fastest developing economic activities in the world because it adversely affects the conditions and livelihood of Traditional Knowledge holders to a large extent. It is a known fact that Traditional Knowledge is always considered a valuable resource of biodiversity which leads to sustainable development. In addition, Traditional Knowledge covers an ample number of fields like agriculture, medicine, art and architecture, and music which all represent vast bio-resources in terms of products, and culture. In India also there is a variety of traditional knowledge which helps in the holistic development of human beings. It cannot be denied that this knowledge also contributes to the conservation of forests, soil, seed, crop, etc. Hence it is necessary to protect this knowledge from commercial exploitation. The unethical practices of the industries like pharmaceuticals, and private corporations are known to everyone, they use the indigenous people to extract information on medicinal values and usages of biodiversity in day-to-day life and convert the same information into IPs<sup>10</sup>.

It is a well-known fact that since the development of human civilization, medicinal plants have been used to cure diseases and problems. Since time immemorial, mankind has developed many traditional medicine systems by using biological resources through their efforts. Indian system has never been untouched by this aspect, the evidence of which we get from the Vedic age itself. Here, as in other countries, different communities still have a vast knowledge of the diverse uses of plants and other natural resources found around them. It is preferable to say that primitive indigenous societies close to nature have created such a record of “traditional knowledge” based on piloting, empirical reasoning, and experiments over time on plants, animals, and other natural resources. This is the link that continues to inspire them for the conservation and sustainable use

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<sup>9</sup> G. Utkarsh, Madhav Gadgil, et.al., “Intellectual property rights on biological resources: Benefiting from biodiversity and people’s knowledge” 77(11) *Current Science* 1418-1425 (1999) available at: <http://www.jstor.org/stable/24105227>.

<sup>10</sup> Krishnamoorthy Venkataraman and S. Latha, “Intellectual Property Rights, Traditional Knowledge and Biodiversity of India” 13 *Journal of Intellectual Property Rights* (2008).

of biodiversity even today<sup>11</sup>.

According to data shared by the All India Coordinated Research Project on Ethnobotany reveals that indigenous communities in India know about 7500 species of plants for medicinal purposes out of over 9000 species. It was estimated that by 2020 the global market for herbal products will touch 5 trillion US dollars only from pharmaceutical and health food etc<sup>12</sup>.

Similarly, the international regime on access and benefit-sharing describes that ABS is considered an instrument that promotes fairness and equity of traditional knowledge at the inter-state level. However, indigenous people reside in different parts of the world and follow their national boundaries and law, but they still face several illegal bioprospecting contracts or incidents (well-known examples include Haldi and neem). In this sense, there is a need to give direction to domestic legislation on ABS in every country in the world so that local communities get fair and equitable recognition for their traditional knowledge.

Besides, the Nagoya Protocol is more innovative regulations on ABS at the global level because it clearly emphasizes the use of traditional knowledge for research and development purposes. It was the first attempt in which such obligations related to ABS were prescribed with detailed provisions which were not presented under the CBD, 1992<sup>13</sup>.

In fact, after the implementation of the Nagoya Protocol, there was speculation that a biodiversity-rich country like India would get maximum benefit in matters of traditional knowledge. India signed the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their utilization in 2014<sup>14</sup>. It may be noted that under the concept of Access and Profit Sharing of Genetic Resources (ABS) concept, property rights including Intellectual Property Rights (IPRs) are also transferred specifically to the user (industry) of the genetic resource and traditional knowledge provider country. Hence, resource managers

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<sup>11</sup> Pushpangadan, Palpu, et.al., "Review article All India coordinated research project on ethnobiology and genesis of ethnopharmacology research in India including benefit sharing" 7 *Annals of Phytomedicine: An International Journal* 5-12 (2018) available at: [10.21276/ap.2018.7.1.2](http://10.21276/ap.2018.7.1.2).

<sup>12</sup> Suman Sahai, "Commercialization of Indigenous Knowledge and Benefit Sharing", *UNCTAD, Expert Meeting on Systems and National Experiences for Protecting Traditional Knowledge, Innovations and Practices* from 30 October to 1 November 2000, available at: <https://unctad.org/topic/trade-and-environment/biotrade>.

