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Climate Change: Legal ,Regulatory and Policy Challenges

CENTRE FOR ENVIRONMENTAL LAW EDUCATION, RESEARCH AND ADVOCACY
CEERA, NLSIU

EDITORIAL

The Centre for Environmental Law Education, Research and Advocacy (CEERA) at the National Law School of India University organised a One Day seminar on "Climate Change in India: Role of Law, Policy and Management" on 15th June, 2018. Over the course of the seminar we received research papers presentations by more than 90 participants. It gives me immense pleasure and delight to publish the nine selected articles in this special edition of IN LAW magazine on Climate Change.

The first article in this edition is a notable contribution by Mr. V. V. Sasi Kumar on the Role of Indian Law and Policy in the Climate Change and Energy Security Management with the Perspective of Cement and Thermal Power Plants. The author analyses the impact of policies and legal frameworks developed in response to global warming and climate change. At the international stage, the article discusses the role and significance of the Paris Agreement on Climate Change and also highlights the recent decisions on climate change such as the Urgenda Case (Netherlands) where for the first time the people of Netherlands held their own government liable for climate change. The Leghari Judgement delivered by the Lahore Court in Pakistan is also discussed. The author charts out the development of Indian Environmental jurisprudence through PILs and the policy development such as the NAPCC and SAPCC and the various missions under it. The author discusses Energy Security and Management, its relation to climate change and how the technological measures undertaken by the cement industry and coal based thermal energy sector to decrease GHG emissions and increase energy efficiency have contributed towards mitigating the effects of climate change and global warming.

The second article titled Nature vs. People: Legal Framework of Climate Change throws light on policies with regard to climate change at both national and international level. It highlights the increase in annual mean temperature since the dawn of the 20th century. It discusses the national and international legal framework on climate change under three parts. Part One discusses the Indian position on climate change by elucidating the Constitutional provisions, Legislative framework, Executive policies and the role of the Judiciary. Part Two throws light on the evolution of international regime on climate change beginning from Intergovernmental Panel on Climate Change (IPCC) in 1988 to the Paris Agreement of 2015, covering significant development in between such as the UNFCCC, the Kyoto Protocol, the Bali Roadmap, the Copenhagen Accords, the Cancun Agreements, Durban Agreement and the Doha Climate Gateway. It then discusses the key features of the Paris Agreement. Part Three elaborates key facets and features of Sweden's Climate Policy, which is deemed to be the leading country in climate change action, such as the Climate Act (Primary legislation with regard to climate change in Sweden), carbon dioxide tax, Energy Performance Certificate Act etc. The article concludes with suggestions for improving the climate change policy of India in line with the international developments and Sweden's climate change policy.

The third article by Sanjana LB on Climate Change and Challenge to Food Security draws our attention to the World Bank's 2017 Report on State of food security in the world, according to which 793 million people in the world remain malnourished. Her paper enumerates how climate change impacts the various elements of food security viz food production, accessibility and affordability, utilisation and food stability. She complains about relative ignorance of climate change literature towards other elements of food security, with the primary focus being on production. She emphasises that climate change will create an all-round food security problem and stresses the need for a multidimensional policy which synergises processes of adaptation, mitigation and continued increase in food production. The article then surveys the international efforts to tackle the effects of climate change on food security such as the International Food Security Treaty (IFST), UNFCCC and the Paris Agreement. It concludes with possible solutions and their implementations.

The next contribution by Ms. Prathiksha Chandrasekhar and Ms. Harita Ramachandran on Food Security and Climate Change: the Interwoven Intricacies and its Legal Implications explores the interrelation between climate change and food security by analysing the impact of climate change on Indian agricultural sector from an economic perspective by utilising Malthusian theory of population. It also highlights the need of giving adequate climatic considerations in the National Food Security Act by scrutinizing the impact of El-Nino phenomenon on Indian Agriculture. It concludes with some practically implementable solutions such as the need for climate smart agriculture, food security policies which consider the GHG emissions and its impact on agriculture.

Abhijit Rohi's article on Taking Climate Change Seriously: Strategizing to Address the Evil of Farmers Suicide in the Wake of Climate Change stresses the necessity of holistic policy making to deal with climate change's impact on farmers. It scrutinizes John Rawls and Amartya Sen's theory of justice from the perspective of climate change. It contextualises the discussion of study of climate justice and climate change policy making by canvassing farmers suicide in the State of Maharashtra. It points out the nexus between climate change and farmer's suicide. Traditional farming in India depends heavily upon environmental considerations. Climate change leads to poor harvest which leads to indebtedness and bankruptcy which is one of the leading causes of farmer's suicide. Thus, any holistic policy making on climate change in India should also take care of this marginalised section of Indian society. It suggests a hybrid model based on John Rawls' transcendental institutionalism and Amartya Sen's realisation-based comparison.

Krishna Mohan Poddar's article on Examining the Community Cost in Climate Change: A Case Study of Pindar Valley continues the discussion on climate justice on Rawlsian lines and advocates for an environmental inclusive development. The author explores the community perspectives on ideas of development of Pindar Valley and how local community is paying the cost of climate change due to environmental degradation. On the lines of Rawlsian he argues that the agenda of development is fulfilled only when it reaches the last person without negatively affecting others but in reality the peripheral area i.e. the physically remote area and the marginalised community has been the least benefited and worst affected from such

development. Towards that end, the author presents a case study of Pindar valley in the aftermath of the 2013 Uttarakhand flood disasters which occurred due to development induced climatic change in the Himalayan Region.

Abhishek Talluri in his article on Climate Refugees – the Need for Development in the Law draws our attention to the problem of climate induced migration. The obstacles in solving this issue are twofold. At the international plane, the law is not very effective and very far from its objective, while at the domestic level, India is not a party to the Refugee Convention. Thus, creating a need for development of law to address this issue. The article discusses climate induced migration, its scope and relevance and presents a statistical analysis of the same both at the global and domestic level. It analyses the situation of climate refugees from Bangladesh who are migrating to India to escape the disaster prone climatic conditions. The article concludes by suggesting some viable solutions to the issue.

