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Exploitation of Biodiversity Vis-À-Vis Equity and Sustainable Manufacturing: A Legal Perspective

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Abstract: *It is a known fact that the natural resources and biodiversity are vital for healthy ecosystems and are the foundation of our survival, well-being and economy. The principle of sustainable development which is based on equity and sustainability states that the development must be within carrying capacity of the environment and ecosystems.*

Keywords: natural resources

I. INTRODUCTION

"Our activities are responsible for the rapid depletion of the earth's natural resources, which starts a chain reaction of issues. When we continuously look the other way, they can lead to irreversible damage. Therefore, we can no longer regard sustainable practices as a choice. It is a responsibility that we all hold to protect the Mother Earth."[1]

The above statement highlights the serious issue of destruction of natural resources and biodiversity due to the various developmental activities such as agriculture, industries, road and transport, mining etc. In the last few decades, the utilization of biodiversity has increased tremendously leading to over-exploitation and destruction of biodiversity. Recent research has also indicated that food industry, construction, energy and textile sectors account for approximately 90% of the pressure on biodiversity worldwide[2]. Further, the benefits of utilization of biodiversity are not distributed equally and mostly only the rich countries with technology are getting the benefits and the poor countries are facing the loss of biodiversity.

It is a known fact that the natural resources and biodiversity are vital for healthy ecosystems and are the foundation of our survival, well-being and economy. The principle of sustainable development which is based on equity and sustainability states that the development must be within carrying capacity of the environment and ecosystems.

Hence, there is a need to adopt sustainable manufacturing methods and sustainability levels during utilisation of biodiversity. Instead of 'linear economy' which is *take-make-waste model*, there is need to adopt a '*circular economy'* approach which focuses on minimizing use of materials and energy while reducing environmental pressures linked to resource extraction, emissions and waste.[3]

This paper highlights the adverse impacts on environment and economy due to over-exploitation of biodiversity. Further, it examines the significance of equity in biodiversity utilisation as well as need to adopt sustainable manufacturing practices by the different industries for protection of biodiversity.

Biodiversity: Meaning and Significance

Biodiversity is a very complex term and covers many aspects of biologic variation. In popular usage the word biodiversity is used to describe all the living species in a particular area. In relation to the earth, biodiversity can be considered as entire life forms on the earth. As per the Biological Diversity Act, 2002, biological diversity is defined as,

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[1] Sedano I., (2024). 75 Sustainability Quotes and Sayings Inspiring Sustainable Living. Retrieved from https://www.trvst.world date of visit 09-01-2025

[2] The Benefits to Biodiversity of a Strong Circular Economy, European Environment Agency,

[3] The Benefits to Biodiversity of a Strong Circular Economy, (June 2023). European Environment Agency, date of visit 09-01-2025

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"the variability among living organisms from all sources and ecological complexes of which they are a part, and includes diversity within species and between species and ecosystems.[4] Thus, it refers to the number, variety and variability of all life forms- microorganisms, plants, animals and the ecological complexes in which they inhabit. It includes genetic diversity, species diversity and ecosystem diversity[5]. Biodiversity is significant for survival of life on the earth as entire human civilisation as well as other life forms depend on the biodiversity for basic needs of survival. It not only provides food, but also the vital conditions of life such as air and water as well as raw materials for the various economic activities. Each species and every ecosystem is interlinked and indispensable for the preservation of ecology and necessary for the existence of life.