<sup>13</sup> E Tsoumani, "Moving towards fair and equitable benefit-sharing in research and development: The Nagoya Protocol on Access and Benefit-sharing to the Convention on Biological Diversity" *Web publication/site, BeneLex Blog* (2015) available at: <http://www.benelexblog.law.ed.ac.uk/2015/02/18/nagoya-protocol/>.

<sup>14</sup> MoEF&CC, "Implementation of Nagoya Protocol on Access and Benefit Sharing: India's Experience" *Ministry of Environment, Forest & Climate Change* (2018) available at: <http://nbaindia.org/uploaded/pdf/Implementation%20of%20Nagoya%20Protocol%20in%20India.pdf>.



have two possibilities to consolidate these property rights. The first possibility may be decided by national governments to include all indigenous communities in the property rights associated with biodiversity and the benefits derived from their use at the local level. A second possibility may be shown that the origin of genetic resources should be disclosed in the public domain to provide IPRs in every international and national patent law. It is no exaggeration to say that the advent of the Nagoya Protocol envisaged a solution to the issues of imbalance arising from the distribution of property rights. Because it is the only international regulation that truly advocates for fair and equitable sharing of benefits arising from the use of genetic resources held by local communities<sup>15</sup>.

In this context, we can refer that now with the CBD and WIPO guidelines and our national legislation on biodiversity in position, the Jeevani case study of Kani tribes of Kerala and become very relevant and contextual in advocating for access to benefits for its knowledge of Arogyapacha plant (*Trichopus zeylanicus*) and how these indigenous communities are making a progressive way for their empowerment, income generation and poverty eradication at the regional and global level. It could be an imitable example for other local communities of equitable benefit sharing involving genetic resources and associated traditional knowledge<sup>16</sup>.

In this regard, another scholar Prajesh<sup>17</sup> reminds us that India lags in the biodiversity access and benefit-sharing system because the ABS process in India is rigorous and takes an 18-step path. However, India had also published national ABS guidelines in 2014 but still, the question remains how these guidelines help communities and conservation fairly and equitably.

Similarly, Kohli & Bhutani<sup>18</sup> claimed that this new guideline of ABS only added general provisions which are incapable of providing any new information to the stakeholders. In short, in India evidence (The Divya Pharmacy Case) shows that ABS related to local communities and bio conservation activities are both governed by the influence of the business classes<sup>19</sup>. In that

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<sup>15</sup> S Mehta, "The Nagoya Protocol-Convention on Biological Diversity" *IIPRD Blog-Intellectual Property Discussions, Monthly Archives* (2014) accessed from <https://iiprd.wordpress.com/2014/07/> on 12.09.2023.

<sup>16</sup> Suchitra M, "The Kani learning" *Down To Earth* (2012) available at: <https://www.downtoearth.org.in/coverage/the-kani-learning-39208>

<sup>17</sup> P Prajesh, "India lays the cornerstone of biodiversity access and benefit sharing system" 112(1) *Current Science* 24–28 (2017) available at: <http://www.jstor.org/stable/24911609>.

<sup>18</sup> K Kohli and S Bhutani, "Access to India's Biodiversity and Sharing Its Benefits" 50(31) *Economic and Political Weekly* 19–22 (2015) available at: <http://www.jstor.org/stable/24482157>.

<sup>19</sup> M Nomani, "Case Comment: Divya Pharmacy v. Union of India" 39 *Biotechnology Law Report* 122-128 (2020). Available at: 10.1089/blr.2020.29161.zmn.



sense, we cannot deny that ABS is not a successful process in India hence it will remain an administrative maneuver.