INSIDE THIS ISSUE

The article by Ms. Raagya Zadu titled Nuclear Energy: A Strategy to mitigate Climate Change discusses the rising level of Green House Gases due to energy production by burning of coal and fossil fuel. Interestingly, she advocates for Nuclear Energy to tackle climate change as against renewable sources because of the vast amount of resources that are required to install renewable sources and the low output produced by them. She presses that nuclear energy provides a solution to the conundrum of achieving energy security and battling climate change at the same time.

The last article by Mr. Raghav Parthasarathy and Mr. Raghav Niranjan Prasad on *Right to Energy vis-à-vis Climate Change* highlights that energy is a fundamental requirement for any living being. It is required in some for other at all levels. However, the concept of right to energy has developed only recently. An important question which right to energy raises is related to the availability and affordability of energy for everyone. But another important concern raised by their article is with regard to the role of the government in satisfying people's right to energy but at the same time battling climate change. They argue for a comprehensive policy framework for this purpose.

We hope that this special edition will enhance the current understanding or our readers with climate change and related and interlinked issues. As always, we welcome the feedback of our readers and look forward to hearing from you.

Prof. (Dr.) Sairam Bhat

Professor of Law and Coordinator CEERA, NLSIU

THE ROLE OF INDIAN LAW & POLICY ON CLIMATE CHANGE AND ENERGY SECURITY MANAGEMENT: PERSPECTIVES FROM CEMENT AND THERMAL POWER PLANTS

*V. V. Sasi Kumar**

CLIMATE CHANGE: AN INTRODUCTION TO THE ROLE OF POLICY, LAW & MANAGEMENT

It has been scientifically established that the planet is becoming warmer due to climate change. The Greenhouse Gases (GHGs) produced by anthropogenic activities are having an overall warming effect on the Earth's climate. The largest contributors to global warming are gases like carbon dioxide followed by methane and black carbon. Out of these GHGs, carbon dioxide, methane, nitrous-oxide, halogenated gases have long lasting effects, once released into the environment. There is a gradual rise of methane in the atmosphere and a consequent decline in halogen gases due to the restraint imposed by nations on the usage of Chlorofluorocarbons (CFCs) that add to global warming.

The risks associated with global warming and its consequences are many, which are being increasingly felt by nations due to climate change. Some of the risks t are rise in atmospheric temperature, melting of Arctic glaciers and the Himalayan snow caps thereby resulting in floods, destruction of habitats at the foothills of mountains, imbalance in the eco-system, rise in mean sea levels, coastal erosion, change in rainfall patterns leading to the depletion in agrarian production and affecting food security. The greenhouse effect and earth's albedo are significant factors in the rise of global warming[1].

Unless these emissions are checked, the net balance of emissions including the already existing inventory in the environment will continue to increase proportionately, and in the absence of means to drain these emissions from the atmospheric tub, irreversible damage to the climate would be caused.[2]

The historic Paris Agreement on Climate Change was marked as a major milestone with a record of 175 countries signing it on the opening day. The World leaders made it clear that more action is needed to quickly fight the relentless rise in global temperatures. India is also a signatory to the Agreement. The French President Mr. Francois Hollande told the gathering that "There is no turning back now, a key to success in combating climate change will be to get

*Mr. V. V. Sasi Kumar is the Deputy Chief Inspector of Factories, Department of Factories, Govt. of Tamil Nadu.
[1]USEP Climate Change Indicators in the United States. 2017. U.S and Global Temperatures, available at https://www.epa.gov/climate-indicators/climate-change-indicators-climate-forcing (last visited June 6, 2018).
[2] *Ibid.*

governments, companies and people all over the world to work together to move from fossil fuels to renewable energy."[3]

The US Secretary of State, Mr. John Kerry said the signing of the Agreement had to be followed by the world leaders with a recommitment to win the war against carbon emissions that are making the world hotter every year. Translating the deal into economic terms, he said that the power of this agreement would lie on the push that it exerts on the private sector to identify newer forms of energy and set the global economy on a new path of growth and development that preserves the environment.[4]

The Indian Union Cabinet in a historic decision approved the ratification of Paris Agreement, (Climate Document), which would underpin India's responsive leadership committed to the global common cause of environment protection and climate justice.[5]

India under the self-declared Climate Targets at the Paris Agreement with its current policies in place, released an ambitious new report titled "Nationally Determined Contributions" (NDCs) and had promised to reduce its GHGs emissions per unit of GDP by 33 to 35 % below 2005 levels by the year 2030. It had also promised to ensure that at least 40 % of its energy in 2030 would be generated from the non-fossil fuels like solar, wind and biofuels.[6]

It had also projected to increase its forest coverage as a carbon sink of 2.5 to 3 billion tonnes of carbon dioxide equivalent, by the year 2030. The Draft National Electricity Plan of 2016 speaks about the stabilisation of the Coal Powered Electricity to 250 GW over the next decade and an expansion of Renewable Energy to 275 GW by 2027. Thus, the projections are expected to have substantial impact on its GHGs emissions targets.[7]

India has celebrated the Global World Environment Day on June 5th, 2018 with the befitting theme "Beat the Plastic Pollution".[8] Plastic is also one of the agents causing emissions of GHGs, especially free radicals of carbon, dioxins and furans which when burnt have secondary reactions with the atmospheric Ozone layer resulting in its depletion and a sequential change in the global climate contributing to global warming.

