

Vol. VII

Apr-Jun, 2022

Issue II

NUJS Journal of Regulatory Studies

(A Multidisciplinary Blind Peer Review Journal)

ISSN: 2456-4605(O)



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GOVERNANCE AND PUBLIC POLICY
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THE 7S THEORY OF SUSTAINABLE CONSUMERISM IN FOOD SECTOR

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Abstract

Sustainability in resource consumption has become integral to business responsibility in our age. Minimum wastage, optimum utilisation, and economy in usage of resources through techniques such as recycling are some of the features of sustainable consumption. However, the concern towards sustainability in resource use has hitherto been only limited to business enterprises. Sustainability in consumerism is a novel concept that has many dimensions. Sustainability in consumerism entails economy in consumption, wastage minimisation, recycling, reuse, and responsible consumer behaviour. It has financial, social, health, economic and philosophical dimensions. Unsustainable consumerism in food sector can lead to widespread lifestyle diseases, inequity in food availability and nutrition, and environmental degradation. Defining sustainable consumerism and its components could be the first step towards inculcating a culture of sustainability among consumers at the global level. This paper is aimed at expounding a theory on sustainable consumerism in food sector known as 'The 7S Theory on Sustainable Consumerism in food sector'. The theory explains the concept in terms of its seven basic components, namely, Sensible, Sensitive, Shared, Sufficiency, Spirituality, Salvage, and Savings. All these components of sustainable consumerism have been discussed in details with appropriate analogies, illustrations, and examples. An attempt has also been made to relate these components with the consumer rights regime and enforcement mechanism under the Consumer Protection Act, 2020. For instance, consumers in food sector have a right to be informed about the nutritional content or ingredients of food they consume. This comes under 'Sensible' dimension, which deals with the qualitative aspects of consumption. 'Sensitive' entails concern for animals and their habitats. 'Shared' deals with equity in food availability and distribution. 'Sufficiency' involves the quantitative aspects of food consumption. 'Spirituality' takes consumerism beyond strictly material calculus. 'Salvage' involves minimising food wastage. 'Savings' involve economy in consumption. Recommendations have been made to further deepen consumer rights regime and strengthen consumer protection laws in India, consistent with the essence of the theory. Suggestions have been made to popularise the idea of sustainable consumerism among the general public.

Keywords: Sustainability, Consumerism, Law, Rights, Food

Introduction to Sustainable Consumerism

Sustainable consumerism is the application of the principles of sustainability and sustainable development in resource consumption. The United Nations Brundtland Commission held in 1987 issued a Report of the World Commission on Environment and Development: Our Common Future. The report defined sustainability as meeting the needs of the present generations without compromising the ability of future generations to meet their own needs.¹ Since then sustainability has become a running theme in all discussions and debates on issues related to environment and nature conservation. In simple terms, sustainability means an inherent ability of the nature or environment to sustain itself, when left undisturbed. For instance, forests when left undisturbed regenerate eventually. However, human intervention and unsustainable use of resources disrupts that inherent regenerative capacity of nature. This happens when the pace of resource exploitation exceeds the carrying capacity or regenerative rate of the nature. Resources are not infinite. Nature needs time to regenerate its resources and recoup its losses. Sustainability erodes when resources start depleting due to excessively high rates of consumption of resources by the present generation that leaves comparatively lesser amounts of resources for the use of future generations. Sustainability is thus closely connected with inter-generational equity. Even within the same generation, unequal capacities, capabilities, affordability, and accessibility to resources cause intra-generational inequity.

Sustainable consumerism is a pattern of consumption or consumer behaviour that has sustainability as its central concern. Its about doing more and better with less.² It includes efficiency and economy in use of resources. Efficiency means maximising consumer satisfaction at the same level of resources consumption or minimising resources consumption for the same level of consumer satisfaction. This could be possible by adopting methods, practices and technologies that result in better resource efficiency per unit of resources consumed. Economy means reduction or minimisation of resource consumption, regardless of levels of consumer satisfaction. Sustainable consumerism is a culture that emanates from awareness about environmental issues and sustainability concerns. It covers all the stages of consumption from planning to buy or consume resources to their safe and sustainable disposal

¹ REPORT OF THE WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT: OUR COMMON FUTURE, <http://www.un-documents.net/our-common-future.pdf> (last visited Oct. 23, 2022).

² SUSTAINABLE DEVELOPMENT GOALS, <https://www.un.org/sustainabledevelopment/sustainable-consumption-production/> (last visited Oct. 23, 2022).

and includes all intermediate stages such as buying, consumption, reuse, recycling, and recovering. Sustainable consumerism may apply to all kinds of resources that we consume that are subject to sustainability concerns due to their scarcity or constrained regenerative capacity, such as water, energy, and food.

Sustainability Issues Specific to Food Sector

Some of the issues related to sustainable consumerism in food sector that need resolution by global and coordinated efforts are listed as below –

a) Food wastage

13.3% of the world's food is lost after harvesting and before reaching retail markets while 17% is wasted at the consumer level.³ Each year one-third of all food produced ends up as waste, costing the world around \$1 trillion and measuring equivalent to \$1.3 billion tonnes. Most of this wastage is owed to poor transportation from the sources of supply to market places and faulty harvesting practices.⁴ India has its own food wastage conundrum. The per capita food wastage of Indian households amounts to 50 Kg per annum. In financial terms the total cost of food wastage in India is estimated at a monumental INR 92,651 Crores annually.⁵ This is approximately 26.5% of annual food subsidy allocation to Food Corporate of India in the financial year 2020-21.⁶ This huge scale and volume of food wastage exists in spite of the fact that India ranked 107th out of 121 countries with a 'serious' level score of 29.1 in the 2022 edition of the Global Hunger Index.⁷ India is a land of stark inequalities and contrasts. Starvation sleeps next to abundance and even obesity in this country.

b) Health Epidemic

According to the National Family Health Survey (NFHS-5), obesity level in India was estimated to be around 24% in case of women and 23% in case of men.⁸ Lifestyle

³ UNITED NATIONS, <https://sdgs.un.org/goals/goal12> (last visited Oct. 22, 2022).

⁴ *Supra* note 2.

⁵ Vishwa Mohan, *Why it's Time to put Farm and Food Waste to Use*, TIMES OF INDIA (Jul. 16, 2022, 10:54 AM), <https://timesofindia.indiatimes.com/india/why-its-time-to-put-farm-and-food-waste-to-use/articleshow/92910335.cms#:~:text=NEW%20DELHI%3A%20Every%20year%20India,to%20Rs%2092%20C651%20crore%20yearly>.

⁶ PRS LEGISLATIVE RESEARCH, <https://prsindia.org/budgets/parliament/demand-for-grants-2021-22-analysis-food-and-public-distribution> (last visited Oct. 22, 2022).

⁷ GLOBAL HUNGER INDEX, <https://www.globalhungerindex.org/india.html> (last visited Oct. 22, 2022).

⁸ Sohini Das, *Nearly One-fourth of all Men and Women in India are Now Obese*, BUSINESS STANDARD (May 6, 2022, 22:33PM), https://www.business-standard.com/article/current-affairs/nearly-one-fourth-of-all-men-and-women-in-india-are-now-obese-nfhs-122050600458_1.html.

diseases have become the leading causes of deaths all over the world. Around 16% of world's total deaths are caused by ischaemic heart disease.⁹ This dismal state is mainly due to unhealthy diet and sedentary lifestyle. Unsustainable food consumption has taken an epidemic proportion world over. Lifestyle diseases such as strokes, heart attacks, lung diseases, diabetes, cancer, etc. have become the leading causes of deaths globally. Fast food chains, applying the assembly line approach of production to food sector and using economies of scale, have become convenient alternatives to healthy home-made food. Despite all persuasions and market compulsion driven by health concerns, these giant corporations do not transparently disclose the calorific content and nutritional breakup, albeit a few exceptions. Trans-fat or partially hydrogenated fat is used profusely by these fast-food ventures that have a global appeal to local market due to innovative marketing strategies and pricing policies. Excessive consumption of food, far more than dietary needs, may not only result in diseases at an epidemic scale but also cause rapid exploitation of scarce resources, that are used as inputs in food production such as water, land, chemical fertilisers, power, etc. Ranches and farmland cost trees, forests, and habitats of wild animals. Consumerism fuelled by debt is the worst form of unsustainable consumerism as it postpones and transmits the financial burden of unsustainable levels of consumption by present generations to future generations.

c) **Inequity**

Food availability and accessibility is not universal and equal globally. A vast section of population cannot afford nutrient rich food while a \$ trillion worth of food gets wasted every year. Poor food management, distribution and transportation is the main reason behind the situation. Public distribution system is not efficient in targeting beneficiaries accurately while leakages from the system add to the financial and operational woes. This results in a peculiarly familiar situation of abundance co-existing with starvation and hunger in countries like India. Affordability, capability, and accessibility gaps need to be filled to achieve the objective of equitability as a goal with our broader goal of sustainability.

d) **Waste Disposal**

⁹ WORLD HEALTH ORGANISATION, <https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death> (last visited Oct. 21, 2022).

The volume of food waste is huge, mainly fuelled by unsustainably high levels of consumption. However, the methods and techniques of disposal of these wastes raises serious concerns. Segregation of biodegradable or food wastes and non-biodegradable wastes such as plastics or e-wastes at source is not widespread due to lack of environmental education and awareness among communities. This makes composting difficult as plastics get mixed with food wastes. If managed efficiently, food wastes may become critical resources in restoring fertility of soil in the form of organic manures. Vermicomposting is a more efficient way of composting by the aid of earthworms. Anaerobic composting is another form of composting in absence of oxygen. Municipal procedures and practices involved in handling food wastes are highly unstructured, disjointed, unplanned and inefficient in urban localities. Waste handling and disposal is an important aspect of sustainability, as SDG 11 aims at sustainable cities and communities.

e) **Animal Cruelty & Environmental Degradation**

Poultry farms with shanty sheds, improper ventilation, overcrowding with little physical space for movement, and unhygienic conditions are some of the images we deliberately choose to ignore as consumers. Industrial level slaughtering using painful and brutal procedures and tools treat animals as objects. The emphasis is entirely on volume and speed of production and not on care, living conditions, and compassionate treatment of animals. The meat that comes out from such meat processing units poses risks to human health. Animals in the wild are not safe either as demand for farmland for food production causes human encroachment into forests. Higher quantities of food for a rapidly rising population requires more land under cultivation and as ranches for animal rearing. This leads to deforestation at rates exceeding the regenerative capacity of nature. As per the Indian State of Forest Report 2021, only a fourth of India's total land area was under forest and tree cover. Only 17 states and Union Territories had the figure of 33% or more of forest and tree cover.¹⁰ Repeated and excessive use of chemical fertilisers and pesticides have degraded the fertility of soil in land under cultivation. This not only lowers productivity of cultivated land but also adds pressure on forested land of conversion for agricultural purposes.

¹⁰ PRESS INFORMATION BUREAU, <https://pib.gov.in/PressReleasePage.aspx?PRID=1789635> (last visited Oct.20, 2022).

The 7S Theory of Sustainable Consumerism

The 7S Theory of Sustainable Consumerism explains the concept of sustainable consumerism in terms of its 7 basic elements, each of which are listed and explained below. The theory is aligned with the most contemporary concerns on the issue of sustainability in consumerism. It covers issues of animal cruelty, consumer rights, lifestyle diseases, food safety, food wastage and management, waste disposal, waste recovery, food distribution and donation, and economy in food expenditure. The theory is multi-dimensional and holistic in the sense that it has economic, social, environmental, philosophical, and scientific aspects. Each component requires consumers to ask certain questions about their food consumption pattern as a form of self-introspection. The theory places consumers at the centre of sustainability concerns as their decisions and choices are the ultimate factors to achieve the goal of sustainable consumerism. The 7S of sustainable consumerism in food sector are explained below.

1S.Sensible

Sensible relates to the quality of food consumed. It concerns with being sensible and mindful about the nutritional content and hygiene of food being consumed. Consumer protection laws in most countries today entitle them to know the nutritional content in terms of ingredients or calorific content of the food they buy. For instance, The Food Safety and Standards (Packaging and Labelling) Regulations, 2011 requires all pre-packaged food products sold in India to comply with the food labelling norms. Consumers must use such remedies to inform themselves about the qualitative content of the food they eat. Knowing the nature of food one consumes is nothing but sensible consumption. Such enlightened consumer behaviour is rewarding in the long run as it brings down the risk of diseases due to unhealthy diet, leads to better nutritional intake, and thus may result in a longer and healthier life. It requires consumers to ask questions to themselves such as –

- What am I eating?
- What is the nutritional content of my food?
- Does my food provide me the needed nutrition?
- Does the consumption of the food make sense to me?

Being sensible about the food is eating nutritive food of hygienic quality. It also entails refraining from food that are deficient in nutrition, harmful to health, or unhygienic. Sensitive

choice in consumption also supports Sustainable Development Goal ('SDG') 3 that aims at good health and well-being.

Section 2(9) of the Consumer Protection Act, 2019¹¹ provides for a bundle of consumer rights. Consumer has been defined under Section 2(7) as the buyer of goods for consideration and for own non-commercial consumption and includes a user of such goods where such use has been approved by the buyer. Goods under section 2(21) specifically includes food as defined under section 3(1)(j) of the Food Safety and Standards Act, 2006.¹² The definition of food in the said act is exhaustive enough to include both, processed and unprocessed substances intended for human consumption. Even processed meat (but not live animals) is included in the definition. Consumers have a right to be informed about the quality, quantity, potency, purity, standard and price of food products they consumer to protect themselves against unfair trade practices or defective food products. Further, they have a right to be protected against marketing of food products hazardous to life and property, in addition to right to consumer awareness. Section 90 and Section 91 make manufacture, sale, storage, distribution or import of adulterated or spurious (falsely claimed to be genuine) food products punishable. A sensible consumer may bring a product liability action for compensation for any harm caused by any defective food products against the manufacturer or service providers. Thus, the Consumer Protection Act, 2019 lays down an exhaustive consumer rights and remedy regime that promotes sensibility in food consumption.

2S. Sensitive

It means being sensitive to the needs of other creatures and consuming in a manner that does not threaten the habitats of other animals. Animals should be treated with care and kept hygienically by those engaged in animal husbandry or associated with meat industry. The manner and means adopted in slaughtering of animals should cause least pain. Rare and exotic species of animals should not be consumed, as it risks their extinction. Wild animals should also be left undisturbed in their habitats as consuming them may give rise to COVID 19 like pandemics. The food that we grow requires cultivable land, ranches, fodder, water, power, and other renewable and non-renewable resources. The population pressure on land is high in our times and any addition to farmland will only come at the cost of forested land. Such diversion of land resource usage threatens wildlife and their habitats. The same is true about meat industry and animal husbandry. Therefore, being rational about the quantity of food consumed

¹¹ Consumer Protection Act, 2019, No. 35, Acts of Parliament, 2019 (India).

¹² Food Safety and Standards Act, 2006, No. 34, Acts of Parliament, 2006 (India).

and minimising the wastage is being sensitive as it minimises diversion of land usage pattern, deforestation, and loss of habitat of wild beings. Sensitivity about habitats and needs of other creatures and concern for environment and forests is thus an important component of sustainable consumerism. Sensitive consumption of food supports SDG 15 that aims at sustainability in the use of terrestrial ecosystems and forest management, and prevention of loss of biodiversity and land degradation and desertification. The questions that consumers may ask themselves at this stage includes –

- Am I being insensitive to other animals and their habitats?
- Is my consumption pattern insensitive to environment in any manner?
- Are the animals that I consume reared in a sensitive manner? Are they kept at hygienic places and treated with care and compassion?

The Prevention of Cruelty to Animals Act, 1960¹³ is the law that prevents infliction of unnecessary pain or suffering on animals and encapsulates the idea of ‘Sensitive’ as explained above. Section 2(a) defines animals as any living creatures other than human being. Section 11 prohibits and penalises cruel treatment of animals. Cruelty to animals could include treatments such as confining any animal in cage or receptacle of insufficient measure without permitting reasonable opportunity for movement. Similarly, keeping any animal chained by an unreasonably short or heavy cord for an unreasonable time; failure to provide sufficient food, drink, or shelter to any owned animals; offering for sale or possessing any animals suffering pain by reason of mutilation, starvation, thirst, or overcrowding; or ill-treatment, killing or mutilating of animals in any unnecessarily cruel manner also amounts to cruel treatment of animals.

Sensitive aspect of sustainability has been championed by the Indian judiciary time and again. In *G. R. Simon and Others etc. v. Union of India*, the Delhi High Court held that wildlife is our cultural heritage and an asset to be persevered for the future generations. It rejected the contention of the petitioner that certain animals (in this case Jackal and Snakes) are detrimental to human life. Every animal has a role to play in retaining the ecological balance.¹⁴

3S. Shared

¹³ The Prevention of Cruelty to Animals Act, 1960, No. 59, Acts of Parliament, 1960 (India).

¹⁴ *G.R. Simon vs Union of India*, AIR 1997 Delhi 301.

‘Vasudhaiva Kutumbakam’ is the ancient Indian belief that has its origin in Maha Upanishad and it means that the world is one family. Equity in consumption and distribution of food is a critical aspect of sustainable consumerism. ‘Shared’ means consumption that takes care of the needs of the hungry and the starved in the vicinity. A situation where one household consumes many times more than the recommended calorific requirement and another in the neighbourhood struggling to touch that threshold is not sustainable at all. This is because the former household would suffer from lifestyle diseases such as diabetes, obesity, strokes, etc. if such consumption pattern is prolonged, while the later one would struggle against malnutrition and starvation perpetually. Inequity perpetuates poverty, malnutrition, inequality, crimes, misery, etc. A win-win situation would be sharing of surplus by those having excess food with those who are deficient in food. A rational consumption that is mindful about the quantity and wastage also indirectly contributes to equity. Food more than the nutritional requirement may cause diseases or obesity. Such surplus food may either get spoilt, if not consumed. The best alternative is sharing it with others in need of it, as it saves our costs in health remediation against lifestyle diseases in future and prevents food from getting spoilt. Public Distribution System (‘PDS’) should also make sure that no one is left out of the subsidy net while the food is rotting in the silos. Prudent management of food resources and distribution of surplus food at affordable cost by governments is also an aspect of ‘Shared’. Sharing food also supports SDG 10, and 1 that aim at reducing inequalities and eliminating poverty, respectively. SDG 2 which aims at ending hunger, achieving food security, and improved nutrition, also gets realised if sharing food becomes part of our consumption culture. Consumers need to ask the following questions to themselves at this stage –

- Is anyone hungry, starving or suffering from malnutrition in my neighbourhood?
- Do I’ve surplus food with me that may get spoilt if not consumed?
- Am I sharing my food with those in need in my vicinity?
- How and with whom can I share my surplus food with?