#### **4. AN ASPECT OF TRADITIONAL KNOWLEDGE AND RIGHTS OF THE INDIGENOUS COMMUNITIES IN REFERENCE TO COMMERCIAL UTILIZATION OF BIOLOGICAL RESOURCES**

It is a well-known fact that the traditional knowledge and culture of local communities play a crucial role in maintaining the biodiversity of any region. The term “traditional knowledge” includes the idea of intellectual property rights which is derived from an agreement called TRIPS (Trade-Related Aspects of Intellectual Property Rights). Importantly, it holds a legal recognition of the significance of links between IP and trade. In this sense, it is important to know the background of Trade-Related Aspects of Intellectual Property Rights which was acknowledged in 1995 as part of the agreement established by the World Trade Organization (Wipo,1996). It is the most comprehensive multilateral agreement on the protection of Intellectual properties like trademarks, copyrights, geographical indications, patents, protection of plant varieties and farmer’s rights (PPVFR) act, industrial design, layout design for integrated circuits, and undisclosed information or trade secrets. In addition, TRIPS has a significant role in facilitating trade in knowledge and creativity, and in solving trade-related problems over Intellectual Property. It also gives assurance to all the WTO members the latitude to achieve their domestic policy objectives. In short, TRIPS emphasizes innovation, technology transfer, and public welfare<sup>20</sup>.

For many decades the intellectual property was considered only for the western countries but now the trend has changed. Sunder<sup>21</sup> advocates that now in India also many academicians and lawyers have raised their voices for the local communities e.g., framers and artisans, and their intellectual property rights. Thus, it is also a good initiative for discussion related to traditional knowledge of biological resources. Besides, do intellectual property rights work in the favor of the indigenous people in a true sense? It has been experienced that so-called TRIPS is only bound to the knowledge and economic interests of the developed entities from the Western

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<sup>20</sup> World Intellectual Property Organization and World Trade Organization, “Agreement Between WIPO and WTO” 35(3) *International Legal Materials* 754–759. (1996) Available at: <http://www.jstor.org/stable/20698571>.

<sup>21</sup> M Sunder, “The Invention of Traditional Knowledge” 70(2) *Law and Contemporary Problems* 97–124 (2007). Available at: <http://www.jstor.org/stable/27592181>

world. Therefore, it is high time to address the issue of the protection of indigenous and traditional knowledge of poor people who are the real conservator of the ecology.

In this context, the insight from James Boyle is also relevant who specifically presented a dark side of intellectual property in terms of Conventional wisdom. He criticizes the idea of common benefits of intellectual property rights exploiting the cultural contribution of third world countries and their poor people. The developed country did not give proper recognition to third world peoples for their cultural contributions who conserved all those cultural raw materials which gave profits to rich industrialists. Conventional wisdom was introduced for the upliftment of intellectual property rights to keep in mind the digital world. But unfortunately, this progressive thought went in vain, and the enclosure of the cultural commons and industrialization damaged our natural resources<sup>22</sup>.

Also, Boyle established a metaphor called “cultural environmentalism” and observed that the conservation of cultural raw materials is necessary for the process of creation or innovation. There is a need for fair distribution in ownership of these materials then only the process of creation may be flourished. In fact, “cultural environmentalism” gave a new direction for the recognition and protection of traditional knowledge and natural resources available in the developing world. Besides, this idea introduced a moral and economic dimension in recognizing the contribution of global biodiversity and the traditional knowledge system of biological resources which were crucial inputs in any innovation.

Boyle claimed a view related to the public domain on intellectual property. But the confusion remains about the traditional knowledge holders on this aspect. However, they may avail the money for protecting the biodiversity and contribute the raw materials for innovation through the biological resources, but it appears an irony that they have no recognition as intellectual property holders in their own right. Therefore, it is considered here that a dual role is being presented under the guise of “cultural environmentalism”. On one hand, this metaphor claims to protect the knowledge of poor people and on the other hand, it is advocating for promoting commercial development (a narrow lens of economic incentives for innovation) through the intellectual property which is an obstructive factor toward conservation of biological resources. No one can deny that humankind is enriched by chronic and dynamic traditions, not the

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<sup>22</sup> J Boyle, “Cultural Environmentalism and Beyond” (Vol. 70, Issue 2) *In Source: Law and Contemporary Problems* (2007) available at: <http://www.econlib.org/Library/NPDBooks/Pigou/pgEW1.html>.

commercialization of natural resources. Indeed, it reveals the comprehensive purpose of intellectual property which is social and cultural too, not just the economic.