In *M.C. Mehta* v. *Union of India & others,*[9] decided by the Hon'ble Supreme Court of India on 15 November, 2017 the Court discussed the directions given by the Chairman, CPCB, New Delhi, under Section 5 of the Environment (Protection) Act, 1986, related to the banning of the usage

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[3] *Paris Agreement: 175 countries sign landmark deal on climate change*, THE INDIAN EXPRESS, April 23, 2016, available at https://indianexpress.com/article/world/world-news/paris-agreement-175-countries-sign-landmark-deal-on-climate-change-2766525/(last visited June 6, 2018).
[4] *Ibid.*
[5] *Ibid.*
[6] *Ibid.*
[7] *Ibid.*
[8]http://www.worldenvironmentday.global/sites/default/files/toolkit_with_nature/wed_key_messages_english.pdf (last visited June 6, 2018).
[9] M.C. Mehta v. Union of India & Ors., WP No 13029/1985

of furnace oil and pet coke by the Industries. This ban was given immediate effect in the states of U.P., Rajasthan and Haryana.[10]

The sulphur dioxide emissions of furnace oil and pet coke are causing irreversible secondary reactions with the Ozone layer, and hence the Hon'ble Supreme Court had requested the remaining States and Union Territories to take similar measures as adopted by the Chairman, CPCB, New Delhi.

As per the National Greenhouse Inventory, the direct carbon dioxide emissions from industries accounts for 31% of the total carbon dioxide emissions of the country. These emissions from industries are broadly categorised, as process related emissions and emissions occurring due to combustion of fossil fuels. Out of the total estimated 250 million tonnes of direct carbon dioxide emissions from industries, nearly 60% is accounted for energy usage.[11]

The focus of the author in this paper is the management of emissions related to energy intensive industries like the cement industry, and coal-based thermal power plants, and the energy conservation methods adopted by these industries for sustainable use of energy to prevent further climate change and global warming.

CLIMATE CHANGE AND ADJUDICATIVE CHALLENGES:

A) International Scenario: It is as important for lawyers to study the effects of climate change on legal system as it is for ecologists to study the effects of climate change on the ecosystem. Climate change is not only environmentally disruptive; it also affects the legal field. Due to climate change, there have been developments in law such as compensation claims won or lost, regulations adopted or repealed, institutions formed that would not have occurred but for the goals of mitigating and adapting to climate change. It is important to understand the effect of climate change on the legal regime and the social policies and to gauge its preparedness in handling the problems that it is posing.

J.B. Ruhl [12] in an article published in the Journal of Environmental Law has defined Climate Change Litigation as any litigation in which the party fillings, judicial review claims, negligence, public nuisance actions, tribunal decisions or constitutional claims directly and expressly raise an issue of fact or law regarding the substance or policy of climate change causes and impacts. The author in his article has contended that climate change will affect all aspects and walks of life and hence the different fields of law have to adjust and incorporate changes in light of climate change.[13]

Climate change and climate policy also raise issues related to the opportunities and constraints on climate actions in the existing Constitutions, including the rights and duties of the

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[10]. *Ibid.*

[11] NATIONAL ACTION PLAN ON CLIMATE CHANGE, 2008, at 22.

[12] J.B. Ruhl, *What is Climate Change Law?*, JOURNAL OF ENVIRONMENTAL LAW, 25th Anniversary, August 22nd, 2015 (Oxford University Press) available at https://blog.oup.com/2015/08/what-is-climate-change-law/(last visited June 6, 2018).

[13] *Ibid.*

Government and the rights and duties of the citizens. Furthermore, Climate Policy can justify interferences with non-environmental constitutional rights and could even lead to the evolution of new Constitutional Jurisprudence through the expansion of the environmental rights or the consolidation of key environmental statutes such as Climate Change Act, 2008 of the United Kingdom (UK).[14]

A recent case on climate change was filed before the Lahore High Court, Green Bench of Pakistan (Leghari Case)[15], where the Petitioner (a Farmer) alleged that the National and Provincial Governments had neglected their responsibilities to implement Pakistan's National Climate Policy framework, violating the fundamental right to life under the Constitution of Pakistan due to the threat posed by climate change.

Responding to the issue, the Court found that the delay and lethargy of the State in implementing the Framework violates the fundamental rights of the citizens and ordered the creation of a Cross-Sectional Climate Change Commission to monitor the Climate Policy implementation. Hon'ble Justice Shah identified a dynamic relationship between the Pakistan's Constitutional Order and the nation's response to climate change and the existing environmental jurisprudence to be fashioned to meet the needs of something more urgent and overpowering.[16]

In another case, *Urgenda Foundation* v. State of *Netherlands*[17] the Hague Court of Appeal ordered the Dutch Government to limit "National Greenhouse Gas" emissions by at least 25% by 2020 compared to the emissions rate of 1990. The Court found that the State was in breach of its duty of care to the Dutch Society by failing to take sufficient mitigation measures to prevent the dangerous effects of climate change.[18]

The *Urgenda* case follows closely on the heels of *Client Earth, R(Applicant)* v. *Secretary of State for the Environment, Food, and Rural Affairs,* [19] in which the UK Supreme Court ordered the UK Government to comply with the Nitrogen Dioxide (NO_2) limits for EU, Air qualitative directive. Nitrogen dioxide is an indirect GHGs, unregulated by the Kyoto Protocol and emitted into the environment predominantly by burning of fossil fuels.[20]

Most nations have agreed upon the significance of climate change and its effects, and by making requisite amendments to their Constitutions, have created an opportunity to address the issues of climate change. The new Constitution of Nepal adopted in September 2015 amid ongoing controversy, included the right of clean environment. The small country which is more