Section 2(9) of the Consumer Protection Act, 2019 provides consumers the right to assured access to a variety of food products and services at competitive prices. Assured access and competitive prices are the keywords. Thus, accessibility and affordability are two most important goals of securing consumer rights and welfare and the idea is central to the concept of ‘Shared’ in food distribution.

4S. Sufficiency

‘Sufficiency’ emphasises on quantity of food being consumed. Sufficient quantity and composition of food may differ for different individuals, depending upon factors such as height, weight, age, gender, and occupation. For instance, those involved in physical labour may require a heavier and a different kind of diet than those involved in mental labour. Physical labour may require energy giving and muscle building nutrients such as protein, carbohydrates, and fat in larger proportions of the diet while mental labour may require food rich in vitamins and minerals. Food in excess of the nutritional requirements of body or with disproportionate composition of nutrients may cause diseases and obesity. Storing food in excess of needs may result in wastage. Unsustainably high levels of consumption add to out-of-pocket expenses on health in future. Spoilt food results in lost resources such as water, fertilisers, fodder feeds, etc. tied to the wasted food. A balanced diet is the key. A balanced diet leads to optimum Body Mass Index (‘BMI’) due to optimum quantity and composition of nutrients. Optimum BMI leads to a healthy life, savings on health, and minimises diversion of forest and wildlife habitats. Consumers may ask the following relevant questions to themselves at this level –

- What quantity and composition of food is sufficient for my needs, having regards to my physique, age, gender, and occupation?
- Am I eating food in quantity more than sufficient for my sustenance?

5S. Spirituality

Spirituality means consumption of food that nourishes the soul and not just the body. The food which is guilt-free, hygienic, and that goes beyond just material considerations, such as taste, is spiritual. The Bhagwat Gita, the ancient Indian ocean of wisdom, classifies food in three categories, namely, Sattvik, Tamasik, and Rajasik. Rajasik food is energy rich diet and primarily nourishes the body rather than the mind or soul. Tamasik food is the one that is harmful to the body in long-run and causes lethargy and indolence. Sattvik is the kind of diet that feeds the spirit or soul primarily while sustaining the body. Its neither too hot nor too cold and respects seasonality. Its not too spicy or oily nor too heavy and is ideal diet for those engaged in mental labour or intellectual pursuits that requires least energy. Bhagwat Gita’s Sattvik food could be traced to a diet consisting of fruits, vegetables, staple crops, and seeds. We refer to such natural diet today as ‘falahaar’ or a fruit diet. ‘Spirituality’ as a concept includes Bhagwat Gita’s Sattvik diet but is not limited to it. Spirituality also means eating in quantities that are adequate to support the body and not excessively. Taste or sense gratification should not be the only factor for choice of a diet. It requires control over senses or taste buds

to choose nutritive food, wisely and rationally. Emphasis is on nutritional content and enrichment of the soul and mind. Any food that harms the body or is in excess of the requirements of body, or that causes guilt, or which is stale or unhygienic, is not spiritual. At this stage, consumers may ask themselves the following questions –

- Does my food enrich my soul or mind?
- Does my food cause anger, indolence, lethargy, restlessness or harms my body in any manner?
- Do I choose my food purely based on taste, regardless of nutritional content or requirements of my body?

6S. Salvage

‘Salvage’ relates to waste handling in food sector. It’s the equivalent of the 3Rs (Reduce, recycle, and reuse) in food sector. Food wastage should be reduced and minimised as resources have been spent on their production. Edible food should be recovered or salvaged out of wasted food to the extent possible. Food cannot be reused once spoilt as it may lead to serious health issues. However, efforts should be made to reduce wastage and maximise edibility. Food saved is food produced. Salvage may involve refrigeration, cold storage, heating, pasteurisation, sorting, and other such techniques and treatments that help preserve and prolong edibility of food. Judicious use of food is the key, as food is also a vital resource of the nation. Salvage also deals with the manner in which food waste is disposed off. Waste disposal must make sure that non-biodegradable wastes such as plastics be segregated from the bio-degradable ones such as food. This allows for recycling of the waste in the form of manures to provide fertility and nutrition to the soil. Consumers may ask the following key questions at this level –

- How can I reduce food wastage?
- How to preserve and prolongate the edibility of my food?
- Can I salvage any amount of edible food from the food not consumed or wasted?
- Do I segregate non-biodegradable wastes from my food waste before disposal?

7S. Savings

Savings relate to economy in food consumption. Cost of food consumption should not be unreasonably high. Food is just one of the several components of our consumption basket and

thus expenses on food should not be disproportionate relative to other important elements of consumption such as health, education, leisure, housing, clothing, etc. Excessive spending on food relative to the biological needs may lead to high rates of indebtedness or financial ruin in addition to lifestyle diseases. Prudence and economy in food spending brings multiple benefits such as financial savings, better health, environmental sustainability. Reasonable spending on food consumption results in a more equitable availability of food and lesser exclusion. At this stage, consumers may ask the following questions to themselves –

- What proportion of my disposable income is spent on food?
- Do I spend excessively on food?
- How can I bring down my food expenditure to a rational level, keeping in mind my nutritional needs?

Recommendations

Following are some recommendations that could be made to promote sustainable consumerism in food sector based on the 7S Theory of Sustainable Consumerism –

- Labelling regulations currently cover only pre-packaged food products. Laws need to be enacted/amended to make it mandatory for restaurants and food chains to transparently and proactively disclose the nutritional content of different items of food displayed in their menu. Periodical inspection and testing of the disclosed nutritional information should be provisioned in such legislation. The objective is to uphold the right of consumers to be informed about the food they consume.
- Awareness should be created at mass scale on the optimum Body Mass Index ('BMI') and its interpretation relative to body measures. Health stalls could be installed at public places with appropriate machinery tools to measure BMI, visceral fat, muscle mass, and other indicators of fitness level and health risks. Health counsellors and dieticians could be attached to such stalls to provide personalised dietary or nutritional information for a balanced diet that upholds sufficiency and sensibility in food consumption.
- Decentralised food stalls should be installed at equidistant locations across cities and towns to cater to the nutritional needs of those facing affordability, accessibility, and capability gaps in food consumption. Such stalls may source their material requirements from those willing to share their surplus food stocks. Weddings and banquet halls,

religious and philanthropic organisations, NGOs, universities, etc. too could contribute to the running of such stalls by contributing materials, men, and money.

- Animal cruelty must stop. Those engaged in meat processing and slaughtering should be mandated to devise an Standard Operating Procedure ('SOP') for every stage of their processes such as rearing, breeding, sheltering, vaccination, sanitization, feeding, veterinary support, slaughtering procedures and mechanism, and hygiene practices. Regular inspection after initial approval of the SOP should be carried out to make sure that actual practices comply with the proposed ones.
- Education and awareness should be created in students of schools, universities and among adults about the significance of sustainable consumerism and the harmful effects of unsustainable consumption of food. Risk of obesity, cardio-vascular diseases, cancer, respiratory diseases, etc. should be highlighted through such campaigns while projecting 7S of sustainable consumerism as the ideal solution.

Conclusion

The 7S Theory on Sustainable Consumption on Food Sector is aimed at fostering a culture of sustainability in our consumption pattern and behaviour, consistent with the aims of SDG 12 on responsible and sustainable consumption. The idea may seem like a utopia or too idealistic. But that does not make it less worthy of adoption and execution. Every idea in the beginning seems to be utopian. For instance, Ozone layer depletion was a serious threat to environment in 1980s. The ideals proposed in the Montreal Protocol of 1987 on protection of Ozone layer seemed utopian and impossible to execute at the time. National Oceanic and Atmospheric Administration (NOAA) in august 2022 announced that the levels of Ozone Depleting Substances (ODS) in 2022 are back to those observed in 1980. It took us nearly 40 years to achieve that milestone but we eventually did it. Our resolve and commitment to environmental remediation prevailed over our fears, doubts, and pessimism. Today, resource consumption sustainability is one of the most pressing environmental issues. And we need the same level of resolve, enthusiasm, and sincerity, as witnessed in Montreal Protocol, to resolve it. The 7S Theory of Sustainable Consumerism in Food Sector is a small but significant step towards inculcating environmental sensitivity and sustainability in food consumption, as part of the global sustainability movement. The road of sustainable consumption is long and tough and the theory only lays down a roadmap. Ultimately, it is for consumers themselves to walk the talk.

MARINE SPATIAL PLANNING: A PLAUSIBLE AND SUSTAINABLE LEGAL SOLUTION TO INTERNATIONAL TERRITORIAL DISPUTES AND FISH WARS

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Abstract

The contemporary relevancy of Hugo Grotius' Paradigm routed in the foundational principles of the law of the sea has resulted in escalating ecological degradation demanding a conversation on the status quo of the United Nations Convention on the Law of the Sea in regards with its applicability and jurisdictional framework. China's incursions on the territorial limits of its South- East Asian counterparts catapulting into so called fish-wars highlights the chasm that international law of sea has failed to abridge even after infamous 'cod wars'. The intersection of economic pursuits of Natural resources coupled with fish harvesting motivated by unsettled political disputes over ambiguous territories pose a serious limitation on UNCLOS and other relevant law pertaining to the governance of sea. With China's domestic waters exhausted due to unbridled exploitation and lapse of legal framework to regulate the same; it has now taken to explore and claim sovereignty over undefined maritime territories (Diaoyu islands) contested by Japan, Vietnam and South Korea. The said circumstances are insinuating of danger to the "concept of the Common heritage of Mankind"; as china is not isolated in its attempts. One has to carefully tread and craft a line of distinction between sustainable development and exclusive exploitation which can be made possible by Global Ocean Governance facilitated by 'Marine Spatial Planning' based on principle of equity; a well formulated, flexible and transparent legal tool to adjudicate legal dilemmas with primary focus on Marine conservation. MSP can be catalyst in mitigating if not eliminating the chasm in law of the sea establishing an interaction link between ocean users in pursuance of environmental preservation and sustainable development policies. The law of the sea affirms formulation of a global legal framework; with the Spirit of MSP routed in the UNCLOS defined directives of marine environment and aquaculture preservation can bolster international law.

Keywords: Maritime Territories, Marine Spatial Planning, Hugo Grotius, Unclos, Cod Wars

Introduction

Southeast Asia is home to some of the most diverse and productive coastal waters in the world. As a result, they are sites of huge importance from economic and environmental security

perspective and should be a conservation priority at international stage. Population explosion, increase in food demand, varied levels of economic growth, overuse of resources and technological change is placing undue burden on these marine resources. These waters are now in turmoil due to conflict and social unrest, posing danger to both security as well as marine sustainability.

Fish constitutes primary source of income generation and dietary protein for many Southeast Asians; more than any other region in the world. It is now universally acclaimed that South Asian coastal fisheries are overused; one of the primary reason being excess capacity. This has resulted into depletion in fish stocks and other resources at varied levels. With increase in Population adding pressure to already over fished fisheries events will turn for worse unless an effective remedial plan is undertaken. Sugiyama states that “Based on current trends, production from capture fisheries in the Asia-Pacific region will decline over the next 10–20 years unless excess capacity and fishing effort is greatly reduced.” Increase in conflict, impoverishment of fisheries, economic losses, lower productivity and loss of food security in communities primarily dependant on fish stocks for wages, protein and livelihood are some of the repercussion plaguing international stage due to overfishing.

Formulation of a policy for marine conversation and effective governance routed in ground reality is one of the contemporary challenges facing the decision makers. However, The identification of such policy which can stand test of both; long- term environment sustainability and economic feasibility is yet to be elucidated. Devising a solution to this conundrum forms the central goal of the paper. This paper aims to elaborate on the solutions put forward in this regard and how marine spatial planning can provide a way out this conundrum.

Fish Wars

Conflict over the access to resources has been documented many times over the course of history. Although wars routed in religious, political and territorial disputes are more well known; conflicts over fishing rights and resources aren't scarce in World History. Ever since the formulation of Exclusive Economic Zones in the 1970s, there is an increase in the frequency of such wars. As establishment of EEZ led to demarcation of access to ocean resources; restricting the areas earlier treaded by foreign fishing vessel resulting in conflict of interest. Maritime treaties, diplomatic negotiations (such as between African and European countries) and redressal by international courts have often came as relief amidst rising tensions.

This has not prevented fights from breaking out (such as between Cambodia and Vietnam and China and Philippines) over access to Territorial waters. This has led to boats from other countries and migrant fisherman being Imprisoned or expelled out by taking resort to force. Indonesian fishers are taken into prison as consequence of illegal fishing in Australian waters; with numbers ramping up-to thousands. While sovereignty issues over undefined maritime boundaries are at the roots of such conflicts, access to fish stocks and other resources also constitutes leading cause. Such conflicts are not circumscribed within the boundaries of high sea but also occur in the regions coastal waters. For example, conflicts due to difference in technologies such as between those who use passive fishing equipment like long lines, hand and gill nets (used by small farmers) and those who use “trawls and purse seine nets” (used by comparatively well off farmers). This is partly due to the fact that equipment used by small farmers often get caught and carried off by trawlers used by industrial farmers.

Modern fishing vessels employing high technology for commercial fish processing, vacuum and monopolize resources taking hold of all marine life rendering small scale local farmers vulnerable. Moreover; it is not hidden that more often than not “industrial fishing operations” operate unlawfully within a country’s maritime boundary and soon the differences ultimately culminates into conflict with small scale farmers on one side and industrial on another. Such competition has been reported to be turned violent in areas of Philippines and Thailand.

Overfishing leads to vociferous repercussions with increased pressure on south Asian waters resulting in collapse of fisheries and Increase in conflicts.

The toxic cycle

A cycle is formulated in the above-mentioned circumstances where sudden increase in population coupled with few economic opportunities increases the dependency on fishing as the primary source of livelihood. Such increase puts pressure on the available stock and leads to decline in fish population and increase in competition on both front inside the local community as well as the global one. The effects spiral down to low food and income security, decline in living standard and overall national welfare. These factors only aggravate already over-crowded competition and thus higher chances of conflict concerning the fish stock. This complex and negative feedback cycle follows a design of “self-reinforcing fish-wars” embedded with sociocultural and environmental perils.

Due to this even the most diverse and biologically productive ecosystems are being dragged into the never ending conflict and have to face serious consequences of ever increasing social

tensions. Unrestrained use of modern state of art equipment serves only to further aggravate the situation and widens the gap between economically disadvantaged and well-off in regards of their access to stock. Such conflicts are being increasingly reported to turn violent with increased global competition and demand. The need to align the demands of improving the ecological sustainability of fisheries consumption with the need to maintain and improve food security has been acknowledged by the global community. Same was one of the priority outcomes of 2002 World summit on sustainable development¹.

Devising solutions in a pragmatic institutional arrangements

While devising a solution to bring this cycle to an end; sustainability should be the primary idea if the conflicts are to be reduced. The idea of a novel public policy or better governance to counter this menace of conflict over fish resources by making pragmatic institutional arrangements for access, use, and ownership of the same is at the heart of many solutions advanced. Law and policymakers thus need to look for effective strategies if the conflict is to be contained. One such was the institution of national fisheries management plans by a centralized management agency and seeking scientific advice over the judicious utilization of stock.

Some of the management experience about the effect of implementation of the above said idea has been mostly negative² while an another approach focused on collaborative effort of the community shows some potential for limiting conflicts³ and hope for sustainability and food security. Such collaboration on the part of the global world can be fundamental in achieving the desired outcome of sustainability and preservation of fisheries.

For instance in San Salvador island in the Philippines, Conflict between local fishing community and new migrant one using traditional and modern fishing gear respectively was resolved under co-management arrangement⁴. Co-management is becoming an instrumental tool in effective governance and policy implementation. It is being successfully being accommodated in alternative fisheries management policy in countries such as Indonesia,

¹ United Nations. Report of the World Summit on Sustainable Development, Resolution II, § 30, 2002.

² Pomeroy RS, Viswanathan K. Fisheries co-management developments in Southeast Asia and Bangladesh. In: Wilson DG, RaakjaerNielsen J, Degnbol P, editors. The fisheries co-management experience: accomplishments, challenges and prospects. Dordrecht, The Netherlands: Kluwer Academic Publishers; 2003.

³ Tawake A, Parks JE, Radikedike P, Aalbersberg W, Vuki V, Salafsky N. Harvesting clams and data: involving local communities in implementing and monitoring a marine protected area. *Conservation Biology in Practice* 2001;2(4):32–5.

⁴ Berkes F, Mahon R, Pollnac R, Pomeroy R. *Managing small-scale fisheries: alternative directions and methods*. Ottawa: International Development Research Center; 2001.

Thailand, Philippines and Vietnam. A pre-requisite to such policy is a close collaboration between Government and local stakeholders. As Bennett et al. States “In so far as such an arrangement can strengthen the links between those that use the resource and those that manage or control the resource, comanagement of some form may be the best long-term solution to conflict management. Where co-management is able to redistribute power and responsibility in the fishery, potential conflicts related to power relations and allocation of resources might be mitigated.”⁵ If instituted effectively it can prove to be pivotal in resolving marine resource conflict. It can serve as a pragmatic and effective management tool for coastal nations dealing with conflicts regarding marine resource.

Marine Spatial Planning: An effective way out

Resolving the issues of ocean, its preservation and judicious use of the marine resources needs collaboration and cooperation at regional, national and global level. Marine spatial planning is an pivotal tool for sustainable marine governance; transparent, well-formulated and flexible instruments of marine sustainable governance are important in reaching holistic development goals aiming at better regulation and preservation of the global ocean.

“Global ocean governance” is a multidimensional and dynamic concept taking in to account management on economic, social and legal fronts⁶. Ocean governance is a concept focused on addressing pertinent issues concerning world ocean. MSP is a pragmatic way to formulate and enforce rational framework in the use of marine space. It is pivotal to bolster the link between ocean users to establish a firm reach to the goals of environmental preservation and sustainable development along with socioeconomic factors as well. The law of the sea affirms formulation of an International legal regime best suited to address the issues of international cognizance; although at the same time it will be challenging to institute the same due to decentralized nature of the public law system.

In the study of international public law the law of the sea is one of its earliest areas that governs the use of World ocean and its resources. Hugo Grotius - “the father of the Law of Nations”- has significantly influenced the principles of the the law of sea. Hugo Grotius’ paradigm (as

⁵ Bennett E, Neiland A, Anamg A, Bannerman P, Rahman AA, Huq S, et al. “Towards a better understanding of conflict management in tropical fisheries: evidence from Ghana, Bangladesh and the Caribbean”. ;25:365–76.

⁶ Friedheim, R. “ Designing the Ocean Policy Future: An Essay on How I Am Going To Do That”, “Ocean Development & International Law”, pp. 183–195.

mentioned in his work *mare liberium*) is still relevant today and confirms the fundamental foundations of the law of the sea-

(1) Coastal states have jurisdiction over their marine spaces and (2) the resources beyond that aren't limited to any particular state but open to all.