Gadgil<sup>23</sup> shares a clear view about the conservation of biodiversity in Uttara Kannada that it is an undeniable truth that conservation cannot be underestimated in isolation from the local people and broader patterns of natural-resource use and development. Therefore, all the bases that promote sustainable and equitable development of natural resources must be supplemented by policies. Also, policy-makers must involve the local people in the policy-making process as the effectiveness of any policy rests on the support of the local people as well. Since the well-being of local communities is still closely tied to the natural resources of their areas, this approach of participatory policymaking seems to work. At the same time, these people must be given their real share in the sustainable use of biological resources without any delay.

It is to be noted that people in Uttara Kannada are completely dependent on natural vegetation for all domestic needs such as fodder for animals and for their various livelihoods such as making ropes, baskets, agricultural and fishing equipment, and sorting their huts and cattle sheds, etc. Therefore, keeping these aspects in mind, it is a challenging responsibility to protect all the landscapes and ecosystems of the region and conserve the natural resources available there. There is no denying that many practices related to nature conservation still provide a viable strategic base for biodiversity conservation.

However, involving the local communities in the initiatives of ecological conservation does not mean that no effort should be made toward industrialization in the country. Rather, balancing with nature, all rights related to natural resources should be returned to the village communities so that the originality of the village society is maintained. It is also true that there are many international economic and political challenges in this effort. In this context, it is appropriate to emphasize efficient, sustainable, and equitable resource use along with incorporating industrial and intensive processes in agriculture by adopting a viable alternative. Along with this, the villagers also get the right of all management and control related to the natural resources of their area such as monetary benefits, etc. To establish a just and fair process for the conservation of biodiversity and to provide a quality of life to the local communities which are often influenced by the elite.

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<sup>23</sup> Madhav Gadgil, "Conserving Biodiversity as If People Matter: A Case Study from India" 21(3) *Ambio*, 266–270 (1992). Available at: <http://www.jstor.org/stable/4313937>.

Studies by Murugan and Israel<sup>24</sup> also show that the formation of Forest Development and Conservation Co-operative Societies (FDPC) keeping in view the case of the local communities involved in the management of the forest and strengthening their local leadership capacity and creation of some physical assets etc. is also an essential initiative. To enable stakeholders to meet the primary needs of local communities, better micro-climatic conditions, and facilitate FDPCs' conduct of economic decisions. Therefore, giving the community full opportunity to decide which community-level asset has the most potential to meet the priority needs of the communities concerned. This initiative primarily enhances the sense of ownership of the forest among the local communities, so that they strongly contribute to forest management and conservation.

Other intellectual property scholars like Vandana Shiva have also discussed intellectual property's distributive and social effects. She always reminded us that biological diversity in our country has always been a common resource for various traditional communities, which they use and preserve as a heritage for many generations. At the same time, it is the collective and cumulative innovation of these communities that lays the foundation of a core economy by meeting the diverse livelihoods and needs of the communities while underpinning the local culture and local economies of those regions. It is to be noted that the traditional knowledge associated with some major occupations such as agriculture and fisheries is the primary basis for meeting the food and health needs of these communities.

It is fair to say that the issue of conservation of biodiversity is important in the lives of many traditional communities. For them, conservation of biodiversity is primarily a combination of aspects such as the integrity of ecosystems and different species, the right to resources and knowledge, and the right to production systems, they cannot ignore it. In other words, the scope of biodiversity closely encompasses the right to protect the generational knowledge and resources of various local communities in addition to traditional indigenous knowledge systems.