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[14] I. Hadjiyiani, S. Minas, & E. Scotford, *Postings of the Symposium on Adjudicating the Future in September, 2015*, November 30th, 2015, JOURNAL OF ENVIRONMENTAL LAW, (Oxford University Press) available at https://blog.oup.com/2015/08/what-is-climate-change-law/ (last visited June 6, 2018).
[15] Ashgar Leghari v. Federation of Pakistan (W.P. No. 25501/2015)
[16] *Ibid.*
[17] Urgenda Foundation v. State of Netherlands [2015] HAZA C/09/00456689
[18] The Urgenda decision: balanced constitutionalism in the face of Climate Change? by CERI WARNOCK, July 22, 2015, JOURNAL OF ENVIRONMENTAL LAW, 25thAnniversary, Oxford University Press.
[19] Client Earth, R(Applicant) v. Secretary of State for the Environment, Food, and Rural Affairs [2015] KSC 28).
[20] *Ibid.*

vulnerable to climate change is preparing itself to successfully address climate change litigations.[21]

In all the aforementioned cases, the Hon'ble Courts have made way for a greater constitutional role for themselves over a period and are gradually clearing all the obstacles that lie in the path of securing climate justice. As the imperatives of climate mitigation and adaptation grow more and more urgent and climate disputes get registered in the legal forums, the judiciary and the advocates must be prepared to accept these challenges with evolving expertise.

B). Indian Law and Environmental Jurisprudence:

The Hon'ble Indian Supreme Court through its judicial activism had initiated Public Interest Litigation (PIL), focussing on socio-economic rights and improving the quality of life of its citizens. The Hon'ble Judges begin to incorporate the rights to health, food, education, shelter and so forth into the fundamental rights to equality (Article.14 of the Indian Constitution), life and liberty (Article 21 of the Indian Constitution).

The Supreme Court and High Courts in several rulings initiated through public interest litigations have held that potable water, a clean environment, and sanitation among other important factors have become a part of the right to life enshrined in Article 21 of the Indian Constitution.

The Supreme Court applied the Polluter Pays Principle in *M.C. Mehta v. Union of India*[22], where leakage of Oleum gas from Sri Ram Food and Fertiliser Corporation at New Delhi had led to the death of an individual and several people had fallen ill. The principal mandates that the polluter has to not only pay damages for the restoration of the destroyed ecology but must also compensate the citizens, who have suffered due to the damage caused to the environment.

In *Consumer Education and Research Society* v. *Union of India*, the Apex Court noted the attempt made by the State Legislature and State Government to balance the need for environment protection and economic development and held that, it would therefore, be proper and safe to apply the 'Principle of Protection' and the 'Principle of Polluter Pays' keeping in mind the principle of sustainable development and the principle of inter-generational equity which must be applied. This balanced evolution of environmental jurisprudence is noteworthy.[23]

In India there is no comprehensive legislation that addresses the issues of climate change and global warming. Over the last three decades, advancements have been made in the sphere of environmental jurisprudence due to the intervention of the Higher Judiciary, the National Green Tribunal and environmental laws, that have attempted to address the specific issues of vehicular pollution, industrial emission standards, forest conservation, ozone depleting substances, environmental impact assessment and clearances etc.

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[21] *Supra* note 16.
[22] M.C. Mehta v. Union of India AIR 1986 SC1086
[23] Consumer Education and Research Society v.. Union of India and Ors, AIR 2000 SC 975

Article 48A added by the 42nd amendment to the Indian Constitution, obligates the State to not only protect the environment but also to improve it. The 42nd Constitutional Amendment also added Article 51A, which casts a duty on citizens to protect and improve the environment. Neither of these Articles are enforceable since they fall under the purview of Directive Principles of State Policy and Fundamental Duties respectively, but they guide the State in the formulation of policies and encourage citizens to protect and improve the natural environment. There are some landmark judgements delivered by the Supreme Court, High Courts and the National Green Tribunal that have directly and indirectly, addressed the issues of climate change and global warming.

In *ICELA* v. *MoEF*, the Principal Bench of the National Green Tribunal, at New Delhi,[24] had addressed the issues of climate change related to the use of HFC -23, an Ozone depleting substance and a by-product of HCFC-22 (a refrigerant gas). The NGT gave directions to the Ministry of Environment, Forest & Climate Change and the Central Pollution Control Board, to examine the regulatory regime in relation to HFC-23 and to issue appropriate guidelines in all aspects governing it.

While addressing the issue the Tribunal considered Article 21 read with Article 48A and 51A(g) and held that it is the right of a person to claim protection of the environment including the steps that can be taken for avoiding of global warming and environment pollutants. The Tribunal applied the Precautionary Principle and the Principle of Intergenerational Equity considering the fact that HCFC is a greenhouse gas covered as a part of the basket of greenhouse gases under UNFCCC and its Kyoto Protocol. There is no domestic law regulating the usage and incineration of HFC-23. It was contended that HFC-23 is neither toxic nor is it a pollutant but one metric tonne of HFC-23 is equivalent of 11,700 metric tonne of carbon dioxide, in terms of its impact on global warming.

In another case, *Ratandeep Rangari* v. *State of Maharashtra & Ors*, the NGT (W) Bench, Pune,[25] observed that, as per the Report of the Central Electricity Authority for the year 2013, the average coal fuel consumption by the thermal power generating companies in India was about 454.60 million tonnes. The coal based thermal power generating stations are the single largest source of particulate emissions, besides generating of greenhouse gases, thereby contributing to global warming and climate change. Lesser emission of greenhouse gases would lead to lesser carbon footprints related to the thermal power plants.

To promote clean energy technologies in terms of lesser ash handling and stack emissions by the thermal power generating stations, the MoEF & CC, New Delhi had issued a Notification, dated 2nd January 2014, under Rule 3(8) of the Environment Protection Rules, 1986, stipulating the maximum ash content of 34 % in the supplied coal, on a quarterly basis. The applicant had prayed for issuance of directions to the respondents, to comply with the above

[24] Indian Council for Enviro-Legal Action (ICELA) Versus MOEF, New Delhi' & Ors., the National Green Tribunal (NGT), Principal Bench, New Delhi, Original Application No 170 of 2014, decided on 10th December,2015.
[25] Ratandeep Rangari vs. State of Maharashtra, MoEF & Ors., In Application No.19/2014 (WZ) & M.A. No 66/2015,: decided on October 15th ,2015.

stated MoEF Notification, to ensure lesser particulate emissions to prevent further pollution of the environment of the applicant's village.