UNCLOS are rules and norms governing the use of ocean including marine resources and overseeing the fulfillment of duties and rights of states with maritime boundaries. The preamble to UNCLOS which stipulates that "the problems of ocean space are closely interrelated and need to be considered as a whole" implies the idea of ecological unity of world ocean. This acknowledgement is pivotal for MSP specifically in joint and interacting areas of Areas Beyond National Jurisdiction and Exclusive Economic Zones. The organization of marine space is a plausible and pragmatic advancement of the formulation of duties and use of rights granted under UNCLOS as well as an effective tool in helping the nation parties with their international obligations concerning use of marine space.

MSP was the main focus of international meeting held in 2007 organized by IOC (of UNESCO). Inclusion of MSP in policy formulation adds an holistic, future oriented and consistent decision-making touch to the process concerning the use of sea by humans. There are two doubts to be addressed concerning the issue of integrated management, First, selection of elements to be integrated and second, International law's framework and expanse to which this process can be supported by it. Though there is no clearly stipulated definition of integrated management in the main goal of the said approach is to devise effective solutions to pertinent problems of the sea and its resources. Axiological, normative and functional are the three level at which integration is an essential deciding criterion to address the issues concerning world ocean. The need at first stage is clearly visible through moral obligation and the growth of "preventive responsibility for marine and normative protection"⁷. IOC (of UNESCO) defines MSP as "a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that are usually specified through a political process"⁸. MSP aims to align the diverse groups of entities and their interest with the common goal of sustainability. The difficult legal framework of marine areas, the varieties of and consequences of human activities in the ocean space such as

⁷ Harrison, J. (2011). "Making the Law of the Sea, A Study in the Development of International Law" (pp. 238, 257-258). Cambridge.

⁸ Ehler, C., & Douvère, F. (2009). *Marine Spatial Planning: A Step-by Step Approach Towards Ecosystem-based Management*. Manual and Guides No 153 ICAM Dossier No 6. Paris: Intergovernmental Oceanographic Commission UNESCO IOC, 99 pp.

overfishing, measure of protection and other factors constitute a complex web which can be solved by effective planning.

Many states across the globe has already started process to equip their domestic law with instruments that are used to govern maritime space, to achieve the international obligation of environmental conservation stipulated in Article 192 of UNCLOS. MSP as a tool of maritime policy can do wonders for the problems of fish wars and others issues affecting the sustainability of marine life. In Baltic sea region, the common norms of MSP are developed as such that they include holistic, ecological and sustainable management⁹. Maritime management is primarily focuses on two areas legal and institutional one. The legal aspect focuses on normative and substantial dimensions of law while institutional is primarily concerned with executive level covering governmental and non-governmental organizations carrying out activities directed at environmental management. It is an multidimensional process ranging from planning to executive management practices. The ecosystem approach and precautionary principle seems to determine the present framework for MSP.

Coastal areas have critical role to play to achieve desired result of lowering the conflict and increasing the sustainability. All International law entities should cooperate in the pursuance of common goal of environmental protection. Building awareness in the local community by explaining the importance of ocean on people's life and the ravages of over exploitation of marine resources would could prove to bring change from ground level. The designed MSP framework should include surveillance instruments to maintain scrutiny on the practice of overfishing which are the leading cause of Fish wars. To attain these objectives data and statistics on the use of sea is required. MSP process should meet international norms; while international laws should also be accommodating to new specialized solutions to modern problems.

The problem of fishwars can be solved by MSP by incorporating within three main ideas of first; an effective global management system to determine sovereignty claims and to designate an critical area of common heritage to mankind as of critical importance to avoid conflicts and preserve marine life and resources. Second, global management system should be followed through by a regional one to maintain transparency in administration and effectiveness in execution of the policy and lastly third, active actions should be taken by the nations themselves to formulate policies in consonance with international law to reduce conflict. MSP

⁹ Zaucha, J. (2014). "Sea Basin Maritime Spatial Planning: A Case Study of the Baltic Sea Region and Poland". *Marine Policy*, 50, 34–45.

can also stipulation the possible use of marine resources and their rational distribution to keep check on over-exploitation and maintain principle of equity.

Conclusion

An integrated approach focused on maritime affairs of global and regional level seems to be the necessity of time as China along with other nations engages in fishwars. Moreover; the issue of sustainability and preservation of marine life and resources are plaguing concerns ever since. Marine Spatial planning shows potential which focusing on collaborative effort on global and regional level with effective institutional and legal measures shows hope for an effective solution in the long- run. The introduction of such instruments for the management of the marine space has shed light on new arena in international law. The issues such as fishwars and over exploitation of resources are constantly plaguing the ocean space which calls for better formulated and contemporary relevant policies in order to devise a long term, rational administration of marine resources in a sustainable manner and avoid conflicts on these resources.

MSP is a dynamic process aiming to reduce ever increasing conflict over marine resources threatening environment sustainability and economic feasibility. It should be based on multidimensionality and inter dependencies of interactions in the marine environment and the focus should be on to devising a successful regulatory framework focused on navigating the conflict by establishing checkpoints at various levels. Fish wars are majorly centered around ambitious maritime boundaries and thirst for more resources; both can be successfully tackled with collaborative effort and well framed policies; MSP is one such steps towards achieving that.

UNTYING A GORDIAN KNOT: PARADOX OF BIO-MEDICAL WASTE MANAGEMENT AND LEGAL COMPLIANCE IN INDIA

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Abstract

Every healthcare institution produces biomedical waste material while diagnosing and treating patients who are either humans or animals. This waste might be in a solid or liquid form such as microbiological and biological waste, abandoned medications and cytotoxic pharmaceuticals, soiled trash, solid waste, liquid waste produced from any infected regions, animal waste, human anatomical waste, incinerator ash, chemical waste, waste sharp etc. All such waste products are inherently harmful and needs proper management and disposal. Accordingly, the management of biomedical waste involves the four fundamental phases: i) generation of waste; ii) segregation; iii) collection & storage of waste; and iv) treatment & disposal. It has been the recommended practice that before disposing of the biomedical waste, the healthcare institutions must disinfect all the effluent as needed. The mismanagement of such waste has an immediate negative impact on the environment, humans & other species. On recurring basis, the medical clinics and healthcare facilities all across the world create a reasonably large amount of potentially toxic and enticing garbage. In this regard, majority of the developed nations have lately adopted the technologically advanced practice to neutralize the toxicity & dumping the waste in designated areas. Whereas, in underdeveloped nations such as India, bio-medical waste (BMW) is usually thrown in open areas, largely due to the lack of awareness, suitable infrastructure, funds and execution of national standards for waste disposal. This paper attempts to ponder on the nuances of biomedical waste management, its effects on an environment and legal infrastructure dealing with the concerns pertaining to disposal of biomedical waste, status of compliance of these provisions in some states and eventually recommending the innovative techniques and best practices which can be uniformly adopted by every state for increasing the efficacy of waste management.

Keywords: Biomedical Waste, Environmental Protection, Healthcare Management, Healthcare institutions

Introduction

Medical treatment is essential for sustaining life, but it also leads to production of lot of waste that is perilous to both the environment and living beings. Clinics and hospitals produce a variety of trash, including cotton, syringes, needles, gloves, liquid waste, expired medications, etc. Accordingly, bio-medical waste, often known as hospital waste, is the waste generated throughout the process of conducting tests; treating humans and animals; also, in research activities related to it. For the reason that it is contagious, biomedical waste seemingly is harmful to the people, other species and the environment. When compared to any other garbage, bio-medical waste is particularly more harmful in nature and differs from household or industrial waste. Hospitals, laboratories, clinics, dental clinics, laboratories, veterinary clinics, medical and bio research centres, etc. are the common producers of biological waste.¹ The "*Bio-medical Waste (Management and Handling) Rules, 1998*"—which were first declared on July 20, 1998—have been created by the federal government of India and have been revised in 2016 to reflect all the most recent modifications. This Rule establishes universal standards and a code of conduct for the whole country. It enlisted various kinds of bio-medical wastes² including human and animal anatomical waste, biotechnology and microbiology waste, waste sharps, including shattered glass, scalpels, syringes, and hypodermic needles, discarded medicines and Cyto-Toxic Drugs, solid waste, such as disposable goods like tubes, catheters, etc., excluding sharps, soiled waste, such as dressing, bandages, plaster casts, and material tainted with blood, etc.³ In reference to this, various scientists, researchers, NGOs, and environmental protection activists has pressed upon the legislators to implement adequate regulations for the treatment of bio-medical waste since they acknowledged through data & research that human actions and behaviours were seriously harming the environment and our sustainable development goals.⁴ While, the environmental concerns have existed for a very long time, but historical legal systems mandated that the environment be protected from danger wherever it was required. Earlier, there was no clear legislative directive to regulate bio-medical wastes. Whereas, in this technology advanced era, we have reached to the point where we cannot discard the implication of the hazardous waste generated by the healthcare

¹ Capoor, M., & Bhowmik, K. (2017). Implementation challenges in bio-medical waste management rules, 2016. *Indian Journal of Medical Microbiology*, 35(4).

² See The Bio-Medical Waste Management Rules, 2016, schedule I.

³ See, World Health Organization (WHO). (2013). Wastes from health-care activities. Factsheet No. 253, November 2011.

⁴ Parida, A., Capoor, M. R., & Bhowmik, K. T. (2019). Knowledge, attitude, and practices of Bio-medical Waste Management rules, 2016; Bio-medical Waste Management (amendment) rules, 2018; and Solid Waste Rules, 2016, among health-care workers in a tertiary care setup. *Journal of laboratory physicians*, 11(04), 292-296.

institutions. Scientists and researchers are now attempting to find safe disposal and management solutions for the numerous issues related to bio-medical waste that have repeatedly arisen. It is evident that the relationship between the environment and people varies across time and geographically. This conjecture is justified & applicable to the guiding philosophy of environmental conservation India as well, the Indian Constitution was not ecologically conscious until 1976, and environmental protection in India did not begin until 1972, the year following the Stockholm Conference.

Historical References on Environmental Protection in India

India's ancient history has a tight and immediate connection to the environment. Gautam Buddha, an environmentalist, and humanitarian attained enlightenment by squatting down beneath a Bodhi tree & pronounced the core tenets of human values are nonviolence and simplicity. Thereby, the principles of simplicity teach us that we shouldn't trample on the environment which in essence solidifies the doctrine for encouraging the respect for the environment. The inferences of Buddhism consider people, trees, and forests to be inextricably linked while only the tree may be used to obtain food and shelter. In addition to this, Jainism forbids the animal sacrifice during festivals. It precludes confinement, abuse, overcrowding, and denying animals sufficient access to food and water. Jainism also promotes environmental harmony and aids in protecting and maintaining nature from harm. The person tends to neglect their own unique presence, according to Lord Mahavira Swami, if they dismiss or deny the existence and presence of the earth, fire, air, water, and plants.⁵

Whereas the Kautilya's Arthashastra also stipulated the below-mentioned penalties for citizens who disregarded hygienic standards: 1/8th of a pana (the silver punch-marked currency introduced by the Mauryan Dynasty, which included the pana) will be fined for dumping dirt on the pavement, and one quarter of a pana will be fined for obstruction with mud or water. (2.36.26). If dirt is dumped on a royal highway street, the fee is doubled. (2.36.27). If someone is caught exploiting a reservoir as a urinal, they will be fined 1 pana, as a latrine, 2 panas; if they are caught urinating at a temple, they will be fined one and one half pana, as a latrine, 3 panas; and if they are caught urinating at a royal building, they will be fined 2 pana, as a latrine, 4 panas. (2.36.28). The fine for throwing dead animals inside the city limits, such as cows, dogs, and cats, is 3 panas; for other animals, such as donkeys, camels, mules, horses, or cattle,

⁵ Francis, E. (2012). *King, Governance, and Law in Ancient India: Kautilya's Arthashastra*, A New Annotated Translation.

the fine is 6 panas; and for human corpses, the fine is 50 panas. (2.36.30) It was declared a crime since it unquestionably harms society's ecosystems and habitats.⁶

Inferences from Modern History

During the colonisation period, Britishers left their mark on the legal and administrative system of India. While, during their power stint in India, numerous destructions of natural resources were initiated as they had little sympathy for the need to preserve the forests. However, to control pollution of the water, air, and wildlife in India, the British government passed a number of different legislations. One of the earliest laws pertaining to water pollution was the *Shore Nuisance (Bombay & Kolaba) Act, 1853 (Act No. 11 of 1853)* among them. Act 5 of 1857, the *Oriental Gas Company Act*, was passed to control the pollution emitted by Oriental Gas Company. The Indian Penal Code, 1860 was the second law to be passed (Act No. 45 of 1860). As stated in *Section 268 of the Indian Penal Code, 1860*, "if any act which causes any common injury, danger, or annoyance to the public or to the people in general then the act may be treated as public nuisance then the offender shall be punishable under Secs. 290 or 291 of the Indian Penal Code," there shall be punishment for environmental polluters. Similarly, "if a person conducts any work unlawfully or carelessly that he knows or has cause to think would likely spread infection of any disease harmful to life, may be penalised under Sec. 269 of the Indian Penal Code."

Additionally, there are also criminal penalties under circumstances that result in the loss of value or usability of any property, as stated in several Sections of the Indian Penal Code, 1860, such as Sections 426, 430, 431, and 432.⁷ This suggests that anybody in violation of the

⁶ Kangle, R. P. (1986). *The kautiliya arthasastra* (No. 1-3). Motilal Banarsidass Publ..

⁷ Indian Penal Code, 1860 (Act 45 of 1860) ss. 426, 430, 431, 432

Section 426. Punishment for mischief.—Whoever commits mischief shall be punished with imprisonment of either description for a term which may extend to three months, or with fine, or with both.

Section 430. Mischief by injury to works of irrigation or by wrongfully diverting water.—Whoever commits mischief by doing any act which causes, or which he knows to be likely to cause, a diminution of the supply of water for agricultural purposes, or for food or drink for human beings or for animals which are property, or for cleanliness or for carrying on any manufacture, shall be punished with imprisonment of either description for a term which may extend to five years, or with fine, or with both.

Section 431. Mischief by injury to public road, bridge, river or channel.—Whoever commits mischief by doing any act which renders or which he knows to be likely to render any public road, bridge, navigable river or navigable channel, natural or artificial, impassable or less safe for travelling or conveying property, shall be punished with imprisonment of either description for a term which may extend to five years, or with fine, or with both.

Section 432. Mischief by causing inundation or obstruction to public drainage attended with damage.—Whoever commits mischief by doing any act which causes or which he knows to be likely to cause an inundation or an obstruction to any public drainage attended with injury or damage,

aforementioned requirements if they produce, collect, receive, store, transport, treat, dispose of, or handle bio-medical waste in any way. Additionally, this Penal Code lays out penalties for certain forms of pollution that do not already have a deterrent impact on society. Whereas the Police Act of 1861 (Act 05 of 1861) also prohibits and regulates the slaughter of animals, the washing of carcasses, and the dumping of filth in public places and it also specifies penalties as the form of retribution for violators. Further, the Indian Easement Act of 1882 provided protection for riparian landowners from undue upstream user pollution. The Indian Fisheries Act of 1897 also lists the penalties for violators who pollute the water to kill fish. Besides this, the Bengal Smoke Nuisance Act of 1905 and the Bombay Smoke Nuisance Act of 1912 were two highly dated laws passed during the British era to prevent air pollution.

While taking cognizance of provisions under aforementioned legislations, it was pellucid that there were no explicit environmental restrictions when the British ruled India. Thenceforward, environmental protection was embraced under Article 21 of the Indian Constitution & it was impacted when the Constitution entered into force in 1950 and the judiciary developed the idea of Fundamental Rights. Following that, the Government of India created legislation to safeguard the environment in accordance with societal demands. The Factories Act of 1948 (Act No. 63 of 1948) also outlines the best practises for waste disposal and enlists the State to develop regulations to carry out these directives. The state is also responsible for preventing water contamination under the River Boards Act, 1956(Act No. 49 of 1956) for the maintenance and management of Inter-State Rivers and waterway valleys.⁸ A few important rights, relevant for our subject, are mandated by the Indian Constitution, and they are stated in Part III. Among these rights, Art. 21 gives everyone the right to life. The right to life finds its place in ecological justice's expansion and accessibility. M C Mehta, a dissident lawyer played a major role in expanding the skyline of Art. 21's soul. According to Article 47, of the constitution, improvement of the infrastructure encompassing public health is one of the State's primary duties. Moreover, Article 48A illustrates that the State shall make an effort to protect and develop the environment, and Article 51A (g) makes it a fundamental duty of every citizen of India to protect and enhance the environment.

shall be punished with imprisonment of either description for a term which may extend to five years, or with fine, or with both."

⁸ Divan, S., & Rosencranz, A. (2022). *Environmental Law and Policy in India: Cases and Materials*. Oxford University Press. 579-601

International Conventions

There are three international accords i.e., *The Basel Convention on Hazardous Waste*, the *Stockholm Convention on Persistent Organic Pollutants (POPs)*, and the *Minamata Convention on Mercury* are particularly relevant in setting up the guidelines for the management of bio-medical wastes, environment protection, and sustainable development. are examples of these conventions.⁹ The most comprehensive environmental convention on hazardous and other wastes is the Basel Convention on Hazardous Waste. It aims to protect human health and the environment from the harmful effects of hazardous waste development, management, and disposal, including clinical wastes produced by healthcare facilities, and has 170 member states. Additionally, the *Stockholm Convention on Persistent Organic Pollutants* (also known as the Stockholm Convention) is also a treaty which was designed to safeguard health of the humans and the adjoining environment against persistently released organic pollutants (POPs)¹⁰. POPs are considered as the dangerous compounds that if present in the bodies of living creatures' and can cause immense harm. The mechanism of medical waste disposal including incinerators and few other such processes which produce these compounds.¹¹ In the year 2006, preliminary recommendations on best environmental practises (BEF) were issued. ¹²It provides best guidelines to be followed for waste reduction, segregation, recycling, recovery, education, and appropriate collection and transportation.¹³ In 2013, an agreement called the Minamata Convention on Mercury was made to safeguard both environment and human life & health against the harmful effects of mercury. This Convention calls attention to a material that is used widely in daily items, is naturally occurring, and is emitted into the atmosphere, land, and water from a number of sources.¹⁴

⁹ Technical Guidelines on Environmentally Sound Management of Wastes Consisting of Elemental Mercury and Wastes Containing or Contaminated with Mercury 31 October 2011. Geneva: Basel Convention and United Nations Environment Programme; 2011.

¹⁰ Revised Draft Guidelines on Best Available Techniques and Provisional Guidance on Best Environmental Practices of the Stockholm Convention on Persistent Organic Pollutants. Geneva: Secretariat of the Stockholm Convention; 2006.

¹¹ Also see, Fiedler, H. (2007). National PCDD/PCDF release inventories under the Stockholm convention on persistent organic pollutants. *Chemosphere*, 67(9), S96-S108.

¹² World Health Organization, & WHO. (2004). *Review of Health Impacts from Microbiological Hazards in Health-Care Wastes*. world health organization.

¹³ See, World Health Organization, & WHO. (2004). *Guidelines for drinking-water quality* (Vol. 1). world health organization.