Moreover, the author has shared her views on the conservation of biodiversity and intellectual heritage and mentioned how matters involving bio-resources, particularly through "patent and corporate intellectual property rights" and corporate warfare on nature and people, initiate a challenge to biopiracy. It is therefore a debatable issue today as to what kinds of ideas, techniques, gene identification, and even manipulation of life forms are owned and exploited by

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<sup>24</sup> Padmanaban Murugan and Fekadu Israel, "Impact of Forest Carbon Sequestration Initiative on Community Assets: The Case of Assisted Natural Regeneration Project in Humbo, Southwestern Ethiopia" Volume 17, Issue 1 *African Studies Quarterly* (2017). Available at: <https://asq.africa.ufl.edu/files/v17i1a2.pdf>

huge corporations for profit. To obtain biological resources as a public asset, issues such as biodiversity, traditional knowledge, and the rights of Mother Earth must be considered. To underline how this Western-inspired and unprecedented expansion of the concept doesn't encourage human creativity and the generation of knowledge. Rather, under the guise of corporate intellectual property rights, economic exploitation is being carried out by many international corporations only for private gain, misusing the cost of the health of different communities and the traditional knowledge and freedoms of the world's farmers<sup>25</sup>.

Therefore, it will not be an exaggeration to say that the issue of intellectual protection of biological resources is being converted into a kind of corporate robbery. In this context, resistance to the WTO is also increasing at the global level. It is important to note that the developed economies impose new technologies by dominating the economically less developed nations through this new intellectual world order, pharmaceutical, biotech and other corporations. All these situations represent a conflict of interest primarily between local communities striving for biodiversity conservation and the business establishments that oppose it. One who has access to natural resources and the other who benefits from its use.

Thus, the issue reflects the struggle of those two classes – on the one hand, defining and redefining the traditional rights of communities in rural India. On the other hand, the industrial progress of those so-called global projects on which those “community resources” are indiscriminately commercialized and marketed in the direction of their vested interests. It seems correct to say here that the above mentioned two paradigms related to the conservation of biological resources are explaining different value systems for different sections of the society in which there is bound to be a discrepancy. It is well known that these biological resources are the source of life in traditional communities. On the other hand, global corporations and industrial companies are concerned about their use-values related to bio-resources which give them maximum benefits.

According to Shiva, another idea related to the intellectual property rights of biological resources is also based on the sovereignty of the concerned nations and the autonomy of the individuals at the global level. Autonomy does not occur independently but rests entirely on the question of community rights. It is, therefore, interesting to know that in the issue of conservation of bio-resources the word “Commons” actually means to denote this interrelationship. For example, seed sovereignty and community rights in the context of farmers.

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<sup>25</sup> Vandana Shiva, *Protect or plunder? Understanding intellectual property rights* (Zed Books, London, 2001).

In short, the concept of the word “Commons” within the protection of biodiversity refers to resources that can never be monopolized by a handful of people. In a true sense, it reflects a strong sense of attachment to the community. In this context, the author has logically said that “...the common and the community are beyond the state and the market”<sup>26</sup>.

Therefore, here the synonym of community resources is to develop such an idea that advocates not only the collective use of the traditional resources of a particular area by a particular community but also to motivate the sustainable use of these resources keeping in mind the future generations. Taking initiative in this thinking is an urgent need of this era because day by day mankind is becoming a victim of climate change and various natural calamities which is the result of excessive exploitation and economic control of these biological resources. Therefore, it is important to ensure the protection of all those practices and knowledge towards the conservation of bio-resources through continuous efforts as possible. In this way, the cultural identity of all those indigenous communities can be maintained and their traditional knowledge systems can be truly respected, which they have deserved for centuries.

To put it another way, while analyzing the development in the reference to traditional knowledge, here the vision of Amartya Sen can be more relevant. As he advocates how “development as freedom” is a pluralist approach that measures the development based on the capacity for many freedoms. Development can be considered a broad term that expands human capabilities. In other words, this scope of capacity for many freedoms does not limit to market-oriented freedoms. These freedoms hold a vast range not only for basic needs but also in terms of the right to life and health, to more expansive freedoms of movement, creative work, and participation in social, economic, and cultural institutions.

According to Professor Amartya Sen<sup>27</sup>, the capability approach puts people and their capabilities at the center stage of development. The human capabilities approach also considers human beings and the freedom they enjoy as a means to achieve the ends of development goals. In addition, law related to Intellectual property is essential to the development in terms of narrow efficiency. On the other hand, it emphasizes a broader view of expanding capability for central freedoms. Hence, intellectual property rights also include a wide range of implications like questions of cultural relations, social development, and GDP growth apart from incentives for innovation.