Over-exploitation of Biodiversity: Reasons and Impacts

The biodiversity is threatened and over-exploited due to utilization of biodiversity as raw materials in various industries. All the developmental activities such as agriculture, roads, transport, construction, mining, and various industries utilize the various aspects of biodiversity as raw materials. The unprecedented and large-scale economic growth with inhuman and callous approach towards the environment and biodiversity has resulted in environmental pollution, depletion of natural resources, massive extinction of species, loss of biological diversity, increase in toxic wastes, deforestation, desertification, ozone depletion and climate change. The biologists and ecologists have pointed out that the loss of living species in recent decades represents the largest mass extinction since the dinosaurs were wiped out 65 million years ago[6]. Nearly half of the forests that once covered earth have already been lost and almost 14 million hectares of tropical forests are being lost each year[7]. Majority of the world's ecosystems including the forests, mountains, water bodies and other eco-fragile areas are polluted and threatened. India alone is losing forest wealth at a rate of 1.3 million hectares per year[8]. The loss of dense forest cover is much larger than what is reported by the Forest Survey of India[9]. Almost all the major rivers in India are polluted due to industrial effluents and sewage and it is reported that about 2/3rd of all illnesses in the country are related to water borne diseases[10]. Large scale development projects like dams, thermal power stations, ports and railway lines cause enormous environmental losses such as deforestation, loss of wildlife, submergence of land and more importantly the displacement of people who are mostly tribals and forest dwellers. The number of displaced people in India is reported to be about 30 million[11]. Thus, the over-exploitation of biodiversity is disrupting the delicate ecological balance on the earth.

Principle of Sustainable Development : Meaning and Significance

The need to protect and preserve the global environment started with the convening of the Stockholm Conference on Human Environment in 1972[12]. The Rio Summit in 1992 has further led to the recognition that all human beings are

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[4] See Section 2(i) of Biological Diversity Act, 2002

[5] Pathan, Azim. (2013). Protection and Conservation of Biodiversity: Legal Regime, National and International Perspective,. Nagpur,Maharashtra: Cehrra Publication, p.15

[6] Shantakumar, S, (2007). Introduction to Environmental Law, 2nd Edition, Nagpur, Wadhwa & Company, p. 23.

[7] Id. at p. 29

[8] Asthana D.K., Meera Asthana, (2006). Environment Problems and Solutions. New Delhi, S. Chand & Company, p. 105.

[9] Forest Survey of India reports that there was a net loss of 5,482 sq. km. of dense forests since 1995. It is argued that the loss must have been 17,777 sq. km. P. Leelakrishnan, (2005). Environmental Law in India. 2nd Edition. New Delhi, Butterworths Lexis Nexis, p. 55.

[10] S. Shantakumar,(2007). Introduction to Environmental Law, 2nd Edition, Nagpur, Wadhwa & Company, p. 23.

[11] Interview of Walter Fernandes, Director (Tribal Studies) Indian Social Institute, reported in Down to Earth, 15 Feb. 1999. See, Divan Shyam, Armin Rosencranz, (2005). Environmental Law and Policy in India, Cases, Materials and Statutes, 2nd Edition, New Delhi, Oxford University Press, p. 417.

[12] The United Nations Conference on the Human Environment held at Stockholm in June 1972, was the first UN Conference held specifically to consider global environmental conditions. Heads of state and high government officials

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entitled to a healthy and productive life in harmony with nature. The concept of sustainable development was placed on the international agenda with the release of the report 'Our Common Future' by World Commission on Environment and Development in 1987 has been endorsed by the UN conferences as one of the principles of international environmental law. It means, "*Development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.*"[13] A healthy economy can only exist in symbiosis with a healthy ecology. The adverse impacts violate the most basic human right to life and to live with dignity and health.

Hence there is a need to look into the present developmental activities and adopt sustainable developmental approach based on equity.

Significance of Equity in Biodiversity Utilization

The term 'equity' means 'fairness and justice'. In the context of development and environmental resources it means that the benefits arising due to utilization of biodiversity and developmental activities must be distributed fairly among all the people, not just for the present generation, but also for the future generations. This is also reflected in the Brundtland Report, 1987 which is the key statement of sustainable development and emphasises on inter-generational and intra-generational equity. Further the UNEP clarified that sustainable development implies, "progress towards national and international equity, as well as the maintenance, rational use and enhancement of the natural resource base that supports the ecological resilience and economic growth.[14] Allen in 1980 defined it as the development, which is likely to achieve lasting satisfaction of human needs and improvement of the quality of human life. Barbier says sustainable development as applied to the Third World means, increasing the material standard of living of the poor at the "grassroots" level and its primary objective in general is reducing poverty by providing lasting and secure livelihoods, and minimizing resource depletion[15]. Thus, all international environmental documents emphasise on sustainable development in harmony with nature and in an equitable manner for all generations. It implies all three aspects of sustainability: environmental, economic and social sustainability. Hence, when biodiversity is utilised in various economic activities, the benefits must be not for a limited few, but for all the members of human family for present as well as future generations.