¹⁴ United Nations Environment Program. (2013). *Minamata Convention on Mercury*. united nations environment program. see also, Kessler, R. (2013). The Minamata Convention on Mercury: a first step toward protecting future generations.

Judicial Response towards Bio-Medical Waste Management

There are numerous judgements pronounced by the Apex Court of the country and various High Courts of states which apparently emphasized on the aspects of Bio-Medical Waste Management and largely emphasised on the protection of environment. In the year 1990-91, a Public Interest Litigation was instituted in *Subhash Kumar v. State of Bihar* asking the Supreme Court to direct the Director of Collieries to prevent the river Bokaro from receiving sludge from its washeries. Slurry storage on agricultural land is rumoured to have an impact on its fruitfulness. Furthermore, the flowing slurry pollutes the river, rendering it unsuitable for use in the water supply. The arena of discussion pertaining to this case was to determine whether the right to have a healthy environment was included in the broader aspect of right to life. In final judgement pronounced by Justice Singh, “*the right to life is a basic right protected by Article 21 of the Constitution and it includes the freedom to enjoy clean water and air*”.¹⁵ Prior to this, in mid-1980’s, a writ was filed in *Kinkri Devi v. State of Himachal Pradesh* under Art. 226, 51A (g), and 48A at the Himachal Pradesh High Court with the intention of securing and protecting the Shivalik Hills. As a consequence of this petition, a rent for the exhumation of limestone had to be wiped off. Thereafter, the Court kept an eye on concerns related to the environment and how things naturally change. Further, In the year 1993, in the case of *K.C. Malhotra v. State of Madhya Pradesh*, an expert filed a PIL in relation to the pandemic cholera outbreak (which resulted in the deaths of 12 children) as a result of open waste, soiled water, dirt storage, defiled water, and garbage. This situation was clearly brought about by the negligence of many State entities and professionals.¹⁶ According to the court, the right to life also included the fundamental necessities of life, such as the access to adequate nutrition, clothing, protection, and facilities for reading and writing. Upon the further interpretation, the citizens of that state have a direct responsibility under Art. 21 to ensure that the government works to improve general wellbeing as this is one of its fundamental duties. Finally, the Court gave an order to preserve the vigour of the local tenants and their general health. In the case of *Vellore Citizens Welfare Forum vs. Union of India*¹⁷, the Supreme Court declared, the principle of ‘Sustainable Development’ and ‘Polluter Pays Principle’ to be integral part of environment protection law of the country.

¹⁵ *Subhash Kumar v. State of Bihar*. AIR 1991 SC 420

¹⁶ *K.C. Malhotra v. State of M.P.* AIR 1994 MP 48

¹⁷ 1996 (5) SCC 647

The supreme court's real intervention for hazardous waste disposal came in *Research Foundation For Science, Technology National Resource Policy v. Union Of India*¹⁸ wherein a Committee on Management of Hazardous Wastes was constituted and directed to recommend measures for hazardous waste material disposal. Whereas, In the case of *Environment Monitoring Forum and Anr. Vs. Union of India (UOI) and Ors*¹⁹, court held that all such institutions which are generating bio-medical waste have to handle such waste in a prescribed manner which do not cause environmental damage. Further, Odisha High Court in *Maitree Sansad vs. The state of Orissa and Ors* case passed observations on inappropriate measures of dumping biomedical waste in municipal dustbins and open spaces and held that it leads to spreading of diseases. Also, *National Green Tribunal, in Haat Supreme Wastech Pvt. Ltd. Ors vs State Of Haryana Ors*²⁰ held that any plant involved in bio-medical waste disposal will require Environmental Clearance (EC). It also said that environmental damage may be prevented by enforcing such rules. However, Supreme Court, in *D Swamy vs. Karnataka State Pollution Control Board*²¹, decided on 22nd September 2022, held that if the unit has other requisite consent to operate and confirms required pollution norms, ex post facto EC can be granted in exceptional circumstances and wouldn't be closed only because it does not have the environmental clearance papers. The court decided it in the interest of preventing environmental pollution.

Contemporary Legal Provisions

Biomedical waste is defined as "any solid, fluid, or liquid waste, including container and any intermediate product, which is generated during diagnosis, treatment, or immunisation of humans or animals, in research activities, or in the production or testing of biological products" under the *Biomedical Waste (Management and Handling) Rules 1998*, which were enacted by the Indian parliament. Infectious, chemical, heavy metal, ordinary municipal garbage, and a variety of other unclean goods are all included in the hospital waste. Needles, scalpels, anatomical human organs, blood samples, microbiological cultures, and other biomedical wastes are also included, as are infectious wastes like clothing and other things contaminated with bodily fluids and discharges. Biomedical waste released by hospitals might be dangerous since it could include infectious disease. Some pathogenic organisms pose a threat due to their high pathogenicity and potential drug resistance. Poor waste management will lead to natural

¹⁸ (2005) 10 SCC 510

¹⁹ MANU/KE/0894/2003

²⁰ MANU/GT/0089/2015

²¹ 2022 SCC OnLine SC 1278

contamination, offensive odours, the development and spread of insects, rats, and worms, as well as the possibility for the transmission of illnesses including typhoid, cholera, hepatitis, and AIDS through wounds from syringes and needles tainted with human blood.

The new *Biomedical Waste Management Rules 2016* were announced by the MoEFCC, Government of India, in early 2016, while exercising of the powers conferred by sections 6, 8 and 25 of the *Environment (Protection) Act, 1986 (29 of 1986)*. These rules shall be utilized to regulate the management of biomedical waste and have a significant impact on the clean-India initiative.²² Accordingly, all the authorized health care institutions in the country are required to separate bio-medical waste and classify it into yellow, red, blue/white, and dark coloured bags or dustbins.²³ These wastes can be kept for up to 48 hours before being safely disposed of or collected by a professional from a common bio medical waste treatment facility (CBMWF). The CMBWF then handles the trash in accordance with the bag's colour. The varied colours necessitate distinct methods of disposal, including cremation, deep entombment, autoclaving, destruction, concoction treatment, transfer to a landfill, etc. Health Care Facilities are currently responsible for pre-treating research facility and micro biological waste, blood tests, and blood sacks through local sanitization and cleaning in the manner advised by the World Health Organization (WHO) or National Aids Control Organization, regardless of whether final treatment and transfer take place nearby or at a typical biomedical waste treatment facility (NACO).²⁴ To stop the release of dioxins and furans from burning such waste, health care facilities must stop using chlorinated plastic bags, gloves, and blood packs within two years. According to a study by the Government of India, a total of 484 tonnes of biological waste are created daily in India by 1,68,869 healthcare facilities. Only 447 tonnes per day of material are processed before disposal. There are several problems with informal waste disposal. 15% of the trash from health care facilities is dangerous or toxic, whereas 85% is not. Risky consequences are mixed with sullyng, which makes the entire waste harmful.²⁵ As a result, it is necessary to isolate and treat. Inadequate disposal increases the risk of contamination,

²² Bio-Medical Waste Management Rules. 2016 Published in the Gazette of India, Extraordinary, Part II, Section 3, Sub-Section (i), Government of India Ministry of Environment, Forest and Climate Change.

²³ See also, Pandey, A., Ahuja, S., Madan, M., & Asthana, A. K. (2016). Bio-medical waste management in a tertiary care hospital: an overview. *Journal of clinical and diagnostic research: JCDR*, 10(11), DC01.

²⁴ Sheikh N. A. (2012). Hospital Waste Management: Indian Perspective. *Indian Journal of Forensic Medicine & Toxicology*. 6(2):127-9. See also, Nanda, H., & Pati, J. (2017). Legal Regime of Bio Medical Waste and Environmental Protection. *EXECUTIVE EDITOR*, 8(2), 167.

²⁵ Sarkodie, S. A., & Owusu, P. A. (2021). Impact of COVID-19 pandemic on waste management. *Environment, development and sustainability*, 23(5), 7951-7960.

encourages the reuse of organised drugs and prohibited disposables, and produces safe microorganisms.

Status of Compliance by States

Pursuant to the Rule 13 of *Bio-Medical Waste Management Rule of 2016*, the State's Pollution Control Board are required to submit an annual report before July 31st of every year. The report shall embrace the data and nuances such as collection, treatment and disposal of biomedical waste in their respective state to Ministry of Environment Forests & Climate Change. In theyear 2021, the SPCB of all the states have submitted their annual report barring Nagaland. Thereafter, the concerned Ministry has inspected few discrepancies and non-compliances such as absence of liquid waste pre-treatment facilities, non-disclosures related to availability of deep-burial pits and lastly,²⁶ With reference to the unauthorized healthcare facilities, it was discovered that out of 3,25,014 operational HCFs in India, 14% of the HCFs are unauthorised and thereby, the states were recommended to serve the show-cause notice to these HCFs.²⁷

The collective reports revealed that the cumulative amount of biological waste produced in the country per day was estimated to be 774 tonnes, of which 656 tonnes per day were non-COVID biomedical waste and 118 tonnes per day were COVID biomedical waste. Further, as reflected in Fig #1, it was revealed that out of 3,52,014 healthcare facilities in the country only 4% of the have their own facilities for managing the disposal of biomedical waste.²⁸

²⁶ Central Pollution Control Board (MoEF&CC). (2020). *Annual Report on Biomedical Waste Generation*. central pollution control board.

²⁷ See, Ramteke, S., & Sahu, B. L. (2020). Novel coronavirus disease 2019 (COVID-19) pandemic: considerations for the biomedical waste sector in India. *Case Studies in Chemical and Environmental Engineering*, 2, 100029.

²⁸ Central Pollution Control Board (MoEF&CC). (2020). *Annual Report on Biomedical Waste Generation*. central pollution control board.

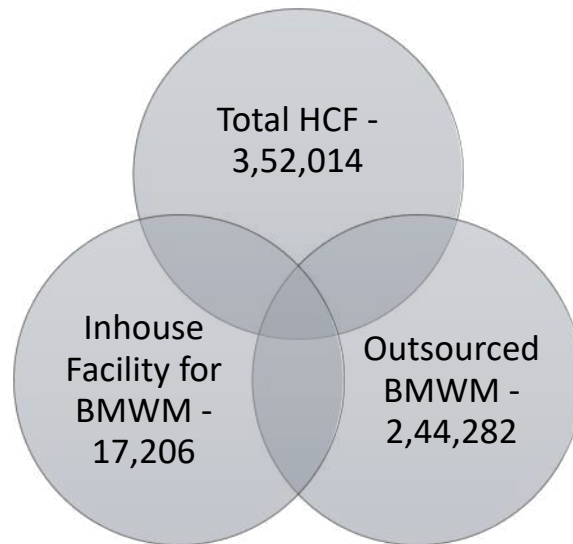


Figure 1

Further, it has been noted that there is a lag among the production of biomedical waste and its effective treatment. The CPCB has detected this oversight and informed the appropriate State Board to close the gap and guarantee that biomedical waste is disposed of in accordance with the 2016 BMWM Rules.

Report of Compliance by the States²⁹

S.No.	Name (State/Union Territory)	Cumulated Quantity of BMW generated	Cumulated Quantity of BMW Treated and Disposed	Gaps in treatment and disposal of bio-medical waste (kilogram per day)
1	Andaman Nicobar	536.36	536.36	0
2	Andhra Pradesh	25029.3	25029.3	0
3	Arunachal Pradesh	353.63	353.63	0
4	Assam	8235.97	5314.22	2921.75

²⁹ Central Pollution Control Board (MoEF&CC). (2020). *Annual Report on Biomedical Waste Generation*. central pollution control board.

5	Bihar	27846.15	10201.3	17644.85
6	Chandigarh	5729	5729	0
7	Chhattisgarh	7234.31	7234.31	0
8	Daman &Diu and Dadra & Nagar Haveli	450	450	0
9	Delhi	23200.09	23200.09	0
10	Goa	1272.68	1272.68	0
11	Gujarat	49492	49492	0
12	Haryana	19217	19217	0
13	Himachal Pradesh	3545.78	3545.78	0
14	Jharkhand	8406.7317	8406.7317	0
15	J & K	5941.81	5941.81	0
16	Karnataka	82604	38951	43653
17	Kerala	40408	40207	201
18	Ladakh	43.35	43.35	0
19	Lakshadweep	1137	1137	0
20	Madhya Pradesh	20008.91	19003.55	1005.36
21	Maharashtra	82146.35	82111.82	34.53
22	Manipur	921.9	888.5	33.4
23	Meghalaya	1556.95	1556.95	0
24	Mizoram	863.13	863.13	0
25	Nagaland	891.8	652.5	239.3
26	Odisha	15303.76	15303.76	0
27	Puducherry	4360	4360	0
28	Punjab	16998.16	16998.16	0

29	Rajasthan	18911.56	18911.56	0
30	Sikkim	477.56	477.56	0
31	Tamil Nadu	35269.74	35269.74	0
32	Telengana	23810	23810	0
33	Tripura	3852.58	3852.58	0
34	Uttarakhand	7616.57	7616.57	0
35	Uttar Pradesh	64038	64038	0
36	West Bengal	43513.39	43513.39	0
37	DGAFMs	5450.99	5450.99	0
Total		656674.5117	590941.327	65733.19

In order to address such gaps in earlier years and to lessen negative effects on human life and environment, a Common Bio-medical Waste Treatment and Disposal Facility (CBWTF) is established. Here, the member healthcare facilities treat the biological waste they produce properly. Recyclable materials can either be recycled or disposed of in a secure landfill after treatment. Occupiers are prohibited by BMW Rules from establishing an on-site or captive bio-medical waste treatment and disposal facility if a public facility is reachable within a 75-kilometer radius. According to SPCBs/PCCs' 2020's annual report, apparently there are presently 208 CBWTFs operating in the nation, and 33 more are being built. There are no CBWTFs for the treatment and disposal of biomedical waste in the following states: Andaman & Nicobar, Arunachal Pradesh, Goa, Ladakh, Mizoram, Nagaland, Sikkim, and Tripura. Additionally, In accordance with the 2016 BMW Rules, each owner or operator of a facility for the treatment of common biomedical waste is required to install an Online Continuous Emission Monitoring System (OCEMS) for the parameters authorised by the State Pollution Control Board or Pollution Control Committees and to transmit the real-time data to the servers at the State Pollution Control Board or Pollution Control Committees and Central Pollution Control Board. The numbers given indicate that 195 out of 208 CBWTFs have OCEMS installed in their incineration stacks.

In addition to this, according to the report of the Oversight Committee instituted by National Green Tribunal, Lucknow, there were total 23,882 health care facilities (including Government & Private) in the state out of which only 20,927 health care facilities were authorised. Whereas the remaining 2955 were still in the process of obtaining the authorization from State. Out of these only 5239 healthcare facilities have actually submitted the annual report on BMW Management in the year 2019 and out of these, only 1048 facilities have registered on the real-time interface established by the state titled *BMWIS*.³⁰ Accordingly, it is estimated that all the healthcare facilities in the state generate almost 52.5 Mega Tonnes of Bio-Medical Waste per day (including incinerable & non-incinerable waste). While only 3620 healthcare facilities have initiated the deep-burial facility out of which only 21% is operation & remaining is in the process of construction. Furthermore, as per this report, few surveys reflect the veracious status of awareness regarding disposal of BMW among the direct stakeholders such as healthcare workers in various districts. The lack of awareness pertaining to segregation and hazards related to BMW among varied classes i.e., Nurses, Pharmacists, Technicians, Dental Practitioners & Paramedics ranges from 50% to 75%.³¹ As a consequence of this report, the State Government has imposed a cumulative penalty of INR. 8.0 Crores as ‘Environment Compensation’ on almost 140 defaulters. Besides, the notices related to incomplete authorization were issued to 5806 healthcare facilities excluding few show cause notices issued for contravening the provision of BMW Rules 2016.³²

Interpretation of gaps through Sustainable Development Goals

Sustainable Development Goals (SDG) have been adopted by United Nations in the year 2015 as an action plan for development and better standard of living of humanity. Appropriate healthcare waste management will ensure realising some of the SDG goals including a) good health and well-being (SDG 3); and b) clean water and sanitation (SDG 6)

Good health and well-being are fundamental aspect of right to life. As mentioned earlier, even the Apex Court has ruled in a number of cases that the right to health is a component of Article 21 of the Indian Constitution, which also protects the right to life. The gap between the biomedical waste generated and disposed of, as noted in the previous section, will endanger the health and well-being of the people. As noted by World Health Organisation, at least fifteen

³⁰BMWIS available at <http://BMWis.uphsspmis.org> (accessed on Oct 10, 2022)

³¹ NGT Lucknow, Uttar Pradesh. (2019). *Report of the Oversight Committee 2019*. ngt lucknow, uttar Pradesh.

³² Central Pollution Control Board (MoEF&CC). (2020). *Annual Report on Biomedical Waste Generation*. central pollution control board.

percent of bio medical waste is dangerous and expose citizens to health and environment related risks³³, safe handling of bio medical waste fundamental to ensuring healthy life of people. If this hazardous waste is not insulated and treated properly and thrown in open areas, it poses a severe risk to sanitation of health care workers and people handling waste materials. If such wastes can find its way in water bodies, it will contaminate the water bodies and also be threat marine species and access to clean water of people.³⁴

Limitations of Legal Regulations

It's quite apparent that there is a certain level of improvement & enhancements in our procedures for managing biomedical waste in India, there are still a number of issues that prevent us from declaring a complete success. The regulation has granted the local self-government, the state, and the national pollution control board full authority. A harsh action should be taken against any hospital found to be in violation of the bio-medical regulations in their hospital, which may result in the facility's immediate closure. It is the obligation and authority of the states PCBs (Pollution Control Boards) to periodically check the hospitals without prior warning. Even if the regulations include a variety of treatments for bio-medical waste, it can be challenging to adhere to disposal procedures in city hospitals, which may have an impact on the nearby residential areas and residents. The cost for tiny clinics increases as a result of the hospital's dependence on a private contractor to transport and dispose of the biomedical waste produced at the facility. In many countries, the unlawful dumping of biomedical waste has grown extremely prevalent. The law might not have total control on the rule-follower. Because they mix biomedical waste with regular trash and dump it in the neighbourhood dustbins, unauthorised disposers are difficult to spot. One of the key problems that the government cannot readily resolve is this one. In addition, influence and bribery lead to the protection of defaulters.³⁵

³³ World Health Organization. (2017). *Safe management of wastes from health-care activities: a summary* (No. WHO/FWC/WSH/17.05). World Health Organization. available at: <https://apps.who.int/iris/bitstream/handle/10665/259491/WHO-FWC-WSH-17.05-eng.pdf> (accessed on 26th Oct. 2022)

³⁴ Nalini Ravichandran, Used plastic masks and gloves are making their way into water bodies across India. *Scroll.in* Nov 02, 2020. Available at: <https://scroll.in/article/977217/used-plastic-masks-and-gloves-are-making-their-way-into-water-bodies-across-india> see also, Kothari, R., Sahab, S., Singh, H. M., Singh, R. P., Singh, B., Pathania, D., ... & Tyagi, V. V. (2021). COVID-19 and waste management in Indian scenario: Challenges and possible solutions. *Environmental Science and Pollution Research*, 28(38), 52702-52723.