The respondents pleaded before the NGT(W) Bench that there were no prescribed methods and equipment for taking the sample of the ash contents in the coal and for the same reason the issue was *sub-judice* before the Hon'ble High Court Bench at Nagpur and before the Appellate Authority of the Competition Commission. The NGT relied on Sections 14 and 33 of the NGT Act which have overriding effect and give jurisdiction to the NGT to resolve anomalies, in the interest of environment protection. The Tribunal passed directions to the enforcing agencies, the State Pollution Control Board and the MoEF for complying with the notification, in true spirit. Thus, the NGT (W) Bench intervened to ensure lesser particulate and GHGs emissions by the thermal power generating stations.

In another important judgement on global warming and the first of its kind, the NGT, Principal Bench, New Delhi[26] had issued *suo-moto* directions to the authorities of the state of Himachal Pradesh on February 6, 2014 to prevent climate change and global warming of the Himalayan mountain glacier at Rohtang pass of the state. On an average about 11 lakh tourists visit the Rohtang Pass annually which is a source of revenue for the state. A study was conducted by IIT, Kanpur on the accelerated rate of melting of snow caps and glaciers of the Himalayan range. It was observed that the presence of black carbon soot in the glaciers was one of the major reasons for the melting of snow, apart from the presence of carbon dioxide. And the biggest source of black carbon soot is the burning of agricultural waste and tourist vehicular pollution.

By applying the Polluter Pays Principle, the State had levied green tax on the vehicles and two-wheelers passing the Rohtang Pass and the funds generated were to be utilised for the restoration of the environment. The State Government had already initiated steps for preventing and controlling of forest fires as forest fires are one of the major contributors of black carbon soot. Vehicles which have been registered for more than ten years are not allowed to pass through the Rohtang Pass. Usage of plastic bags, littering and commercial activities along the pathways have been prohibited. Eco-friendly toilets along the path have been added and efforts have been made to prevent deforestation.

In *Gaurav Kumar Bansal* v. *Union of India & Others,*[27] the Principal Bench of the NGT gave directions to the States for expediting the preparation of an Action Plan for climate change and to get it approved by the MoEF & CC, New Delhi. It is one of the landmark judgements which triggered the States to plunge into action to put in place a plan for the preventing climate change.

POLICY

For the past two decades, the Indian policy approach to climate change negotiations in the international sphere has been guided by the principles of equitable burden sharing, historical

[26] In Application No: 237(THC)/2013, (CWPIL No.15 of 2010) (NGT) Principal Bench, New Delhi, dated: February 2014.
[27] Gaurav Kumar Bansal v. Union of India & Ors, In OA No 498 of 2014, decided on July 23rd , 2015.

responsibility for GHG emissions and common but differentiated responsibilities and respective capabilities.

The National Environment Policy 2006 (NEP), for example, states in its Preamble that India 'recognizes the interdependent and transboundary character of several environmental problems', and the present policy is 'a statement of India's commitment to making positive contribution to international efforts'. The framing of environmental protection as an integral part of the development process and of intragenerational and intergenerational equity mirrors the principles enshrined in the Stockholm Declaration and the UNFCCC.

The NEP specifically recommends that new legislation should be enacted in line with multilateral environmental regimes. Various norms embedded in international agreements such as the Kyoto Protocol are visible in the NEP. These include notions of environmental standards, social responsibility and the offsetting of environmental impact through mechanisms promoting economic efficiency.[28]

A) National Action Plan on Climate Change (NAPCC):

The Government of India released the NAPCC in 2008.[29] The Action Plan focuses on understanding climate change, adaptation and mitigation, energy efficiency and natural resources conservation. There are eight national missions which form the core strategy of the National Action Plan, in achieving the key goals in the context of climate change which are as follows: The National Solar Mission, National Mission for Enhanced Energy Efficiency, National Mission on Sustainable Habitat, National Water Mission, National Mission for sustaining the Himalayan Eco-System, Green India Mission, National Mission for Sustainable Agriculture, National Mission for Strategic Knowledge for Climate Change.

The National Solar Mission aims to promote the development and use of solar energy for power generation and other uses, with the ultimate objective of making solar energy competitive with fossil fuels. By promoting the use of renewable solar energy in India, the Action Plan is striving to achieve energy security to prevent the indiscriminate usage of fossil fuels and emissions of GHGs.

The National Mission for Enhanced Energy Efficiency mandates reduction of specific energy consumption by the energy intensive industries like coal based thermal power plants, cement industries, iron & steel industries etc. and promotion of trade energy saving certificates, promotion of energy efficiency appliances in the consumer sector and energy incentives for conservation of energy, thereby also achieving the objectives energy security.

The National Mission on Sustainable Habitat promotes the Energy Conservation Building Code and Commercial Complexes, waste management and recycling and lesser GHGs emitting

[28] A. Atteridge, M. K. Shrivastava, N. Pahuja, H. Upadhyay, *Climate Policy in India: What Shapes International, National and State Policy?* 41 AMBIO 68 (2012), available at https://doi.org/10.1007/s13280-011-0242-5. (last visited June 11, 2018).

[29] NATIONAL ACTION PLAN ON CLIMATE CHANGE: available at http://www.moef.nic.in /modules/about-the-ministry/CCD/NAP_E.pdf (last visited June 11, 2018).

vehicles. The Green India Mission aims at increasing the forest cover from the existing 23% to 33%, thereby creating increase in the percentage of tree coverage for absorbing carbon dioxide emissions.

As a part of the National Action Plan, the States have also drafted policies on climate change to meet the aforesaid eight objectives of the mission, in tandem with the NAPCC, to combat climate change.