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<sup>26</sup> Vandana Shiva, *Reclaiming the Commons: Biodiversity, indigenous knowledge, and the rights of Mother Earth* (Synergetic Press, London, 2020).

<sup>27</sup> Amartya Sen, *Development as freedom* (Alfred A. Knopf, Inc, New York, 1999).

Accordingly, there is a need for giving proper recognition to the poor in terms of receivers and producers of knowledge. Lacking in the promotion of the capacity and participation of the poor people for creative work in global culture and commercial markets also hinders development as freedom. In fact, in Sen's views, the rejection of the freedom to participate in the labour market is also considered oppression in which people are not allowed to utilize their freedom. In conclusion, it would be appropriate to consider people's access to this traditional knowledge not only from a monetary point of view but also to emphasize their ability to produce new knowledge and benefit from this creation culturally and economically.

## **5. DECISION ANALYSIS AND GAME THEORY IN BIODIVERSITY CONSERVATION**

The researcher attempts to address the Decision analysis and game theory<sup>28</sup> in this study which could be considered as a useful tool to measure biodiversity conservation planning and modelling contexts. By using the game theory, conflicts between stakeholders can be used to identify Pareto-inefficient Nash equilibria. This can further be used for designing conflict resolution mechanisms which will help informed group decisions among various stakeholders.

We have seen many cases in the above paragraphs of this chapter where various agents or stakeholder holders had individual self-interests which leads to a worse outcome for all, relative to other feasible outcomes. Based on the above-mentioned evidence related to biodiversity conservation showing this feature is modelled to demonstrate how game-theoretical representation can inform group decision-making.

In this study, the researcher is using Game theory to handle the situations of interdependent decisions in biodiversity conservation, where various agents or stakeholders like governments, private enterprises, and indigenous communities play their role in their own feasible set of actions or alternatives and those outcomes depend on the choices of all the other agents or stakeholders. It has to be noted that the priorities of these various stakeholders or agents are based only on those outcomes which are the complete specification of each of the agents' actions.

Within this study, the researcher makes an analogy that an outcome is considered as Pareto - efficiency in the recently proposed amendments to biodiversity where the Government of India

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<sup>28</sup> DM. Frank and Sahotra Sarkar, "Group Decisions in Biodiversity Conservation: Implications from Game Theory" (*PLOS ONE* 5(5): e10688,2010). Available at: <https://doi.org/10.1371/journal.pone.0010688>.



failed to address the concerns of indigenous people and gave more priority to the industrial sector. In this sense, within bio conservation, it cannot be possible that no agent or stakeholder opts for profit without harming the other stakeholders.

In addition, Pareto Efficiency<sup>29</sup> is an economic state where the reallocation of resources cannot be done without benefiting at least one person and harming another. Pareto efficiency believes that resources are allocated in the most economically efficient manner but are not equal or fair. An economy is said to be in the Pareto Optimum State when no economic change can take place without benefiting one person and harming the other. Indeed, Pareto efficiency is the main pillar of welfare economics. Pure Pareto efficiency only exists in theory. Alternative criteria for economic efficiency based on Pareto efficiency are often used in economic policy making because it is difficult to make changes that do not harm any individual.

Presumably, if there is fair competition and resources are used to the maximum efficient capacity, everyone will be at the highest standard of living or Pareto efficiency. In situations other than the Pareto Efficiency, some changes in the allocation of resources in an economy can be made in such a way that they are beneficial to at least one individual and harmful to no one. Only such changes in resource allocation that meet this condition are considered to be progressing towards Pareto efficiency. Such a change is called Pareto Improvement. Therefore, it cannot be exaggerated to say that Pareto–efficiency is a weak criterion because such an economic situation is a mere fantasy.