³⁵ World Health Organization. (2011). *Aide-mémoire: developing a national blood system* (No. WHO/EHT/11.01). World Health Organization.

Conclusion

Stringent laws, committed assistance of government and authorities and effective BMW practises followed by both healthcare professionals and HCFs, and regular monitoring of BMW practises should all go into the management of biomedical waste. There is no doubt that the lawmakers have created tough regulations for the safe and effective management of biomedical waste for healthcare facilities, yet they should be closely followed by the various state agencies to prevent biohazards from entering the environment. The new BMW 2016 recommendations, which aim to reduce environmental pollution and ensure the safety of staff, patients, and the general public, are an improvement over prior norms in terms of better segregation, transportation, and disposal processes. In light of this, it is advised that medical wastes be grouped in a similar manner according to their origin, typology, and risk considerations related to their management, capacity, and extreme disposal. The main step is isolating waste at the source, and reduction, reuse, and repurposing should be taken into account from genuine viewpoints. We must think of radical and innovative solutions to address the troubling situation of municipal disregard for healthcare facilities and lax government adherence to the bare minimal of regulations as generation of waste, particularly biomedical waste, places increasing immediate and abnormal costs on society. In this way, our ability to logically monitor growing quantities of biological waste that exceed practises will be put to the test. If all the direct and indirect stakeholders aim to protect our precious environment and the wholesome wellness of our community, then they should focus on this crucial problem out of both a reasonable concern for healthcare providers and a legitimate concern for the fellow citizens.

HUMAN DEVELOPMENT AND ENVIRONMENT- ARE WE COMPROMISING ENVIRONMENTAL PROTECTION OVER THE ECONOMIC BENEFIT

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Abstract

Marking 50 years of the landmark Stockholm Declaration, numerous changes and developments took place in the environment. The conference marked a new era in global cooperation for the environment. The Stockholm Declaration established effective environmental strategies for sustainable development and gained recognition for the evolution of domestic environmental policy toward an eco-centric approach to environmental protection. Predominantly, all the conferences have prioritized sustainable development, envisaging the need for the future. Human development has gained enormous benefits through large-scale industrial-driven economic processes but imminently resulted in environmental depletion. To strike a balance between an understanding of the necessity of development without compromising environmental depletion underlies the principle of environmental protection. The Rio Declaration was introduced in 1992 to commemorate the 20th anniversary of the Stockholm Declaration, which strengthens the idea of how various socio-economic and environmental developments are inextricably linked. The precautionary principle approach which is principle 15 of the Rio Declaration of 1992 prominently highlights the importance of exercising caution, pausing, and reviewing potentially disastrous innovations. To harmonize economic development vis-a-vis environmental protection, “Environmental Impact Assessment” was brought into the picture. India in this reference brought in the EIA notification of 2020 which sought to replace the EIA 2006. The author critically analyses the EIA on whether EIA rules have compromised environmental harm over economic benefits. EIA notification of 2006 had to go through various revisions spite of this fact the deficiencies in the EIA 2006 were unresolved and were incorporated in the EIA notification of 2020. In this article, researchers will focus on the effectiveness of good environmental governance and transparency in decisions affecting the environment. This paper will also discuss the importance of various conventions in the recent past that evolved over the primary principles of the Rio and Stockholm declaration in the modern globalized world.

Keywords: Stockholm declaration, Rio Declaration, EIA, precautionary principle, good governance, Environmental Protection, sustainable development.

Introduction

The importance of protecting the environment and how people treat natural resources as the gift of God can be traced in various religious scriptures. The Bhagavad Gita says: Let the human community protect the environment for their survival and the biodiversity around¹. This verse of the Bhagavad Gita expresses the notion that every human being is duty-bound to protect the environment. Islam forbids resource waste and environmental destruction. During the conflict, the Prophet (peace be upon him) commanded the Muslims not to cut down any trees. He placed a strong emphasis on protecting the environment and preventing its degradation. Therefore, every Muslim has a religious obligation to protect the environment. In Christianity, the environment is considered god's glory, and to maintain its glory one should protect the environment not only for their interest. The environment is considered a sacred thing by every religion. All these teachings in every religion emphasized one thing the environment is a sacred thing and therefore one must protect the environment. With these beliefs, environmental protection gained its importance and made its place. Gradually protection of the environment shifted from a national concern to an international concern, which was brought into effect in Stockholm in 1972. This conference came with 26 principles. The Stockholm Conference marked the beginning of the discussion on human development vis-a-vis environmental protection. It emphasized economic growth when it leads to environmental contamination. This conference through its 26 principles tried to have the well-being of people around the globe. One of the major results which were brought about by the Stockholm conference was the creation of the United Nations Environment Programme (UNEP)². The need for environmental protection gained more importance and then in 1992 came up the Rio Declaration. Some various legal instruments and policies evolved with these conferences where the 1992 Stockholm conference, Action Plan Human Environment emerged and in Rio Declaration Agenda 21 came into existence. Sustainable development became one of the core principles of the Rio Declaration in 1992. This conference marked a stepping stone that can be adopted worldwide by stating that long-term economic progress can be only achieved by keeping a balance with environmental principles. These conferences have

¹ Sachidananda Padhy, An Ethno-ecological Introspection of the Bhagavad Gita: 6. The Present Distorted Environment Compared to Five Thousand Years Ago, 51 Journal on Human Ecology 227, 227 (2015)

² United Nations, <https://www.un.org/en/conferences/environment/stockholm1972> (last visited Oct. 6, 2022)

immense importance in environmental protection. There came the need of the hour to create a balance between development and environmental protection. It is seen mostly that in the name of development a huge amount of environmental degradation takes place which becomes a never-ending process.

To protect the environment from any further environmental pollution in developed and developing countries came in existence Environmental Impact Assessment in 1978. In India, EIA was first formulated in the year 1994. EIA was an attempt to make it mandatory for getting clearance for setting up any new project. With time EIA notification has gone through various kinds of amendments. The most important amendments lie in the year 2006 and the amendments took place in the year 2020. These two amendments have made the EIA change drastically. With time it is seen that the essence of having an EIA has loosened up. These amendments were made to protect the environment from the harmful effects of the newly established industries or projects but this main objective can be seen as lacking in the EIA notification of 2020 as it contains various loopholes, these loopholes need to be assessed on a priority basis so that the main motive behind the EIA formulation can be achieved. These conferences had the main agenda of protecting the environment by having a sustainable approach to it and keeping a balance between the development and environment was always one of the prime objectives of every conference that has ever taken place in the history of the environment.

Overview of the Impact of Treaties and Conventions on the Environment

In the context of celebrating 50 years of the Stockholm conference and 30 years of the Rio Declaration which were the two primary outputs that raised global concern towards environmental protection. There comes the need to analyze the impact of these treaties and conventions on the environment. Undoubtedly these conventions and treaties that were brought into effect nevertheless brought significant changes in the development of environmental jurisprudence around the globe. But there is always the other side, as to whether the environmental principles that were adopted in these treaties or the conventions are relevant or effective enough today to protect the environment from further degradation. And if yes, then how far are they being effective in changing the surrounding where one is surviving? These are the question that must be looked upon when one refers to these international conventions on the environment.

Stockholm declaration- then vs now

50 years have passed since the first United Nations Conference on the Human Environment. The year 1972 in Stockholm lightened the minds of the various stakeholders of this conference with an idea to come together in one place and promise together to adapt the various principles for the sound management of the environment. This very idea brought in effective legal instruments to restore the environment and provide various measures in case of any damage to the environment. An action plan for the human environment was brought into effect with various other resolutions. The broad types of activities that make up the Plan are:

- ❖ The global environmental assessment program (Earth Watch)
- ❖ Environmental management activities.
- ❖ International measures to support the national and international actions of assessment and management³.

In a brief reading of the various principles that were adopted in the Stockholm Conference, it can be very well understood that Principle 1 of the Stockholm conference outshines Article 21 of the Indian Constitution. Article 21 of the Indian constitution talks about the Right to life⁴. Where it has been expanded to the "Right to live in a healthy environment". This addition has not come just by one night. It took years for the legislature to understand that the Right to live in a healthy environment is an inherent right under Article 21 of the Indian Constitution. The right to live in a healthy environment as part of Article 21 of the Constitution was first recognized in the case of Rural Litigation and Entitlement Kendra vs. State⁵ (Popularly known as Dehradun Quarrying Case)⁶. In M.C. Mehta vs. Union of India⁷, the Supreme Court treated the right to live in a pollution-free environment as a part of the fundamental right to life under Article 21 of the Constitution⁸. Through these pronouncements of various cases, it can be very well proven that the principles were taken into consideration by the judiciary while formulating the judgment.

³ *Action Plan for the Human Environment. A. Framework for environmental action* A/CONF.48/14/Rev.1 (1972), <https://documents-dds-ny.un.org/doc/UNDOC/GEN/NL7/300/05/IMG/NL730005.pdf?OpenElement> (last visited Oct. 6, 2022)

⁴ INDIA CONST. art. 21.

⁵ Rural Litigation and Entitlement Kendra vs. State, AIR 1988 SC 2187.

⁶ Pooja P. Vardhan, *Environment Protection under Constitutional Framework of India*, PRESS INFORMATION BUREAU GOVERNMENT OF INDIA (Jun.4,2014, 12:25 IST), <https://pib.gov.in/newsite/printrelease.aspx?relid=105411#:~:text=Article%2021%20guarantees%20fundamenta%20right,to%20live%20with%20human%20dignity.>

⁷ M.C. Mehta vs. Union of India, AIR 1987 SC 1086.

⁸ *ibid.*

Another important principle that cannot be over looked, is Principle 24 which relates to International Cooperation among the people to contribute towards international law for protecting the environment. This principle focuses on the very important aspect which is needed at a prime outset, to have international cooperation in other words to have a cooperative spirit to adopt the various measures which are needed to protect the environment. This principle stands as a very important goal to be achieved by every country to work towards the common objective of protecting the environment. These principles and the measures that were very well incorporated in the Stockholm Conference enlightened the major environmental issues globally. But are these principles relevant till now?

Over the last 50 years of the Stockholm conference, we still lack the institutional and legal mechanisms to deal with the various emerging environmental issues. Now whether this is because these principles are way too old to be still considered? or whether the concerned authorities have stopped paying attention to these principles now? These unanswered questions are never looked upon. According to the EPI(Environment Performance Index) 2022

India has been ranked at the bottom in a list of 180 countries that were judged for their environmental performances in the 2022 Environmental Performance Index (EPI)⁹. The list is headed by Denmark, which is seen as the world's most sustainable country¹⁰. The EPI 2022 report says: "Based on the latest scientific insights and environmental data, India ranks at the bottom of all countries in the 2022 EPI, with low scores across a range of critical issues."¹¹ The EPI is considered more accurate than other reports because it uses outcome-oriented indicators as compared to the ESI. Some of these indicators are environmental risk exposure; air quality; average exposure to PM2.5, or the infallibility of the air; air pollution; water and sanitation parameters; drinking water quality; the vitality of the ecosystem; health and management of water resources; wastewater treatment; Green investment; Green innovations; and national leadership around climate change¹². This shows how well environmental protection awareness is still a concern for people or the authorities. The lack of concern towards the poor environmental condition is leading to a very dangerous situation where it will become difficult to even breathe properly.

⁹ Lyla Bavadam, *India ranks at the bottom in a list of 180 countries in the 2022 Environmental Performance Index*, FRONTLINE (Aug,25,2022), <https://frontline.thehindu.com/dispatches/india-ranks-at-the-bottom-in-a-list-180-countries-in-the-2022-environmental-performance-index/article65497256.ece>.

¹⁰ id

¹¹ ibid..

¹² supra note 9.

Rio declaration – two steps back or one step forward

Two events and various effective measures have been brought. Rio Declaration in 1992 was a blueprint for bringing an effect to international cooperation and action which would benefit environmental protection in the twenty-first century. The conclusion drawn by the Rio declaration was that achieving the sustainable development goal should be the unattainable goal for every country which should not be limited to regional, national or international levels. The Rio Declaration also known as the "Earth Summit" led to the creation of the Commission on Sustainable Development, the holding of the first world conference on the sustainable development of small island developing States in 1994, and negotiations for the establishment of the agreement on straddling stocks and highly migratory fish stocks¹³. The importance of balancing economic growth with the environment should be the priority globally for every nation. This declaration marked the very important fact that long-term economic development can be only achieved by balancing the environmental impact. Like every other principle of Rio one of its principle which stands very important is the "Precautionary Principle" under Principle 15 of the declaration. Also known as the Precautionary Approach or Precautionary Action, the Precautionary Principle is a concept best summed up by the proverb "better safe than sorry" or the medical maxim "first do no harm"¹⁴. This principle expresses a notion to adopt precautionary measures in case the causes of harm to the environment are uncertain therefore reducing any uncertainty which might affect the environment to a greater range should be avoided. These principles provide a moral justification for acting even though causation is unclear. This condition forces decision-makers inevitably to confront a variety of difficulties.

In the fast-moving world, it becomes difficult to keep up with the old techniques along with the innovation in hand.

Harmonizing Development and Environment- Challenges Faced By the Society

Environmental concerns have become more prominent in policy creation in recent years, notably in development and growth strategies. Environmental quality is regarded as a welfare determinant and natural resources are considered necessary production inputs. The integration of environmental concerns into theories and empirical research on economic growth and

¹³ United Nations Organization, <https://www.un.org/en/conferences/environment/rio1992> (last visited Oct.30,2022).

¹⁴ Farnam Street, *The Precautionary Principle: Better Safe than Sorry?*, FARNAM STREET(Oct.30,2022, 9:29 PM), <https://fs.blog/precautionary-principle-2/>.

development is currently the subject of much analysis¹⁵. The protection of biodiversity is crucial for ensuring human life since it has fundamental social, economic, cultural, spiritual, and scientific values. The provision of ecosystem services that support human well-being is in jeopardy due to the fast loss of biodiversity, which is unprecedented in the last 65 million years. According to the Millennium Ecosystem Assessment, of the 24 ecosystem services examined, 15 were in decline, 4 were improving, and 5 were both improving and declining in different parts of the world. There is a need to significantly improve and integrate social, political, and economic issues with efforts to protect biodiversity and create a sustainable society. Biodiversity and ecosystem services must be valued, and markets must be established that can use the value of these services as a foundation for a green economy¹⁶. When done properly, industrial development and environmental protection can coexist. Both industrial development and environmental preservation are crucial since one is necessary for lowering poverty while the other is necessary for the long term. We must industrialize if we want to keep a nation operating. Communication of environmental concerns in emerging nations with big populations is incredibly challenging. Industrial expansion costs money and damages the environment. Looking at China as an example demonstrates that unrestrained industrialization will not only have a negative long-term effect on the environment and economy. China's unchecked expansion led to a significant increase in air and water pollution, resulting in health problems, illnesses, and billions of dollars in crop losses for farmers.

We should use renewable energy sources to achieve long-term growth. If we use the sustainable development approach, our nation might experience both industrial progress and environmental preservation. Additionally, all aspects such as environmental preservation, social justice, and economic development must be taken into account to achieve sustainable development. We can have rapid industrialization with the help of scientific discoveries without doing too much environmental harm¹⁷.

The challenges of Sustainable development can be categorized as follows:-

¹⁵ Valeria Costantini & Salvatore Monni, *Environment, human development and economic growth*, 64, *Ecological Economics*, 867, 867, (2008) <https://www.sciencedirect.com/science/article/abs/pii/S092180090700328X> .

¹⁶ Gro Harlem Brundtland et al, *Environment and Development Challenges: The Imperative to Act*, Barefoot College, Conservation International, International institute for Environment and Development, and International Union for the Conservation of Nature, 1, (2012) https://www.conservation.org/docs/default-source/publication-pdfs/ci_rioplus20_blue-planet-prize_environment-and-development-challenges.pdf

¹⁷ Saishree Rath, *Industrialization and Conservation cannot go hand in hand*, Pixstory Global Holding Inc, (Oct.30,2022, 9:29 PM), <https://www.pixstory.com/story/industrialization-and-conservation-cannot-go-hand-in-hand/47709>

Ø The dichotomy between government spending on sustainable technologies and short-term profit. (In Poland, where coal accounts for 80% of all energy generation, the government has even increased funding to the mining industry rather than pushing ahead with the adoption of sustainable energy sources.)

Ø Corruption. (Funding for developing nations is typically delivered in the form of foreign grants; in the case of Nepal, the UK provides the majority of these grants.) However, due to bureaucracy and corruption in Nepal, certain development initiatives need the payment of service fees to the Nepali government as well as stipends to ministers, which greatly slows down NGO processes¹⁸.)

Sustainable development becoming an unattainable goal- a critical study on various industrial projects

Deeper epistemological - and political - issues with the labels "environmental sciences" and "sustainable development" complicate efforts to encourage the effective fusion of disciplines. The issue with "sustainable development" is extremely severe. Fossil fuels and limited material resources, such as metals, phosphate fertilisers, rare gases, etc., are the current foundation of our growth and prosperity. We will undoubtedly pursue the methods to locate and extract ever-rarer and costlier resources with ever-increasing zeal and intelligence. It is possible to interpret sustainable development as having an integrated growth notion that is difficult to reconcile with a near-stop to growth based on stopping the consumption of finite resources like fossil fuels. Fossil fuels and virgin mineral resources will never be renewable resources. Conceptually, sustainable development is framed by two questions. What should we maintain first? This necessitates consideration of both the nature of our bequest and the distribution of resources among generations. Some contend that consumption or welfare Others argue that a specific stock of environmental assets has to be conserved. Robert, a Nobel laureate Solow suggests that humans maintain a broad ability to create economic prosperity (Solow, 1993). The viability of sustainable development is the subject of the second question, which is closely related to the first. Dependence on the feasibility of the interchangeability of human-made and natural capital (such as equipment or knowledge) in the production process. Sustainability can be robust or

¹⁸ Olga Adhikari, *Sustainable Development and its Challenges in Developing Countries*, International Young Naturefriends, (Oct.30,2022, 9:29 PM), <https://www.iynf.org/2018/08/a-guide-to-sustainable-development-and-its-challenges-in-developing-countries/>

weak depending on the degree of substitutability. Strong sustainability makes the case for the preservation of a particular pool of natural assets by implying that environmental assets and man-made capital work in tandem to produce goods and services. Renewable resources should be seen as "money in the bank," as Andersen (Andersen, 2007) recommends, as this secures their inheritance by future generations: capital is kept and only the revenue created is utilised. However, when all generations are given the same weight, robust sustainability for resources that deplete quickly is impossible. This is because resource consumption cannot be sustained at a positive level forever. This economy practises "cake eating"¹⁹.