B) The Telangana State Action Plan on Climate Change (SAPCC): The Telangana State Government had identified Environment Protection Training and Research Institute (EPTRI), Gachibowli, Hyderabad as a nodal research institute to support and achieve the objectives of the State Action Plan (SAPCC). There are ten key sectors identified in the plan out of which energy, industry (including mining), and transportation are the key initiatives in achieving the energy security.[30]

The key initiatives with respect to energy are improving the efficiency of thermal power generation, transmission, elimination of pilferages, improving the efficiency of electrical drives including agricultural pump sets, promotion of alternative energy sources like solar home, solar streetlights, electricity generation using renewable energy sources. Related to the transportation sector the key initiatives are enhancing the share of low emission and fuel-efficient vehicles that run on alternative fuels, usages of bicycles, redesigning of the city road network for smooth traffic movement, interlinking of private and public transport modes to minimise the usage of private transport.

The plan also initiated steps to adopt cleaner technologies, protecting the industrial cluster from natural disasters, minimising the emission of GHGs for preventing the global warming and climate change, promoting diversified and dispersed industries including small and medium scale agro-processing industries, measures to prevent pollution during the open cast mining activities, promoting compensatory afforestation activities on a larger scale along the state notified forest area and along the national highways, industrial corridors, schools under the campaign of Telangana Haritha Haram -the large scale tree planting programme.

The Telangana Haritha Haram is the flagship programme of the Telangana State Government to increase the tree coverage of the state from 24% to 33%. As a part of the programme, in the coming three years 230 crores seedlings are proposed to be planted in the state. With this flagship programme of tree coverage, the carbon sink of CO_2 absorption of GHGs, will be improved drastically and will help in mitigating the global warming. For achieving the Plan objectives of all the key indicators, a time frame has been fixed, and a monitoring mechanism has been developed.

[30] STATE ACTION PLAN ON CLIMATE CHANGE FOR TELANGANA STATE available at http://www.eptri. com. (last visited June 11, 2018).

ENERGY SECURITY AND MANAGEMENT:

A) Introduction: In India energy conservation with energy efficiency had attained significant importance for not only its commitment to combat global warming and climate change but also to ensure sustainable usage of fossil fuels like coal, oil and natural gas. Over the last decade, as the per capita energy consumption in India has increased to 1,101 kWh, optimum utilisation of energy has become critical for ensuring energy security, reduction of energy costs and achieving the committed emission goals to prevent global warming and climate change. Since Independence India has been mainly dependent on coal-based fossil fuels for energy generation. The country's industrial sector, like thermal power plants, cement industries, iron and steel sectors consume 41% of the energy generated by depleting the primary energy fuels by 41% of 120 BTOE (Billion Tonnes of oil equivalent) coal, oil fossil fuels.

The ISO 50001 Energy Management Standard supports industries to use energy more efficiently and to improve the overall management and quality of environment. It is one of the standards to achieve sustainability by the reduction of costs and carbon emissions. By 2030, India had voluntarily committed under the Nationally Determined Contributions (INDC) that it would reduce its GDP emissions by 33-35 percentage.

The Government of India had initiated certain steps for the efficient usage of energy by the industries, utilities and consumer segments such as displaying Star Labelling Schemes on the consumer appliances for choosing energy efficient goods by the customer and thereby saving costs in energy consumption. Similarly, initiatives are taken to replace incandescent bulbs, tube lights with LED bulbs. Under the PAT Scheme (Perform, Achieve and Trade) certain energy intensified industries were identified to reduce their specific energy consumption within a stipulated time. The achievers are presented with tradeable certificates and the non-achievers had go to the market for purchasing the same.[31]

Energy efficiency includes efficiency in technological conversion and energy efficient buildings or green buildings. It can be achieved by promoting energy efficiency as a culture in the organisation involving all concerned, and not merely technical personnel. Allocation of resources and responsibilities, continual review with technological upgradation and review of energy usage during the life cycle of the equipment can be used to promote energy efficiency.

The following measures as shown in the Table [1], can be adopted as a technological improvement by the cement and coal based thermal power plants to achieve the energy efficiency and there by conserving energy to lessen the burden of fossil fuel consumption and GHGs emissions.

[31] Industrial Energy Efficiency and Material substitution in Carbon-Intensive Sectors-Prepared for the dialogue on Industrial Energy Efficiency organised by the Technological Executive Committee, on 29th, March 2017, Bonn, Germany.

Table 1

Technology	Industry	Technical Improvements
Steam	Coal Based Thermal Power Plants	Adopting Critical Technologies, Increasing of Boiler Efficiency, Better Steam Distribution, Recovery of Condensate Temperatures, Minimising the Blowdown.
Energy Drives and Prime movers	Both the Cement and Thermal Plants	Replacing with Energy efficient Drives, Periodic Maintenance of the Drives, shifting to variable speed Drives.
Compressed Air	--do---	Assessing the Demand and supplying of it to the required Pressure Ratings, Checking the Leakages and misusing of it for non-Process Purposes like de-dusting, Maintenance of the Equipment etc.
Pumps and its Piping Network	---do--	Increase efficiency of the Pumping Operations with Network and controlling of the Leakages.
Heating	--do--	Waste Heat Recovery Projects and Boilers, Controlling the usage of Fuels during the Start Up Operations.

Increasing energy efficiency is the first step towards achieving energy security and reducing the emission of greenhouse gases. Economic benefits accrue as a direct consequence of energy saving. Energy efficiency also has social consequences. It helps to generate employment with the adoption of clean technological developments and innovations.

Cement plants are adopting highly efficient vertical roller grinding mills, instead of ball mill pulverisers, adding pre-calciners to the pre-heaters, adopting multi-stage pre-heaters for the efficient waste heat recovery from the kiln emissions. They are using alternative fuels, tyre pyrolysis oils, bulk drug and pharma recovered solvent distillation residual waste, bio-mass based fuels as an efficient fuel mix strategy for reducing the emissions at least from the kiln fuel consumption instead of from the calcination reactions. As a sequel to this, the industry is gaining cost reduction measures and generating new employment opportunities for the society. By using pharma residual waste, the composition of net emissions will alter, compared to conventional coal fuel and it was observed that NO_2 emissions are higher, by adopting changes in the fuel strategies.