In addition to all this, it is important to note that efforts to conserve and promote biodiversity require at least two regulatory commitments<sup>30</sup>, which are - First of all, implementing the concept of “biodiversity”, should be decided which taxa or other biodiversity surrogate are eligible for allocation of finite conservation resources or not? Another regulatory commitment should be to reconcile major social goals such as economic welfare, public health, etc (especially when land-use policies are being formulated) when setting biodiversity conservation goals. It is clear here that there is a substantial potential for conflict in both the cases mentioned above. Therefore, it is worth considering by which type of agents and stakeholders such protests are being pursued in the direction of conservation of biodiversity? However, when such opposition is formulated in

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<sup>29</sup> E C Smith and S K Swallow, “Lindahl Pricing for Public Goods and Experimental Auctions for the Environment” 3-3 *Encyclopedia of Energy, Natural Resource, and Environmental Economics* 45–51 (2013). Available at: <https://doi.org/10.1016/B978-0-12-375067-9.00107-8>.

<sup>30</sup> Sahotra Sarkar and Chris Margules, “Operationalizing biodiversity for conservation planning” 27(4) *Journal of biosciences* 299-308 (2002).

favor of a single agent (individual or organized group) it provides a useful and comprehensive insight to the analyst. Therefore, it is fair to say that game theory can play a similar role in resolving differences between multiple agents with the help of decision support tools based on such multiple-criteria analysis<sup>31</sup>.

Moreover, there are two potential roles descriptive, and normative for game theory in cooperating biodiversity conservation. The first role describes evolutionary theory and economics. Where evolutionary games are used to model frequency-dependent selection<sup>32</sup>. But in economics, traditional (Rational Choice) game theory can be used to interpret macro-behavioural consequences by trying to appeal to or harmonize some underlying game's balance<sup>33</sup>. Similarly, Game theory can be used to address the conflicts related to biodiversity conservation<sup>34</sup>. The recently proposed amendments to the biodiversity act also come under the purview of the second normative (or prescriptive) role of game theory. No doubt while addressing the issue of bio conservation that there are certain contradictions between the government's initiative and the traditional rights of indigenous people in this national legislation.

Hence the researcher believes that it is needed to identify those conflicts with Pareto-inefficient Nash equilibria which can help in taking constructive action to receive optimal conservation outcomes by known policy tools. One more thing to keep in mind is that while conserving biodiversity there is no need to attain Pareto-efficient cooperative outcomes via formal institutional arrangements<sup>35</sup>. It can be received in the best manner only through mutual consideration of all the stakeholders or agents associated with bio conservation. In this way, the Game theory is a normative tool that advocates for the best and a sustainable solution for biodiversity protection as it represents an analytical framework of deliberations to address the concerns and conflicts of various stakeholders. In this context, we also need to discuss some aspects of the theory of Commons which strengthen this study to comprehend the feasible technique for building consensus between different stakeholders for biodiversity conservation.

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<sup>31</sup> R Keeney and H Raiffa "Decisions with Multiple Objectives: Preferences and Value Trade-Offs" *Cambridge*: Cambridge University Press (1993). Available at: doi:10.1017/CBO9781139174084.

<sup>32</sup> J Smith, "Evolution and the Theory of Games" *Cambridge*: Cambridge University Press (1982). Available at: doi:10.1017/CBO9780511806292.

<sup>33</sup> W E Deming, J V Neumann, et.al, "Theory of Games and Economic Behavior" 40 *Journal of the American Statistical Association* 263 (1944).

<sup>34</sup> Clark C Gibson and Stuart A Marks, "Transforming rural hunters into conservationists: an assessment of community-based wildlife management programs in Africa" 23(6) *World development* 941-957 (1995).

<sup>35</sup> DM Frank and Sahotra Sarkar, "Group Decisions in Biodiversity Conservation: Implications from Game Theory" *PLOS ONE* 5(5): e10688 (2010). Available at: <https://doi.org/10.1371/journal.pone.0010688>.

Indeed, within biodiversity conservation or environmental protection, the term “Commons” predominates in the form of a community’s shared assets such as air, water, wildlife, and trees forming a safety net and providing the necessary cornerstone for respectful, democratic, communities. Through the principle of the Commons, this study seeks to understand how it is important to preserve the rights of local communities as public property under environmental governance to protect bio-resources from privatization by wealthy, authoritarian elites<sup>36</sup>.