The perceived failure of "sustainable development," as well as some of the term's misuses, inherent ambivalence, and various interpretations (Mebratu, 1998; Mitcham, 1995), may have contributed to the community of environmental sciences experts' cynicism and resentment that their work is lumped together under this heading. Anecdotally, we notice a prejudice against "sustainable development" due to the term's overuse in circumstances where environmental benefits are negligible or nonexistent and because it has been linked to corporate and/or governmental actions being "greenwashed." As a result, a lot of people genuinely disagree with the phrase and the frame of reference (Lakoff, 2010). We argue that it is not viable to use the phrase "sustainable development" as a unifying concept that encompasses all areas of environmental sciences for these epistemological and political grounds.

Environmental Decision-Making- Who's Agenda?

Role of Environmental clearance:

Degradation of the environment can be seen in the past 50 years which can be related to various factors like depletion of forest reserves, vehicular emissions, and various other undesirable human activities. The impact of the Bhopal gas tragedy and the LG Polymers gas leak created seriousness to look for the proper regulation and introspection of these industries dealing in various hazardous chemical substances. To do so, Environment Impact Assessment plays a

¹⁹ In 2021, Delhi most polluted capital in world, no Indian city met WHO air quality standard: Report, Economic Times, (last visited Oct. 6, 2022) https://m.economictimes.com/news/india/in-2021-delhi-most-polluted-capital-in-world-no-indian-city-met-who-air-quality-standard-report/amp_articles/90374053.cms

greater role. It determines the impacts of various industrial units and other polluting entities. Therefore to curb any further degradation of the environment from such polluting units EIA mandates various safety norms that need to be taken into consideration before the establishment of these industries. The most crucial element of EIA notification is Environmental Clearance. The Environmental Clearance (EC) process, which requires all major capital investment projects by the private sector or government to seek regulatory approval before beginning construction, is the centrepiece of environmental regulation of development in India²⁰. The clearance is mandatory for the ecologically fragile areas, regardless of the type of the project²¹. Through Environmental clearance it tries to assess the impact on the environment and industry might cause and therefore applying various safety measures to curb such degradation.

Evolution and development of EIA law

With time in place, various laws on the environment strive to maintain a balance between the economy and ecology. Nevertheless, such a balance is very necessary to attain long-term economic growth in a country. To ensure such a fruitful balance there was a need for the introspection and rectification of various units which contribute to environmental pollution. EIA is one such regulatory framework which strives to bring balance between these two very important aspects. In India, there has been a concatenation of the EIA. It was first brought in the year 1994. This first EIA notification covered only a few industries. There were various shortcomings in the EIA, 1994. To solve the various conflicts in th00.3

e EIA 2006, the EIA notification of 2006 came in. Nevertheless, this was brought in to bring a perfect regulation that was missed in the EIA 1994 but gradually it was brought to notice that EIA 2006 was very far from reaching a perfect regulation for environmental impact. In the ongoing years, it went through various amendments and

²⁰ Rohini Pande & Anant Sudarshan, *Harnessing transparency initiatives to improve India's environmental clearance process for the mineral mining sector*, 3ie Impact Evaluation Report 92. New Delhi: International Initiative for Impact Evaluation (3ie) (2019) <https://www.3ieimpact.org/sites/default/files/2019-03/IE92-India-Environmental-clearance.pdf>

²¹ Aruna Singh, *The draft EIA notification, 2020: what went wrong?*, Lexology <https://www.lexology.com/library/detail.aspx?g=2761b4ea-af66-4c10-9056-61cd9d66036f> (last visited Oct. 6, 2022)

as a result, the EIA draft of 2020 was passed. Since the day the EIA draft of 2020 has been passed it has been subjected to various criticism all around the country.

Hindrance to Precautionary Principle – The untouched post-facto clearance procedure of EIA 2020.

The EIA 2020, predominantly strived a hindrance to the precautionary principle through its various features as adopted. But this shortcoming in the EIA, 2020 remains an untouched area or has been neglected by the authorities. The post-facto clearance procedure of EIA 2020, has given liberty and time to the various project holders of the industrial units or various other polluting units. In a very brief understanding of this procedure, it relates to allowing any industry to function even if it has not obtained the “green clearance”. This itself is a violation of the very objective of EIA for which it was formulated. This is disastrous because we already have several projects that are running without EIA clearances. An example is the LG Polymer Plant in Vishakhapatnam, where the styrene gas leak happened on May 7. It was revealed that the plant had been running for over two decades without clearances. A similar incident was reported on May 27, where due to poor adherence to environmental norms, the natural gas of Oil India Limited in eastern Assam’s Tinsukia district had a blowout and caught fire. This caused severe damage to the livelihoods in the region rich with biodiversity²². The State Pollution Board, Assam, had reported that the oil plant had been operating for over 15 years without obtaining prior consent from the board²³. This EIA approach was made to ensure that there is no further degradation of Environment but through various examples referred it can be understood that it has to lead to a hindrance to reaching to the precautionary approach developed through various international conventions. Such an industry dealing with hazardous substances without any environmental clearance proves that they must have not adopted any precaution before functioning and therefore resulted in such a disastrous happening.

Minimizing the role of Public Participation- Is this opening the new floodgates to violations

Environmentalists around the globe have argued on the very notion of the EIA notification of 2020 that it has opened new gates for violations to take place concerning

²² Archita Kashyap, *Burnt homes, illnesses, damage to ecology — what Baghjan is left with months after OIL fire*, The Print, (last visited Oct. 6, 2022) <https://theprint.in/environment/burnt-homes-illnesses-damage-to-ecology-what-baghjan-is-left-with-months-after-oil-fire/536957/>

²³ Abhijit Mohanty, *Why draft EIA 2020 needs a revaluation*, Down To Earth, (last visited Oct. 6, 2022) <https://www.downtoearth.org.in/blog/environment/why-draft-eia-2020-needs-a-revaluation-72148>

environmental harm. The new features of the EIA 2020 are floodgates to the violation. The post-facto clearance, reduction in the number of compliance reports, lack of public participation, excluding various projects. One of the primary contentious issues in the EIA notification along with post-facto clearance is “minimizing the role of public participation”. This has resulted in various conflicts which predominantly brings on the very fact that EIA 2020 has given huge liberty to polluting units while keeping the public uninvolved. Mostly, the people concerned relation to environmental harm is given 30 days time period to raise any issues related to the preliminary report of the EIA. The EIA 2020, has reduced the time to just 20 days. In a country like India, where there is a huge rural population and the majority of the stakeholders belong to poor communities. The less technology outreach the less information on the reports in such places most often reaches late and due to such time constraints, it leads to granting environmental clearance without public consultation. In such a lesser time of 20 days, it is practically impossible to transfer the reports in a country like India, where the percentage of poor is 21.2 % in rural areas compared with 5.5 % in urban areas. Rural areas account for nearly 90 % of poor people, accounting for 205 million of the nearly 229 million poor in India²⁴.

This feature of EIA, 2020 is a clear violation of principle 10 of the Rio declaration which proposes that “Environmental issues are best handled with the participation of the concerned citizens”²⁵.

Conclusion & Suggestions

Development and Environment balance remain a burning issues of all time. It's difficult to weigh the balance of both and even more difficult to practically analyze as to which one is heavier than the other. Though India has signed various conventions for environmental protection. yet the reality towards environmental protection is far from perfect. Practically it is impossible to reach a perfect level for any country, especially regarding environmental protection where there is net zero pollution. But there can be a minimal level where the environmental harm can be reduced. To curb environmental degradation various

²⁴ 41.5 crore people emerged out of poverty in India since 2005, but country still has largest poor population globally: *UN Report*, The Times of India, (last visited Oct. 6, 2022) <https://timesofindia.indiatimes.com/india/41-5-crore-people-emerged-out-of-poverty-in-india-since-2005-but-country-still-has-largest-poor-population-globally-un-report/articleshow/94921655.cms>

²⁵ *UNEP - Principle 10 and the Bali Guideline*, United Nations Environment Program, (last visited Oct. 6, 2022) <https://www.unep.org/civil-society-engagement/partnerships/principle-10>

Environmental principles were adopted in the Stockholm conference and the Rio declaration of which India has been one of the signatories.

Over time, it has been reflected through various environmental hazards that there has been non-conformity to these various environmental principles. There has gradually caused erosion to environmental protection. In recent times, Delhi was found to be the most polluted capital in the world for the fourth consecutive year in 2021 and 35 of the 50 cities with the worst air quality were in India, according to a new report²⁶. These alarming data represent the condition of the country which should be an eye-opening to the concerned authorities. The silence on this very part will lead to a catastrophic result and then it will be difficult to restore the situation. The deeper holes which are present in various regulation which was enacted for a piece of effective machinery to introspect and rectify any environmental hazard that takes place are being neglected now and then. For instance, the EIA 2020 is one such regulation which is consisting of various lacunas, these loopholes need attention on a priority basis and need to be rectified with time in force.

There is a need to strengthen the EIA process and bring certain changes to it. Human development is important for economic growth but it should never be at the cost of environmental harm. There is a very thin line between human development and the environment but this thin line encompasses a very important notion that should not be neglected at any instance. The proposed notification appears to have completely disregarded the precautionary principle, which is a crucial component of both Indian environmental law and the idea of sustainable development. Sustainable development should be an attainable goal for every nation. For this very concern, it should be suggested that there is a need of having wide public participation and transparency in decision-making in matters related to environmental hazards which adheres to principle 10 of the Rio declaration. In the EIA draft, there are various new concepts dealing with environment permissions, Resource augmentation plans etc. Therefore it formulates a need that the ministry should clarify these new concepts.

Lastly, the principles of good governance are much needed in environmental protection which should take into account all the stakeholders related to the environment. This will help in achieving Sustainable development and help in minimizing environmental harm.

²⁶*In 2021, Delhi most polluted capital in world, no Indian city met WHO air quality standard: Report*, Economic Times, (last visited Oct. 6, 2022) https://m.economictimes.com/news/india/in-2021-delhi-most-polluted-capital-in-world-no-indian-city-met-who-air-quality-standard-report/amp_articles/90374053.cms

THE CRIMINALISATION OF ECOCIDE - AN INDIAN PERSPECTIVE

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Introduction

In light of cases such as the Bhopal Gas Tragedy and the Oleum Gas Leak, wherein there were several injured parties, those who lost their lives, and countless victims of those who were not directly affected by the cases but were born with deformities and disabilities, the criminalisation of ecocide, a grave international crime that is gaining momentum on the international scale is something to be reckoned with. India already has criminal provisions in order to penalise the offenders. However, the current Indian government under the Modi administration plans to decriminalise environmental violations and replace them with higher penalties, according to a consultation paper that was published in July, 2022, by the Indian Government¹. In addition to this, in light of the Conference of Parties 27 (COP27), wherein the main theme has centred on climate finance and green bonds. India, as a rapidly developing nation, actively pushed for climate funds in addition to holding on to their fossil fuel “phase down” policy, as the current Indian fossil fuel market is the second-largest in Asia². This goes to show how the curbing of climate change through policies and legislations has become a lesser priority as compared to the acquisition of climate finance and funding for India - both in the domestic scenario as well as in the international forum. This paper illustrates how and why this is not a fair exchange, as this alteration would largely cater to business interests and corporations motivated by profit-making incentives, and delves into the importance of criminal liability of corporations for environmental pollution and damage in today’s world.

What is ecocide?

The term “ecocide” is relatively new, and has gained momentum in its use since the late 2010s due to an exponential increase in climate awareness and the public call for climate action. “Eco” generally refers to the abbreviation of “ecology” or “environment”, whereas “-cide” is a Latin suffix meaning “killer” or “the act of killing”³. Thus, the literal meaning of the

¹ ENVIRONMENT (PROTECTION) AMENDMENT RULES, 2022 INDIA ENVIRONMENT PORTAL, <http://www.indiaenvironmentportal.org.in/content/472602/environment-protection-amendment-rules-2022/> (last visited Oct 30, 2022).

² OIL & GAS INDUSTRY IN INDIA INDIA BRAND EQUITY FOUNDATION, <https://www.ibef.org/industry/oil-gas-india> (last visited Oct 30, 2022).

³ -CIDE DEFINITION & MEANING DICTIONARY.COM, <https://www.dictionary.com/browse/-cide> (last visited Oct 30, 2022).

term “ecocide” is the “act of killing the environment”, and the word has substantially gained substance and expanded its meaning since the spread of environmental awareness and education, as a result of the public pushing for legislative and policy changes towards climate action and curbing global warming. The roots of the word are the Greek *oikos* (home) and the Latin *cadere* (to kill)⁴.

Ecocide can be described as an act of “substantially damaging or destroying ecosystems, or harming the health and well-being of a species, including humans,” and, in other words, means “destruction of the natural environment by deliberate or negligent human action”. Examples of ecocide range from: ocean damage; deforestation; land and water contamination; and air pollution. Such large scale, harmful industrial activities have ultimately been the cause of the climate emergency, which calls for the necessary action to be taken in order to abide by the objective of sustainable development and steady growth that will not harm the natural environment.

In both the domestic and international contexts, environmental experts have demonstrated the need for the criminalisation of ecocide. Under international law and the Rome Statute, making ecocide a crime, especially in times of war, has been globally encouraged. This has also been codified by ten countries⁵. It has been proposed that ecocide should be a crime punishable by the International Criminal Court⁶. In addition to this, American environmental theorist Patrick Hossay has stated that the “human species” is causing an “ongoing extinction and ecocide”⁷. This has often been associated with the rapid and ever-growing increase of consumer demands being met with the supply of unsustainable practices by corporations, fuelled by a capitalistic environment. In the domestic opinion, critics have indicated there is a strong need for the usage of criminal punishments for violations of environmental law⁸. India’s rapidly developing economy, the vast infrastructural changes that have been taking place, and primal focus on poverty eradication have led to unsustainable practices and an unprecedented rate of

⁴ TO STOP CLIMATE DISASTER, MAKE ECOCIDE AN INTERNATIONAL CRIME. IT'S THE ONLY WAY THE GUARDIAN, <https://www.theguardian.com/commentisfree/2021/feb/24/climate-crisis-ecocide-international-crime> (last visited Oct 30, 2022).

⁵ R. D. WHITE & DIANE HECKENBERG, GREEN CRIMINOLOGY: AN INTRODUCTION TO THE STUDY OF ENVIRONMENTAL HARM (Routledge) (2014).

⁶ R. D. WHITE & DIANE HECKENBERG, GREEN CRIMINOLOGY: AN INTRODUCTION TO THE STUDY OF ENVIRONMENTAL HARM, pp. 45-59 (Routledge) (2014).

⁷ PATRICK HOSSAY, UNSUSTAINABLE: A PRIMER FOR GLOBAL ENVIRONMENTAL AND SOCIAL JUSTICE (Zed Books) (2006).

⁸ COMMENTS ON THE PROPOSED DECRIMINALISATION OF FOUR KEY ENVIRONMENTAL LEGISLATION VIDHI CENTRE FOR LEGAL POLICY, <https://vidhilegalpolicy.in/research/comments-on-the-proposed-decriminalisation-of-four-key-environmental-legislation/> (last visited Oct 30, 2022).

industrialisation that have had adverse effects on the environment, and thus stronger laws coupled with the threat of imprisonment would therefore deter such behaviour.

Thus, ecocide is largely regarded as the intentional causation of large-scale environmental damage during times of war⁹ – and the call to action for its criminalisation is seen as a means for the Rome Statute to eventually make it a crime punishable by the International Criminal Court. On the other hand, domestic laws regard ecocide on a relatively smaller scale, and use the term to coin the general damage to the environment caused by various entities ranging from individuals to large enterprises within a country.

While the definitions above largely pertain to international law and order, this paper aims to apply the object of “ecocide” as a criminal act within the country to a national level. It is important to note that there is a marked distinction between minor offences (such as smoking in prohibited zones, etc., that are on a much smaller scale) and large-scale violations of environmental law (for example: wildlife crime; illegal mining; dumping illicit trade and hazardous waste, etc.). Keeping this distinction in mind, the paper funnels into the criminal liability of corporations that are motivated by their profit-making motive in order to act in their self-interest and thereby cause major damage and pollution to the larger environment. The actions of criminal liability and current governmental plans on decriminalisation that largely cater to corporate interests, are analysed from a criminal jurisprudential point of view.

Current Environmental Legislations in India

The current legislations that govern Indian environmental jurisprudence are: the Air (Prevention and Control of Pollution) Act; the Water (Prevention and Control of Pollution) Act, the Environment (Protection) Act and the Public Liability Insurance Act. These four laws, as their names suggest, govern the quality of air and water resources, regulate the methods of protection of the environment, and put forward the penalisation of violators through the satisfaction of legal principles and doctrines such as public liability. The current laws have paved paths for ground-breaking judgements made by the legal authorities, such as *M.C Mehta v. Kamalnath* (1996)¹⁰ and *Union Carbide Corporation v. Union of India* (1989)¹¹. Environmentalists and policy experts claim that, though there is a need for reform for the current laws, the overall decriminalisation of environmental laws would not be helpful. All of

⁹ Prisca Merz, *Ecocide: Prisca merz argues it is now time to act against the large-scale damage or destruction of ecosystems*, SOCIALIST LAWYER , 16–19 (2014).

¹⁰ M.C. MEHTA VS KAMAL NATH & ORS (1997) 1 SCC 388.

¹¹ UNION CARBIDE CORPORATION VS UNION OF INDIA, 1990 AIR 273, 1989 SCC (2) 540.

these laws have provisions for fine and/or imprisonment, which is a method used to deter behaviour that could violate the laws set in the Act. However, it is pertinent to note that these laws have not been updated, reviewed or reformed in many years, which is why policy experts believe that the new intention of the Indian government would be counterproductive to their desired goal. Although the word “ecocide” is not mentioned in any of the Acts, the objectives of the Acts pan out to the ultimate goal of the protection of the environment and to take the necessary steps towards climate action and India’s pledges in the international forum, for example the Paris Agreement in 2015, etc. So, the term “ecocide” can be understood implicitly through the objectives of the various Acts.

The current environmental legislations have only just begun taking steps towards producing tangible results in holding corporations and companies criminally liable for their actions in causing damage to the environment. For example, in the case of *Union Carbide Corporation v. Union of India (1984)*,¹² wherein there were several victims of the Bhopal Gas Tragedy, the aggrieved were barely compensated, and the Indian Government had largely taken responsibility for the victims by providing specialised hospitals for them and attempting to treat the contaminated groundwater as an aftermath of the leakage, while the criminals had fled the jurisdiction. The criminals who were liable for the disaster, mainly the owner of the foreign company who refused to pay for maintenance of the pipes from which the methyl isocyanate had leaked from, were never punished. This has led to widespread grief as they were never brought to justice and the victims and their families who would suffer for generations after the disaster will never get the closure that they are entitled to. The corporation as a whole was held criminally liable, and it was later known as the worst gas accident in history. Similarly, in cases such as *Rural Litigation and Entitlement Kendra v. State of Uttar Pradesh* and *M.C. Mehta v. Union of India*, the corporations were subject to orders from the Court, and these types of corporations are graded as the fourth-highest group of organised criminal activities that occur across the globe¹².