The energy consumed by these plants, can be replaced with lesser GHGs emitting fuels like natural gas and renewable energy sources like solar, wind energies. Cost-effective technologies should be adopted for tapping the abundant gas resources at the Krishna -Godavari basin, which has less potential for GHGs emissions when compared to other fossil fuels.

The availability of Natural Gas Pipeline Network at the industrial corridor is going to lessen the net percentage of GHGs emissions. An energy mix of fossil fuels and renewable energy sources can be planned to achieve sustainable energy security. A percentage of the limestone in the cement plants can be substituted with blast furnace and thermal power plants slags as a raw material alternative, to reduce the CO_2 emissions during the calcination process thereby reducing global warming and climate change.

About one third of the energy generated in India is utilised by the industrial sector. Small and medium scale industries account for 90% of the industries which produce only 45% of the output. Industrial subsidies and lack of awareness were identified as barriers to energy efficiency.

The following are the driving instruments in India for achieving energy efficiency and energy security: The Energy Conservation Act, 2001, the Indian Electricity Act 2003, the National Electricity Policy 2005, the National Plan for Climate Change 2008. Amendment to the Energy Conservation Act, 2010 incorporated energy certificate, energy auditors and managers, accreditation to the energy auditors. For reducing of energy intensity in the Indian economy a statutory body called the Bureau of Energy Efficiency (BEE) was established in March 2002.

The PAT (Performance, Achieve, Trade) was set up in 2011 as a market-based mechanism for the energy intensive industries, a trading scheme for having energy saving certificates. The first phase of the PAT scheme, 2014-15 was applied to the energy intensive industries like cement and coal based thermal power plants for reducing energy consumption to the target of 4.05% energy consumption. There is an urgent need to improve energy efficiency in the small and medium sector industries also. The capacity building of the states and local bodies is also required to achieve specific energy consumption targets.

The Government of India launched the Energy Conservation Building Code in May 2007 for implementation in new buildings on voluntary basis. Due to the amendment of the Energy Conservation Act in 2010, a set of minimum energy standards for new commercial buildings with connected loads of 100 kW or a contract demand for 120 Kilovolt amperes are incorporated.

Following the above strategies for energy management and thereby shifting towards technologies and that generate lesser emissions by industries will help to contain climate change and global warming.

ENERGY SECURITY MANAGEMENT WITH THE PERSPECTIVE OF THE CEMENT AND THERMAL POWER PLANTS AND IMPACT OF CLIMATE CHANGE WITH REFERENCE TO THE EMISSIONS FROM THE CEMENT AND COAL BASED THERMAL POWER PLANTS

A) Method adopted: A predefined questionnaire was circulated amongst the cement industry and coal based thermal power plants of capacity below 500 MW. The generated data was analysed against the emissions standards and ambient air norms prescribed by Telangana State Pollution Control Board, and MoEF & CC, New-Delhi notifications concerning cement and

coal based thermal power plant industry specific emission norms. There are no specific norms, prescribed under the said notifications for CO_2 emissions.

B). Cement industry: As the demand for cement in construction industry is increasing, the cement industry is pushing its limits and capacity for achieving its supply targets. The main GHGs emission in the Cement Industry is CO_2 and 40% of it is emitted during the usage of fuels like pulverised coal, pet coke and furnace oils (during the start-up) for raising the temperatures of the kiln to 1400^0C, to initiate the calcination process. The remaining 50% of CO_2 emission is during the calcination reaction and the left over 10% is emitted during the grinding, materials handling and transportation.

Table 2

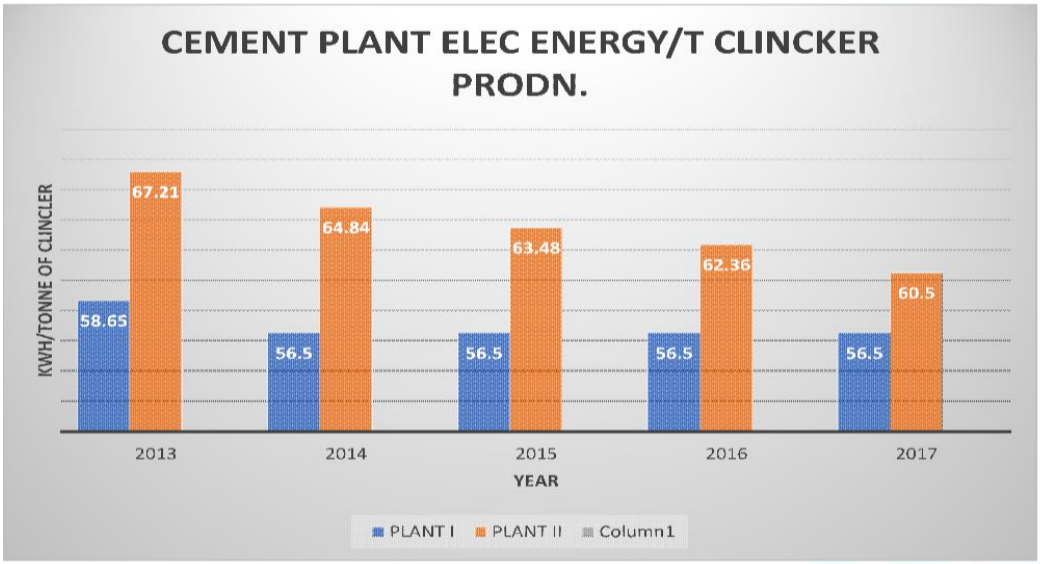


Table -2 above, shows the electrical energy consumed by two different cement plants per tonne of clinker production by adopting the energy conservation methods. Plant-I is sustaining less fluctuations of mean energy consumption per tonne of clinker production whereas Plant-II is reducing the energy consumption year by year.