As there are different approaches to development, various authors have explained the different sustainability levels and it is necessary to understand these in order to know whether development is sustainable and it is sustainable manufacturing.

Sustainable Manufacturing and Levels of Sustainability

Sustainable manufacturing is the creation of manufactured products through economically-sound processes that minimize negative environmental impacts while conserving energy and natural resources. Sustainable manufacturing also enhances employee, community and product safety[16]. For businesses to achieve true sustainability, they must look at literally every area of their supply chain and manufacturing operations, to find ways to improve and optimise. Sustainable manufacturing is a system that integrates product and process design with manufacturing, planning, and control to identify, quantify, assess and manage the flow of environmental waste.

Today sustainability is a matter of survival for both the manufacturing sector and the Planet[17]. Sustainability has been defined by Costanza et al, as the amount of consumption that can be continued indefinitely without degrading capital

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from 113 countries participated in the deliberations which culminated in the adoption of a Declaration and an Action Plan.

[13] Report of the World Commission on Environment and Development, Our Common Future, Brundtland Report, 1987

[14] S. Shanthakumar, (2005). Introduction to Environmental Law. Second Edition, Nagpur, Wadhwa & Company, p. 354

[15] P. Rathnaswamy, (1998). International Environment Management. New Delhi, Manas Publications, p. 13

[16] Sustainable manufacturing, U.S. Environmental Protection Agency, https://www.epa.gov visited on 25-01-2025

[17] Sustainable Manufacturing: The Future of Industry, https://www.sap.com

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stocks including 'natural capital stocks'.[18] Costanza et al have also highlighted that the relationship between human economic systems and ecological systems should be such that the effects of human activities remain within bounds so as not to destroy the diversity, complexity and function of the ecological life support system[19].

Sustainability simply means maintaining the quantity or level of the total capital as well as the level of the individual forms of capital. Four kinds of capital[20] are recognized i.e.

i. manmade capital;
ii. natural capital including natural resources and environmental services;
iii. human capital; and
iv. social capital.

Depending upon the importance given to the type of capital, sustainability is classified into following four levels i.e. weak, sensible, strong and absurdly strong.[21]

- **Weak sustainability** means maintaining only the total of the capital stock intact. It does not consider the quantity of the natural capital. According to Daly and Cobb, it is based on the notion that manufactured capital and natural capital are substitutes for one another. As Per Pearce et al. the weak sustainability assumes that one can consume or destroy environmental resources as long as one can compensate for the loss by increasing the manmade capital[22]. It is criticized on the grounds that one cannot substitute natural resources with man made goods. Only if a particular natural resource is abundant then one may to some extent utilize it to make manmade goods. For example, only if the forest resources are abundant, then industries can be set up for producing goods like paper, pharmaceuticals, cosmetics, paints, textiles and agricultural implements etc. But if the forest resources are in scarcity, then conservation of the forest resource is more important than production of the goods. Moreover, most of the natural resources and environmental services cannot be substituted by manmade capital and such continuous substitution would actually lead to their depletion.
- **Sensible sustainability** requires that in addition to maintaining the total level of capital intact, some concern should be given to maintaining the level or quantity of the individual kinds of capital like natural resources[23]. Thus,

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[18] Costanza Robert; Herman E. Daly; Joy A Bartholomew, (1991). "Goals, Agenda and Policy Recommendations for Ecological Economics" in Robert Costanza (Ed), Ecological Economics. Pp. 1-19, at p.8, New York, The Science and Management of Sustainability, Columbia University Press.

[19] Ibid at p. 8

[20] **Manmade capital** such as machinery, houses, roads, railways which are usually considered in financial and economic accounts; **Natural capital** including the natural resources and environmental services which are excluded from the traditional income accounting methods; **Human capital** which includes human or labour capital and investments in education, health and nutrition of individuals; **Social capital** or cultural capital related to the stock of knowledge and skills of society. Also see, Pearce W. David, (1993). "Valuing the Environment: Past Practice, Future Prospect", in Ismail Serageldin and Andrew Steer (Eds.), Valuing the Environment, Proceedings of the First Annual International Conference on Environmentally Sustainable Development held at The World Bank, Washington, D. C. from September 30 – October 1st, 1993, Environmentally Sustainable Development Proceedings, Series No. 2, pp.47-57, at p.53, The International Bank for Reconstruction and Development, USA, The World Bank, Washington DC.