¹². SHOULD COMPANIES HELD LIABLE FOR THE ENVIRONMENTAL DAMAGE THEY CAUSE, INDIAN JOURNAL OF CORPORATE LAW AND POLICY, <https://ijclp.com/should-companies-be-held-liable-for-the-environmental-damage-they-cause/> (last visited Oct 30, 2022).

What does the Indian government aim to do?

In July, 2022, the Indian government had released the amendments that it plans to make based on a consultation paper¹³. This consultation paper had later manifested itself into a proposal for amending the four environmental legislations, seeking to decriminalise offences under the same, meaning that; although there will still be provisions on the payment of fines, there will be no threat of imprisonment or jail time. The proposed amendments, therefore, seek to make three major changes:

1. The First change that they plan to take is to *replace imprisonment with higher penalties* for majority of the violations presently considered as offences under these laws¹⁴.
2. In addition to this, the proposed amendments also intend to appoint “*Adjudicating Officers*” under each of the Acts to allow the quantum of penalties to be determined.
3. Lastly, the amendments also aim to empower the Central Government to establish three new funds, namely: the Environmental (Protection) Fund, the Water Pollution Remediation Fund and the Air Pollution Remediation Fund, under their respective Acts; where penalties imposed in case of contraventions shall be credited under the EPA, Water Act and Air Act respectively¹⁵.

Thus, the Indian government plans on lifting the threat of criminal liability given for the commitment of “ecocide” in these environmental laws altogether, due to their concern with the consequences of the actions of one set of actors only¹⁶. This is because of the fast-paced industrialisation coupled with the desire to have a boosting economy, that many of the pollution-related activities are outsourced from companies in countries that have much stricter legal standards when it comes to environmental pollution. Therefore, the government felt the need to intervene and “insulate” these economic entities from disruptions¹⁷.

¹³ CONSULTATION PAPER ON PROPOSED AMENDMENTS IN THE FOREST (CONSERVATION) ACT, 1980 MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE , http://environmentclearance.nic.in/writereaddata/OMs-2004-2021/263_OM_02_10_2021.pdf (last visited Oct 30, 2022).

¹⁴ COMMENTS ON THE PROPOSED DECRIMINALISATION OF FOUR KEY ENVIRONMENTAL LEGISLATION VIDHI CENTRE FOR LEGAL POLICY, <https://vidhilegalpolicy.in/research/comments-on-the-proposed-decriminalisation-of-four-key-environmental-legislation/> (last visited Oct 30, 2022).

¹⁵ *Supra*.

¹⁶ NEW RULES OFFER COMPENSATION, NOT FREEDOM FROM POLLUTION HINDUSTAN TIMES, <https://www.hindustantimes.com/india-news/new-rules-offer-compensation-not-freedom-from-pollution-manju-m-and-kanchi-k-101657287924441.html> (last visited Oct 30, 2022).

¹⁷ *Supra*.

Issues

There are various issues with the steps that the Government under the administration of Modi plans to take, that encompass matters on compensations, funding, and remaking the entire mechanism. By making it a green finance issue and completely exempting big corporations from any criminal liability, the government is lifting the burden of dealing with legal action from them. To begin with, removing the provisions of imprisonment from environmental laws in its entirety will defeat the original intent for the protection and improvement of the environment as mentioned in the preamble of the EPA. To deter people from committing grave violations, the criminal provisions must be retained. In addition to this, the quantum of penalty being proposed in each of the Acts is too low to effectively deter violations, especially where the profit from violations outweighs the amount of the penalty¹⁸. Therefore, to sum up, the issues are:

1. Removing the provisions of imprisonment from environmental laws in its entirety will defeat the original intent for the protection and improvement of the environment as given in the EPA.
2. The quantum of penalty being proposed in each of the Acts is ineffective.

The entire purpose of criminal law, as we have learnt in class, are:

1. Punishing criminals;
2. Deterring individuals from committing a crime;
3. Reforming society through methods such as admonishing and probation;
4. And most importantly, compensating the aggrieved party fairly.

It is important to note in this case that the “other party” are not just the environmental authorities or the Indian government. The “other party”, in matters such as the well-being of the environment that are inherently intrinsic to the land, are the generations to come. In environmental law, the factor of “intergenerational equity” is stressed upon, as it is largely believed and agreed upon that the current generation should use the resources that have been given to them without compromising the future generations’ ability to utilise these resources as well. It is also widely believed that we have not inherited the Earth from our ancestors, but have borrowed it from our children. While a representative of the “future generation” cannot

¹⁸ *Supra*.

stand before the Court, organisations and authorities can definitely represent their interests. Therefore, the criminal liability of corporations turning deviant should not be taken away and been rid of by the Indian government. It is important to make provisions and legal mechanisms wherein the strength of criminal law and procedure as well as the object of environmental legislations are utilised to the greatest extent of their abilities, powers and functions.

The future of Indian Environmental Jurisprudence

There have been conflicting opinions on the proposed amendments – ranging from making a different guidance model and retaining the criminal liability provisions in the Acts to bringing in civil liability in order to make court procedures more convenient. However, the government must take a stance with regards to the situation with the environmental laws in order to further the principle of intergenerational equity and for the larger public interest.

According to some policy experts, the proposed amendments of having higher penalties and being rid of criminal liabilities is a model that will not work because these economic entities still need to be held liable in the eyes of the law. However, this set of experts believe that using a legal model based on civil liability would be more effective. As the government may not want to criminally prosecute economic entities that are important to Indian society, and are generally law-abiding actors, the procedure of a criminal case would be too much to bear for both parties involved, ranging from the greater burden of proof, so the limited resources to generate evidence and the long-drawn prosecution procedures¹⁹.

In addition to this, it has been argued that there should be a layered guidance model to assess the penalty amount, as well as a set of guidelines for the adjudication process to be fair and streamlined. This should also be in coherence with the strengthening of “special violations”, that take place often with companies and corporate entities that conduct large-scale operations and therefore have more disastrous consequences on the environment than those causing minor violations of the law and thereby not having as adverse effects. Lastly, to make an effective contribution towards monetary relief, there have been proposals made to have an amalgamation of funds in the existing Environmental Relief Fund (ERF)²⁰.

¹⁹ NEW RULES OFFER COMPENSATION, NOT FREEDOM FROM POLLUTION HINDUSTAN TIMES, <https://www.hindustantimes.com/india-news/new-rules-offer-compensation-not-freedom-from-pollution-manju-m-and-kanchi-k-101657287924441.html> (last visited Oct 30, 2022).

²⁰ COMMENTS ON THE PROPOSED AMENDMENTS TO ENVIRONMENTAL LAWS VIDHI CENTRE FOR LEGAL POLICY, https://vidhilegalpolicy.in/wp-content/uploads/2022/07/Comments_Decriminalization_Environmental_Laws_VCLP_21072022.pdf (last visited Oct 30, 2022)

Conclusion

As the Indian government is often found in a special spot due to international pressure for sustainable development as opposed to its need for economic prosperity, it has been contended that the decriminalisation of the provisions given in the environmental provisions would defeat the original intent for the protection and improvement of the environment as given in the preamble of the Environment Protection Act. This would also feed and cater to one section of society, as corporations and companies are those that contribute the most out of all individuals to environmental damage and pollution, but could easily cater to and budget for the higher environmental penalties if the laws are changed. In addition to this, while decriminalisation does not give these economic entities the “freedom to pollute” it does rid them of the threat of criminal liability and imprisonment, and the proposed civil liability and payment of fines and damages is precisely what these economic entities budget for²¹. In conclusion, the Indian perspective of criminalising or decriminalising ecocide is still a topic of heavy debate, though the objectives of intergenerational equity as well as the Right to Environment must be protected at all costs.

²¹ *Supra.*

THE IMPORTANCE OF DIGITAL FORENSICS IN THE ADMISSIBILITY OF DIGITAL EVIDENCE

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Abstract

There is a paradigm shift in the notion of evidence in the modern era as increasing disputes are technical in nature and there is a voluminous increase in cybercrime. To cope with this situation, courts seek for electronic records for settling any dispute or proving an offence. However, due to the certain unique traits of electronic records or digital evidence, they are susceptible to misuse and thus result in abuse of the process of law which might lead to miscarriage of justice. Hence, it has to pass through the rigorous processes of admissibility. There are also various scientific methods which experts formulate to identify, retrieve, preserve and present such evidence in court. This process is known as "Digital Forensics". Initially, to frame a standard for admissibility was a difficult situation as it was susceptible to different interpretations. Presently, the law is more or less settled. However, there are certain variations in different jurisdictions. This article in Part A features an understanding of Digital Forensics and Digital Evidence. It also focusses on how digital evidence may be used in law enforcement. The section details the step-by-step process followed by digital forensic analysts to present evidence in court. Part B, highlights the admissibility criteria of digital evidence in the UK and India. The article mainly focuses on the law in India, as found in the Indian Evidence Act and also explores key case law findings that have shaped the admissibility of digital evidence in India to date. The concluding remarks draws a brief comparison between the state of admissibility of digital evidence in India and UK as well as the opinions of several scholars and judges on this issue.

Keywords: Digital Forensics, Digital Evidence, miscarriage of justice, Indian Evidence Act, electronic records

Introduction

In the modern era, the metaphysical digital world is just as big a part of our lives as the real world itself. Various social, administrative and economic activities now take place in the digital

space. This means that it has also become a hotbed for criminal activity. With the growing number of digital offences increasing dramatically, modern criminal cases and investigations require the use of digital evidence. It provides an exclusive window to access the correspondences of companies or individuals from the data and statistics that can be generated using the huge amount of information which might not have been possible to record on pen and paper. ¹As Oliver Leroux stated in the *International Review of Law, Computers, and Technology* “The gathering, conservation, communication and presentation of the computer-derived evidence must fulfil legal requirements with regard to the admissibility of the evidence...It is therefore essential to ensure...that computer-related evidence was collected, preserved and transmitted in accordance with legal requirements...”² This is what Digital Forensics enables us to do and why it is an important field to integrate into any legal system as “the value of digital evidence has exploded globally”.³

This article has been divided into two sections. Section A deals with defining digital forensics and digital evidence in layman’s terms and go over some of the key aspects of both concepts. Section B of the article deals with how the digital evidence produced by the forensic process is admissible for use by courts in India and for comparison, how the UK legal system has integrated the admission and use of digital evidence

Section A: Understanding Digital Forensics and Digital Evidence.

Defining Digital Forensics

The term digital forensics can be interchanged with the term computer forensics or cyber forensics⁴ as it is the art and science of applying computer science to aid the scientific and legal process. It is a relatively new field that combines elements of computer science and law to collect and analyse data from computer systems, networks, wireless communications⁵, which is admissible as evidence before a court of law⁶. Put simply, digital forensics is the process of recovering evidence from digital media. It is the examination of computers, cyberspace, and

¹ Professor U Sieber ‘Legal aspects of computer-related crime in the information society—COMCRIME study’.

² Olivier Leroux (2004) Legal admissibility of electronic evidence, *International Review of Law, Computers & Technology*, 18:2, 193-220, DOI: 10.1080/1360086042000223508 [<https://doi.org/10.1080/1360086042000223508>] (Last accessed Jan. 10, 2022)

³ Losavio MM, Pastukov P, Polyakova S, Zhang X, Chow KP, Koltay A, James J, Ortiz ME (2019) The juridical spheres for digital forensics and electronic evidence in the insecure electronic world. *Wiley Interdiscip Rev Forensic Sci* 1(5):e1337

⁴ An Investigation Into Computer Forensic Tools." In ISSA, 2004, pg. 1-11.

⁵Dahbur, Kamal, Bassil Mohammad, *The Anti-Forensics Challenge*, 2011, at 1-7

⁶Ries, David G, Clark Hill PLC. "Digital Forensics in the Courts." (2017).

other electronic devices for evidence, in a forensically sound manner with the aim of identifying, preserving, recovering, analysing, and presenting facts and opinions about that evidence.

It is a broad field which is constantly evolving. Nowadays tablets, smartphones and flash drives are common and depending on the type of device, media or artifacts, this field has branched into various forms of forensics encircling computer forensics such as System Forensics, Network Forensics, Web Forensics, Data Forensics, Proactive Forensics, E-mail Forensics, Enterprise Forensics, Cyber Forensics, Digital Forensics.

There are three main types of investigations, and they differ in terms of the legal restrictions and guidelines as well as the type of digital evidence that is dealt with and the ultimate report that is made after concluding the investigation.

- 1) Criminal Forensics - The first and the largest form of digital forensics is criminal forensics. This is usually undergone as part of a larger law enforcement investigation. The aim is to extract intact digital evidence for use in trials where an expert report and testimony is given that can be understood by the jury and provide relevant facts that can help them make their decision.
- 2) Intelligence Gathering -. Similar to the first, this is also in relation to criminal activity, but the aim is to provide information that can track, stop or identify criminal activity. Unlike the first type, forensic soundness is less of a requirement unless this evidence is to be later used in court.
- 3) Electronic Discovery/eDiscovery – This is like criminal forensic but is used in civil cases. There are usually more legal limitations and restrictions on the scope of these investigations due to various privacy and human rights laws that are applicable in the jurisdiction.

Defining Digital Evidence

Digital evidence has been defined by the council of Europe as “any evidence obtained from data contained in or created by any device, the operation of which depends on software or data stored or transmitted through a computer system or network”⁷ This definition provides much

⁷ Council of Europe (2019) Guidelines of the Committee of Ministers of the Council of Europe on electronic evidence in civil and administrative proceedings < https://search.coe.int/cm/Pages/result_details.aspx?ObjectId=0900001680902e0c> (Last accessed Jan. 10, 2022)

clarity as it not only includes digitally born evidence but recognises data which during its life is transformed and then stored or exchanged in electronic form as digital evidence as well.

Digital Evidence provides unique challenges separate from traditional evidence due to the key characteristics unique to this type of evidence.

- The first issue is the intangible nature of the evidence. Unlike visible and corporeal objects of proof, the evidence is invisible and intangible which opens several practical and legal issues. Digital data is extremely volatile as digital documents, logs and records can easily be altered by a few simple keystrokes and this can be done without leaving manifest traces. For example, by changing the internal clock in a laptop, one can change the time a document was created.
- Secondly, this also means this data is sensitive and prone to destruction. Improper or inexperienced handling of digital evidence can lead to its complete loss, such as data being lost on hard drives via electromagnetic forces within the storage units of police stations. Investigators often have to recover data that has been deleted and the Court has to believe that the data retrieved by investigators are in fact legitimate and untampered. “This is the reason why the computer and its media must be handled in a way that ensures that no possible evidence is damaged, destroyed or altered.”⁸ This creates a high skill ceiling barrier as only forensic experts, those trained in both the law and computer science can handle such data and exposure to untrained parties leads to the evidence becoming polluted and unusable.
- Finally, digital data is easily transferrable and highly mobile. This makes it very easy for confidential digital evidence to be leaked to the public or transferred to malicious parties, which can bias juries and lead to mistrials and ultimately result in the evidence being inadmissible or discarded despite its relevance.

The Principles of Digital Forensics in Handling Digital Evidence

As outlined above, due to the issues caused by the nature of digital evidence, for such evidence to be used in court, certain standards need to be maintained. As Olivier Leroux has emphasised, “these particularities do not exempt the electronic evidence from legal requirements relating to the evidence in the real world. Computer-derived evidence must have all attributes of

⁸ Olivier Leroux, *supra* note 2

conventional evidence”⁹ There have been efforts to make internationally accepted principles which applies to India as well. Moussa has concluded after extensive research into various international best practices such as those in the guidelines of the council of Europe that there are two key principles – “first, the electronic evidence must be legally obtained based on written permission from the competent investigation authorities; second, it must be verified as valid by computer science and information technology experts.”¹⁰ This can be rephrased as two key principles, authenticity, and accountability.

1) Authenticity– Evidence must be collected in a way that does not allow alteration of crucial data. To prevent contamination:¹¹

- All files in a computer system that are not encrypted are copied and only copies of the data are worked on. Copy is made using software specifically designed for such purposes.
- Any deleted information is retrieved and copied to an external source.
- Contents of hidden files are revealed using specific software to identify hidden data and protected files are decrypted and accessed.
- Inaccessible parts of computer disks are analysed to locate files that could contain crucial data.
- Only professionals and experts should have access to original digital evidence.

Accountability – To maintain accountability, all steps of the procedure are documented. The process of obtaining and verifying electronic evidence which consists of access, seizure, storage, and transfer should be documented and reported, conserved, and made available for inspection. Sometimes individuals or agencies oversee the production of technical report. The report aids the court to evaluate the evidence and decide the matter. The report is supplemented by expert testimony which provides the reasoning behind the authors findings and allows for cross examination. All this maintains a ‘chain of custody’ which essentially allows courts to be sure of the fact that the data was handled by individuals who can be held accountable.

⁹ Olivier Leroux (2004) Legal admissibility of electronic evidence , *International Review of Law, Computers & Technology*, 18:2, 193-220, DOI: 10.1080/1360086042000223508 [https://doi.org/10.1080/1360086042000223508] (Last accessed Jan. 10, 2022)

¹⁰ Moussa, A.F. Electronic evidence and its authenticity in forensic evidence. *Egypt J Forensic Sci* **11**, 20 (2021). https://doi.org/10.1186/s41935-021-00234-6

¹¹ IvyPanda. (2018, November 28). *Computer Forensics and Other Information Technologies. Principles of Computer Forensics*. https://ivypanda.com/essays/computer-forensics-and-other-information-technologies-principles-of-computer-forensics/

THE PROCESS TO UPHOLD THE PRINCIPLES

As we can see, the forensic process with regards to digital evidence must be tightly controlled to adhere to the principles mentioned above. The process can be broken down into steps as shown by the image below.¹²

In the 'Identification' phase, depending on the type of forensic investigation, the purpose and resource requirement will vary. In criminal forensic matters there may be multiple possible crime scenes, each scene with a multitude of devices. The first step is to identify all the potential digital media that could contain digital evidence. A single investigation may need to cover phones, tablets, laptops, cloud storage spaces, routers, hard drives, USB, etc.