In other words, this principle of the Commons shows that the rights of indigenous and traditional communities have to be taken seriously. These are the people whose lives not only depend entirely on biodiversity but also jointly specialize in valuable biodiversity knowledge. It is a well-known fact that these communities freely share their innovation and creativity with others, following the principle of the common through communing. At the same time, these people have always been fighting to protect this culture of caring, sharing, and protecting biodiversity and the circle of the intellectual Commons, while making an invaluable contribution to biodiversity conservation. Therefore, this principle has an important role in environmental governance.

The discourse related to the theory of the Commons can easily be extended to environmental goods and services. This theory discusses the interactions and interdependencies between the resources of the traditional Commons and those goods and services that are the goal of environmental protection. According to the old Commons theory - the jointly significant use rights of the local populations of their land or bio-resources were managed by various customs. On the other hand, according to English jurisprudence - the theory of Commons is presented as the right to remove some material value from land owned by someone else. In European states like Norway (In Norway, “Commons” is called allmenning.) these rights were referred to as “*profits-à-prendre*” rights and were related to the land of the people. So here the Commons theory is recognized as an area where a suitably delimited group of common people have legitimate rights to the harvest of its natural resources or goods<sup>37</sup>.

In addition, it should be noted that the protection of biodiversity is often considered a “public good”. Public goods are considered in varying quantities, non-competitive in consumption,

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<sup>36</sup> Vandana Shiva, *Reclaiming the Commons: Biodiversity, indigenous knowledge, and the rights of Mother Earth* (Synergetic Press, London, 2020).

<sup>37</sup> Erling Berge, *Environmental Protection in the Theory of Commons* (2003).

excluded in use, or both<sup>38</sup>. In other words, a public good that is not purely private. When more than one person can obtain a consumption advantage from some level of supply at the same time, a good has a non-rival in consumption. Nothing is excluded if it is impracticable for any one person to maintain exclusive control over its use<sup>39</sup>.

Moreover, the principle of Commons explains why individuals or the state collectively have property rights over natural resources and goods. Hence the theory of Commons is a group of people having authority together as a group. Some discussions also prevailed, which is mainly known as “the tragedy of the Commons”<sup>40</sup>.

Indeed, the questions also rose on the nature of common rights of local communities such as why do they hold as a group and not individually? Similarly, how the theory of Commons is the best option for preserving and managing biological resources. Therefore, the researcher believes that the “theory of Commons” provides feasible conditions to measure Biodiversity in the context of the problems of motivation, the problems of cooperation or collective action, and the problems of self-governance. In nutshell, scholar Hardin Garrett summed the tragedy of the Commons as “the population problem has no technical solution; it requires a fundamental extension in morality”.

## 6. Conclusion

Finally, Game theory can be recognized as a standard tool in addressing the biodiversity conservation contexts: identifying scenarios with Pareto-inefficient Nash equilibria. Likewise, this theory enables a constructive action toward bio-conservation to achieve optimal conservation outcomes, whether policy solutions are based on a specific “system design” or otherwise.<sup>41</sup> There is no doubt, however, that in some cases of bio conservation, formal system-design solutions have the opposite effect. Therefore, such challenges need to be addressed at the earliest by “building mutual relations of group discussion and trust” because only then the usefulness of this theory will be fully visible.

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<sup>38</sup> E C Smith and S K Swallow, “Lindahl Pricing for Public Goods and Experimental Auctions for the Environment” 3-3 *Encyclopedia of Energy, Natural Resource, and Environmental Economics* 45–51(2013) available at: <https://doi.org/10.1016/B978-0-12-375067-9.00107-8>.

<sup>39</sup> D L Weimer and A R Vining, “Policy Analysis: Concepts and Practice” 6th ed. *Routledge* (2017) available at: <https://doi.org/10.4324/9781315442129>

<sup>40</sup> Garrett Hardin, “The Tragedy of the Commons” 162 (3859) *Science*, 1243–1248 (1968) available at: <http://www.jstor.org/stable/1724745>

<sup>41</sup> S Bowles, “Policies designed for self-interested citizens may undermine “the moral sentiments”: Evidence from economic experiments” 320(5883) *Science*, 1605-1609 (2008).