[21] Jones Edwards Gareth; Ben Davies, Salman Hussain, (2000). Ecological Economics An Introduction. UK. Blackwell Science Ltd., pp 27 – 28. Also see Prato Tony, (1998). Natural Resource and Environmental Economics. Iowa State, University Press, Ames, pp 244-245; Dieren Van Wouter, (1995). Taking Nature Into Account. A Report to the Club of Rome, New York, Copernicus, Springer Verlog, 175 Fifth Avenue, at p 86-87 and pp.103-104

[22] Pearce W. David (Ed), (1993). Blue Print 3: Measuring Sustainable Development, New York, Earthscan Publications, London, as given in Dieren Van Wouter, Taking Nature Into Account, A Report to the Club of Rome, New York, Copernicus, Springer-Verlog, 175 Fifth Avenue, pp. 87-88.

[23] Id. at p. 103.

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if the forest resources are utilized for production of goods, it must not result in depletion of forest resources but efforts must be to maintain the quantity of forest resources. Similarly the water resources must not be over exploited. Efforts must be to recycle the used water and also to maintain the quantity through techniques like rain water harvesting, cloud seeding and recharging the ground water. This approach is a reflection of precautionary principle i.e. better to be safe than to say sorry later.

- **Strong sustainability** emphasizes on maintaining the overall level of natural capital and introduces the concept of 'critical natural capital', which means natural capital which if destroyed has profoundly damaging consequences. For example natural capital like ozone layer, the carbon cycle and biodiversity are 'critical natural capital' essential for survival of life on earth and can never be compensated by manmade capital.
- **Absurdly strong sustainability**: means maintaining the level of total capital as well as level of natural capital without using them. It is strongly against the use or depletion of any kind of capital. Hence, this approach is criticized as it would completely stop the development.[24]

It is clear that the different developmental activities must consider the 'sensible sustainability' and 'strong sustainability' levels for achieving sustainable manufacturing and equity.

II. CONCLUSION & SUGGESTIONS

The biodiversity is vital for survival of life on Earth and hence the developmental activities must adopt sustainable manufacturing process in order to achieve sustainable development and equitable distribution of benefits. The industries must consider sensible sustainability and strong sustainability levels and equity principle while making plans for biodiversity utilisation and economic activity. The words of Sir David Attenborough, the renowned British biologist and natural historian are relevant here:

"The living world is a unique and spectacular marvel. Billions of individuals, and millions of kinds of plants and animals….. working together to benefit from the energy of the sun and the minerals of the earth. We rely entirely on this finely tuned life-support machine. And it relies on its biodiversity to run smoothly. Yet the way we humans live on Earth now is sending biodiversity into decline[25]."

Some suggestions for protecting biodiversity and achieving sustainable manufacturing are:

- Urgent need to reorient our developmental activities in consonance with nature and biodiversity.
- At international level countries must cooperate and provide technological help to developing and underdeveloped poor countries in their efforts for biodiversity protection and reduction of pollution.
- Industries must mandatorily conduct Environmental Impact Assessment and modify the plans if there are adverse impacts on biodiversity.
- Regular checking and monitoring of the industries must be there at national level to ensure that environmental standards are met with and steps are being taken by industries to reduce pollution and protect biodiversity continuously.
- As far as possible reduce, reuse and recycle. Adopt ethical approach to life and reduce the materialistic greed and wants which overexploit biodiversity.

The first duty of the human race on the material side is to control the use of the earth and all that therein is. Conservation means the wise use of the earth and its resources for the lasting good of men. Conservation is the foresighted utilisation, preservation and renewal of forests, waters, lands and minerals for the greatest good of the greatest number for the longest time[26].

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[24] Ibid

[25] Sir David Attenborough

[26] Pinchot, G., (1947). Breaking New Ground. New York, NY: Harcourt, p.505. Also see Shantakumar, S., (2005). Introduction to Environmental Law, Nagpur: Wadhwa & Company, p.33