The second phase 'Preservation' is one of the most important ones as it is at this stage that investigators need to acquire the identified devices in a manner that maintains the integrity of the evidence and store it in a way that prevents contamination. Once a valid warrant from the court or permission from the owner of the devices is obtained, the investigator must decide how each device, which is running, or which is static is to be dealt with. If the device is static a bit-to-bit copy of the data is to be made. This bit copy is obtained through specialist tools that prevent modification during the collection. These devices that stop modification are called write blockers. These can be hardware or software. Hardware devices are considered more reliable and are becoming industry standard. This copy is what the next phase, analysis takes place on. Working from a copy and not the original is one of the fundamental steps to making the forensic audit acceptable to the courts. After acquisition there needs to be verification and by leaving the original device and the evidence as it was found, the copies or forensic images that were made can later be verified and shown to be accurate. A common method to show that a forensic image or copy of the evidence is the same as the original is through hashing. Forensic tools are used to create a verification hash (MD5, SHA 256) of the media, and this creates a unique mathematical algorithm that produces a unique value. Any changes made to the data in the forensic image/copy will result in a different hash from the original digital evidence. If both the original and image produce the same hash value, then the accuracy of the image is verified

¹² Lawrence Williams, What is Digital Forensics? History, Process, Types, Challenges [10 September 2021], <<https://www.guru99.com/digital-forensics.html>>

in court. Forensic images are put into secure storage, and this can be via various proprietary formats, a popular one being “Encase Evidence File Format” (EETF) or RAW.

The third phase, ‘Analysis’ is the most time consuming. The copy is verified again, and deleted files are checked for and recovered, timelines are established and the time zone setting of the suspected device is checked, a keyword list is made to make the search for evidence quicker. It requires an individual with special skills that have an investigative mind to find relevant digital evidence to support a case theory. The technicality of this phase is a topic that is beyond the scope of regular lawyers and law enforcement.

The fourth phase, ‘documentation’ is an ongoing step. A creation of all visible data is to be made. Crime scene may be recreated and reviewed through this process. Documentation includes crime scene photographing, sketching and crime-scene mapping. The stage is essential in proving authenticity to the court as any challenge as to the handling of the digital evidence is resolved using this documentation.

The final part is presentation. In criminal cases, normally simple factual conclusions are presented, in a manner that is digestible to common people and speculative assessments are left for law enforcement. The contents of a common forensic report are “glossary with explanations of all technical terms, the analysis and its description and summary of findings.” Expert testimony is provided by the author in support of the report being presented.

Application in Law Enforcement

Digital forensics is critical to law enforcement in resolving conflicts in both civil and criminal cases by providing vital and relevant evidence. Examples of its applicability in civil cases include those involving Intellectual Property theft, Industrial espionage, Employment disputes, Bankruptcy investigations, etc. Examples of its applicability in criminal cases include cybercrimes such as unauthorised hacking, theft of data, Digital Fraud investigations, Cyber terrorism, DDOS attacks, etc. As Moussa states in his findings, “Cybercrimes are among the most serious criminal activity of the present day.”¹³

¹³ Moussa, A.F. Electronic evidence and its authenticity in forensic evidence. *Egypt J Forensic Sci* **11**, 20 (2021). <https://doi.org/10.1186/s41935-021-00234-6>

Evidence adduced can have a wide variety of uses due to the diversity of data that can be obtained from devices nowadays. These applications are listed below¹⁴

Attribution – Digital data helps in identification of an individual from the personal documents found on the computer drive. In the famous case of the BTK Killer from Wichita, Kansas, USA, the use of digital forensics allowed law enforcement, who thought he was dead, to be able to obtain a drive from the serial killer in the early 2000s as he left an intentional trail for police to follow, proving he was still alive.¹⁵

Alibis and statements - Digital Evidence can assist in confirming the validity of alibis or witness statements. For example, mobile phone logs can prove whether a person was out of the country during a particular time.

Intent - Sometimes digital evidence can be used towards establishing mens rea as well. The social media posts of a person, as well as internet search histories can provide indications as to what a person was thinking or looking in to before committing a crime. For example, there are many instances where killers look up guides to killing people or how to purchase illegal weapons.

Evaluation of source and Document authentication – To identify the origin of a certain piece of data file, artifacts and meta-data can be used. Figuring out whether a file was produced on the digital device being examined or obtained from elsewhere (e.g., the Internet) can be very important in criminal trials. In the same vein, it is important to understand when details in documents have been falsified. Meta data with digital documents can be easily modified and this can be crucial in many cases. The creation date of a file can be changed by fixing the computer clock or placing a digital signature for illegal authorization. Cyber Forensics can assist in such matters by validating the authenticity of important documents, which ultimately aids investigation and supplies evidence to the court of law.

Section B – Approach to the Admissibility of Digital Evidence

Hopefully, Section A has provided an outline on the concepts of digital forensic and digital evidence in a general sense. Section B intends to take a closer look at how these concepts work in practise. It would be prudent to note at this point that in commonwealth jurisdictions there

¹⁴ Various. Eoghan Casey, *Handbook of Digital Forensics and Investigation*. Academic Press. ISBN 978-0-12-374267-4, pg – 567, 2009

¹⁵ Rivera, A. (2018, February 12). *BTK Serial Killer: Power of Computer Forensics*. The Bakersfield Californian. Retrieved October 30, 2021, < https://www.bakersfield.com/kern-business-journal/btk-serial-killer-power-of-computer-forensics/article_dd8f0ad3-f833-50b6-8e25-dcf6d406d5c4.html.> (Last accessed Jan. 15, 2022)

are two core principles that present main barriers to the admissibility of digital evidence. They are the hearsay evidence rule and best evidence rule.

The Rule against hearsay essentially means a witness can testify to those facts which he had himself seen, heard, perceived or who holds the opinion himself. The statements of the witness are verified by cross-examination and any statement which is not firsthand is hearsay.

Since by nature the digital mediums which produce the digital evidence cannot be cross examined, the courts have always considered computer documents to be hearsay evidence and therefore inadmissible unless exceptions are made.

The Best evidence rule essentially means that greatest weight is given to evidence that is original. For computer documents the original is contained in the computer in electronic and magnetic form and the printouts are hearsay. While devices such as mobile phones, USBs and hard disks were producible as direct original evidence, it is not always possible to bring the device containing the original data as evidence to the court, such as with large cumbersome servers.

Let us now see how the law in India and the UK have evolved exceptions to admit digital evidence into the fold. This section will focus on Indian laws regarding digital evidence and comparisons will be made with the UK to offer a broader perspective. This is primarily because **Section 65B in The Indian Evidence Act, 1872** is taken from **Section 5 of the Civil Evidence Act 1968 in UK**.

India – Admissibility of Digital Evidence

The introduction of ‘digital evidence’ into our laws can be traced to the Information Technology Act, 2000 (“**IT Act**”). The IT Act along with the related amendments to the Indian Evidence Act 1872 (“**EA**”) and the Indian Penal Code 1860 (“**IPC**”) contain the bulk of statutory law relating to this type of evidence. Section 4 of the IT Act introduced the concept of electronic record and by virtue of Section 92 of the IT Act, EA was amended to include “electronic record”, thereby allowing for admissibility of the digital evidence.

These provisions essentially created a dichotomy between the magnetic digital data contained on the device, which was the original and the copies produced from them. The electronic evidence retrieved by using cyber forensics is deemed to be the original document and the printed reproductions of the same are secondary evidence. Secondary evidence requires certification of authenticity by a competent authority who is subject to cross-examination. Section 65B of the EA deals exclusively with the admissibility of this ‘secondary’ digital

evidence. Since most digital evidence is of this nature, we should look at this section in more detail.

Section 65B of the Indian Evidence Act

Section 65B deals with admissibility of electronic evidence. According to sub-section (1) electronic records which are printed on a paper, stored, recorded or copied in optical or magnetic media produced by a computer shall be also deemed to be a document if the conditions mentioned in this sub-section (2) are satisfied in relation to the information and computer in question and shall be admissible in any proceedings, if:

- Information was produced during the regular course of activities by the person having a lawful control over the computer's use...
- The computer was operating properly, or the improper operation did not affect the electronic record or the accuracy of its contents.

The above conditions are to create a two-fold impact, firstly, to restrict and ensure the unauthorized use of data and secondly to confirm that the device was functioning properly so that the accuracy and genuineness of the reproduced data is maintained.

According to Section 65B sub-section (3) of the Indian Evidence Act, 1872 if the user uses a networked device for storing or processing information, all the devices in the same network would be considered as a single device. Sub-section (4) provides for a certificate of authenticity to be provided by a competent authority for the purpose of proof checking and authentication of the compliance to be maintained in the preceding sub sections.

Leading advocates at Khaitan & Co have authored that “The certificate is to be executed/signed by a person occupying a responsible position in relation to the device through which the data has been produced. The certificate must identify the electronic record containing the statement, describe the manner in which it was produced and also give such particulars of any device involved in the production of the electronic record as may be appropriate for the purpose of showing that the electronic record was produced by a computer. The certificate must also deal with any of the matters to which the conditions for admissibility relate. The entire idea behind the certificate is also to ensure the integrity of the source and authenticity of the data, so that

the Court may be able to place reliance on it. This is critical since electronic data is more prone to tampering and alteration.”¹⁶

The application of Section 65B has led to a few interpretations and issues and an examination of the case law will follow to highlight this.

Case law on admissibility of digital evidence in India

The leading case law on this is the judgement of “Arjun Panditrao”¹⁷, which considered three key issues with regards to Section 65B of the EA. These are:

- A) Whether or not section 65B constitutes the complete code in India as to the admissibility of secondary digital evidence,
- B) Whether the requirement of a certificate was mandatory in all cases and
- C) Finally at which stage of the proceedings in a criminal or civil trial would the certificate need be produced.

Dealing with issue A, initially in the case of *State (NCT of Delhi) v Navjot Sandhu @ Afzal Guru*, [(2005) 11 SCC 600], it was stated that secondary digital evidence could be adduced under other Sections of the EA, mainly Sections 63 and 65 of the EA. This could be done irrespective of compliance with the requirements of section 65B and even without a certificate as specified in subsection 4 of 65B. However, this was not what the legislature had intended and later in *Anvar PV v PK Basheer and Others* [(2014) 10 SCC 473, this decision was reversed, and it was held conclusively that documentary evidence in the form of an electronic record can be proved only in accordance with the procedure set out under Section 65B. It was confirmed in *Arjun Panditrao* that *Anvar* was the correct legal statement, and it could be concluded that section 65B was indeed the complete code on this matter.

Requirement B also generated many issues. The strict requirement imposed by *Anvar* meant that in cases where certificates need to be procured from a third party, the litigant is not in position to dictate the language of the Certificate. This in turn has led to bona fide litigants suffering on several occasions. Due to this, the Division Bench of the Supreme Court went against the three-Judge Bench judgment of *Anvar P.V* in the case of *Shafhi Mohammed v.*

¹⁶ Ajay Bhargava , Aseem Chaturvedi , Karan Gupta and Shivank Diddi, ‘India: Use Of Electronic Evidence In Judicial Proceedings’ <<https://www.mondaq.com/india/trials-appeals-compensation/944810/use-of-electronic-evidence-in-judicial-proceedings>>(Last accessed Jan. 15, 2022)

¹⁷ *Arjun Panditrao Khotkar v Kailash Kushanrao Gorantyal & Ors* 2019 SCC OnLine SC 1553

State of Himachal Pradesh 2018 (2) SCALE 235. The Supreme Court observed that “Sections 65-A and 65-B of the Evidence Act, 1872 cannot be held to be a complete code on the subject.” It further held that “in a case where electronic evidence is produced by a party who is not in possession of a device, applicability of Sections 63 and 65 of the Evidence Act cannot be held to be excluded.” This decision was decisively overturned in *Arjun Panditrao* and therefore the certification requirement remained mandatory and this was justified on the basis that the courts had significant coercive powers to demand certifications from the relevant authorities. Therefore the maxim of “The law does not compel a man to do that which he cannot possibly perform” was not contravened, as via requests to the courts, the mandatory certificate can be attained with assistance or the party liable to provide the certification may incur fines or imprisonment. Reference was made to powers under Order XVI of the Civil Procedure Code, 1908 (“CPC”) and the Code of Criminal Procedure, 1973 (“CrPC”), to summons to produce documents.

Arjun Pandit also confirmed that Oral evidence cannot be a substitute to the certificate under Section 65-B. The Court also clarified with regards to primary evidence that, “the requisite certificate in sub-section (4) is unnecessary if the original document itself is produced. This can be done by the owner of a laptop computer, a computer tablet or even a mobile phone, by stepping into the witness box and proving that the concerned device, on which the original information is first stored, is owned and/or operated by him.”

The third confusion, issue C, was regarding the time as to when the certificate under Section 65-B would be produced in evidence. In this regard contradictory positions were taken by the Supreme Court in the case of *Anvar P.V.* At one place it was observed that such certificate shall be presented to the court when the electronic record “is produced in evidence”. The other view is that certificate shall be obtained at the time of “taking the document”. The contrary observations of the Supreme Court has led to various interpretations. In ***Paras Jain v. State of Rajasthan***¹⁸, the High Court opined that a Certificate under section 65B is not required to be filed with the police report (chargesheet), however, the only necessity is to complete the procedure is to procure and submit the certificate before the admissibility of evidence is considered by the court. The court referred to various provisions of Code of Criminal Procedure, to arrive at such conclusion that documentary evidence may be produced which has not been submitted with charge sheet.

¹⁸ 2015 SCC Online Raj 8331

The Delhi High Court in the case *Kundan Singh v. State*¹⁹ of considered the same issue as Paras Jain's case, whether simultaneously certificate under section 65B can be issued with the production of computer output or whether the certificate be issued and produced when such document is admitted in evidence. The Division Bench observing P.V. Anvar held that it is not required to issue certificate simultaneously or contemporaneously. The Delhi High court distinguished admissibility and authenticity and clarified that section 65B deals with only admissibility and not authenticity as such there is no strict stage where the certificate must be produced.

It has been held the learned judges in Arjun Panditrao that "so long as the hearing in a trial is not yet over, the requisite certificate can be directed to be produced by the learned Judge at any stage, so that information contained in electronic record form can then be admitted and relied upon in evidence."

Thus, as the law currently stands, certification for secondary digital evidence is mandatory from forensic experts which can be called upon by the court in case of any questions as to authenticity if and when certification is not forthcoming, but this does not remove the prerequisite entirely. Let us now consider the legal position in the UK for comparison.

UK Laws on Digital Evidence

The law of evidence in the UK has recognised three types of computer-generated documentary evidence. The first type is 'real evidence', such as calculations or analyses generated by the computer itself. An example would be inbuilt clocks. Real evidence is admissible as direct evidence. In this respect, Smith (1981) wrote on computer evidence, and developed the ideas put forward in *The Statue of Liberty* [1968] 1 WLR 739 and crafted a rule which was later accepted by the courts. "Where information is recorded by mechanical means without the intervention of a human mind, the record made by the machine is admissible in evidence, provided of course, it is accepted that the machine is reliable." This was used in the case of *Castlev. Cross* [1985] 1 All ER 87. The prosecution sought to rely on a printout from a computerised breath-testing device. The Court held that the print-out was admissible evidence. The Court held that so long as it could be shown that the computer was functioning properly and was not misused, a computer record can be admitted as evidence.

¹⁹ (2016) 1 DLT (Cri.) 144

Secondly, there are documents and records produced by the computer which are copies of information supplied to the computer by human beings. This evidence is treated as hearsay.

The third category of digital evidence is derived evidence which is information that combines real evidence with the information supplied by human beings to form a composite record. An example is the figure in the daily balance column of a bank statement since this is derived from 'real evidence' (automatically generated bank charges) and individual cheque and paying-in entries (supplied by human beings). This is also treated as hearsay evidence.

English case law has developed many exceptions to this rule so that the use of digital evidence is not so strictly limited. There are several exceptions to the hearsay evidence rule built into the UK legal system so that it can keep up with the growing need for digital forensic evidence in court. Several distinctions can be drawn from the strict requirement of certification found in Section 65B of the Indian Evidence Act.

In the provisions of general application, the Civil Evidence Act (1968) allows statements contained in electronic evidence to be admissible in civil proceedings regardless of how many removes there are between a copy and the original and it may be authenticated in a few simple ways as opposed to the stricter certification requirement in Indian law. For example, a document which was produced as part of the records of an ongoing business or public authority can be admitted without further proof or certification being required.

If a party cannot obtain an original piece of digital evidence the UK allows the admission of copies. This exception allows the removal of the obstacles created by the best evidence rule to the admissibility before the courts of computer documents. In order to deal with the specific issue of authenticity of electronic evidence in the courts of the UK, the British Standards Institute has published in 2008 a specific standard called Evidential weight and legal admissibility of electronic information. It ensures that any electronic information required as evidence of a business transaction is afforded the maximum evidential weight. India does not have similar standards integrated yet and this can be crucial in addressing some of the admissibility issues already discussed.

Conclusion

The acceptance of digital evidence in India can be seen through the admissibility of emails²⁰, call records²¹, hard disks²², statements of accounts²³ and more. However, by comparing the law as it stands in UK and India, it is clear that India lacks the flexibility and robustness enjoyed by our UK counterparts. As pointed out by the learned Authors at Khaiton & Co “a certificate under Section 65B of the Evidence Act neither does conclusively prove the facts contained in the electronic record nor amount to truth... despite various judicial precedents stressing on the importance of the certificate, the certificate has become a mere formality”²⁴

The learned judge Ramasubramanian.J in Arjun Panditrao pointed out that “when our lawmakers passed the Information Technology Bill in the year 2000, adopting the language of Section 5 of the UK Civil Evidence Act, 1968 to a great extent, the said provision had already been repealed by the UK Civil Evidence Act, 1995 and even the Police and Criminal Evidence Act, 1984 was revamped by the 1999 Act to permit hearsay evidence, by repealing Section 69 of PACE, 1984.” He concluded that “the major jurisdictions of the world have come to terms with the change of times and the development of technology and finetuned their legislations. Therefore, it is the need of the hour that there is a relook at Section 65B of the Indian Evidence Act, introduced 20 years ago, by Act 21 of 2000, and which has created a huge judicial turmoil.”

Several other issues not discussed in Arjun Panditrao was highlighted by Stephen Mason in light of the court’s decision. He points out that in subsection 2(c) of 65B, the requirement of the computer “operating properly”²⁵ has not been defined by a single judge or item of legislation. This will inevitably become an issue at some point in the future. He also points to the lack of clarity in subsection 4 (c) of section 65B, “a responsible official position in relation to the operation of the relevant device or the management of the relevant activities.” Arjun Panditrao provided some examples, however the matter is far from clear, as denoted by

²⁰ *Abdul Rahaman Kunji v. The State of West Bengal* 2014 SCC OnLine Cal 18816,

²¹ *State (NCT of Delhi) v Navjot Sandhu* (2005) 11 SCC 600

²² *Dharambir v Central Bureau of Investigation* 2008 SCC OnLine Del 336

²³ *Om Prakash v Central Bureau of Investigation (CBI)*, 2017 SCC OnLine Del 10249

²⁴ Ajay Bhargava , *supra* note 16

²⁵ *Stephen Masos* “Electronic Evidence and judicial consideration in India”, Aug 12, 2021 | IALS, Legal News, Publications

Mason.²⁶ Another problem highlighted by the author was the incorrect presumption that computers are reliable.

It is evident that our laws on digital evidence must be ever evolving or risk falling behind the unwavering speed at which technology advances. It will be interesting to see where the law in India on digital evidence advances from here onwards.

²⁶ *Id.* at 25



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