Table 3

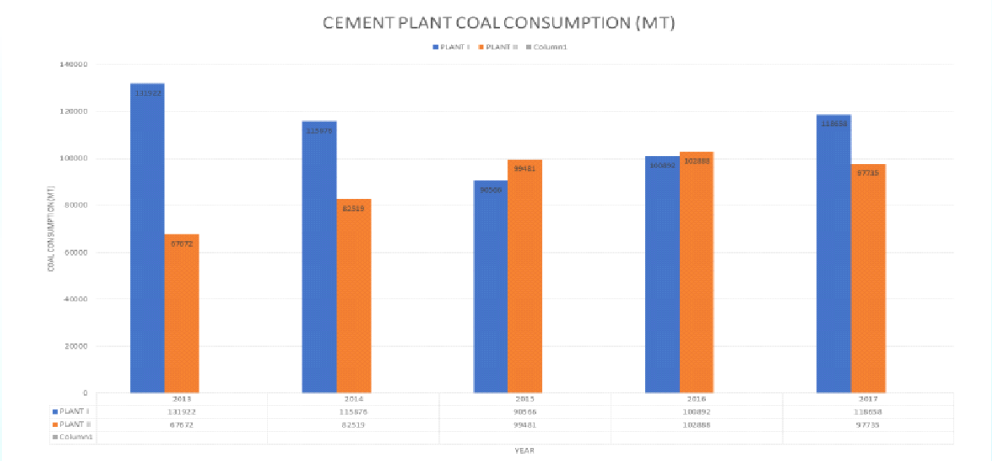


Table-3 above shows the Coal consumption by the Plant I and II. Due to adoption of alternative fuels the consumption pattern was reduced year by year.

Table 4

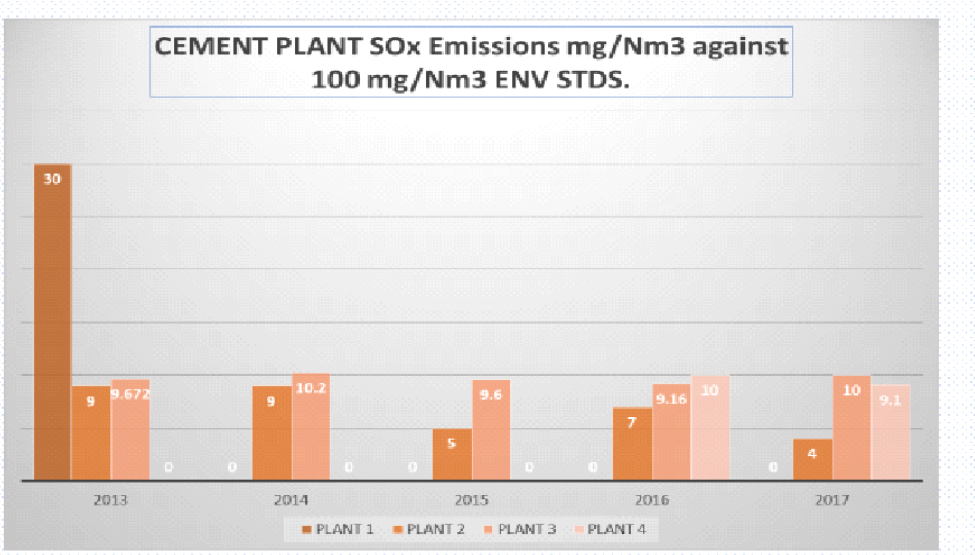
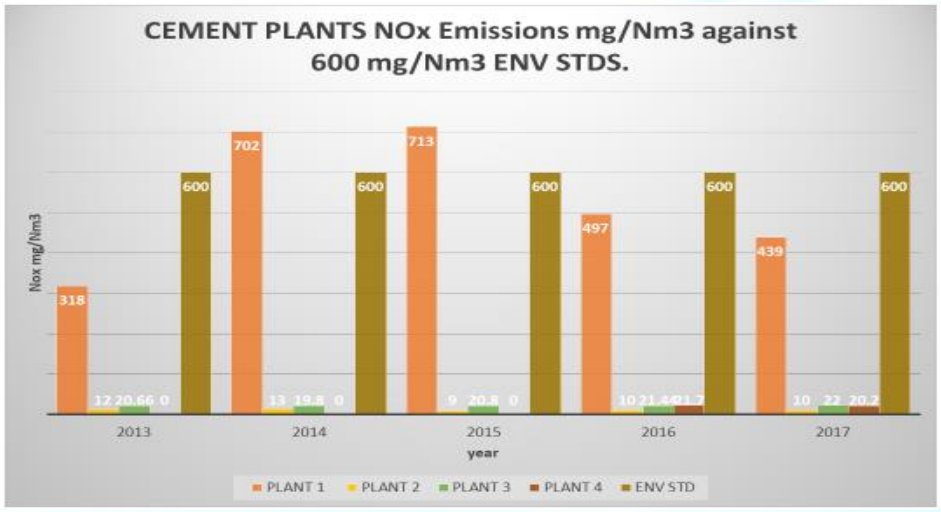


Table-4 shows the SO_2 emissions by four different cement plants against the standards. SO_2 is emitted from the cement plants mainly from the contents of sulphate in the raw materials of limestone and fuels like coal, pet coke, furnace oil. These emissions are as potent as GHGs and are a cause of acid rains after they react with the atmospheric moisture. The strategy adopted for lowering of the SO_2 emissions from the stack is proper blending of the raw materials of limestone and coal. Another one is by spraying a weak solution of NaOH (Sodium Hydroxide) in the scrubber which converts the emitted SO_2 into gypsum sludge.[32]

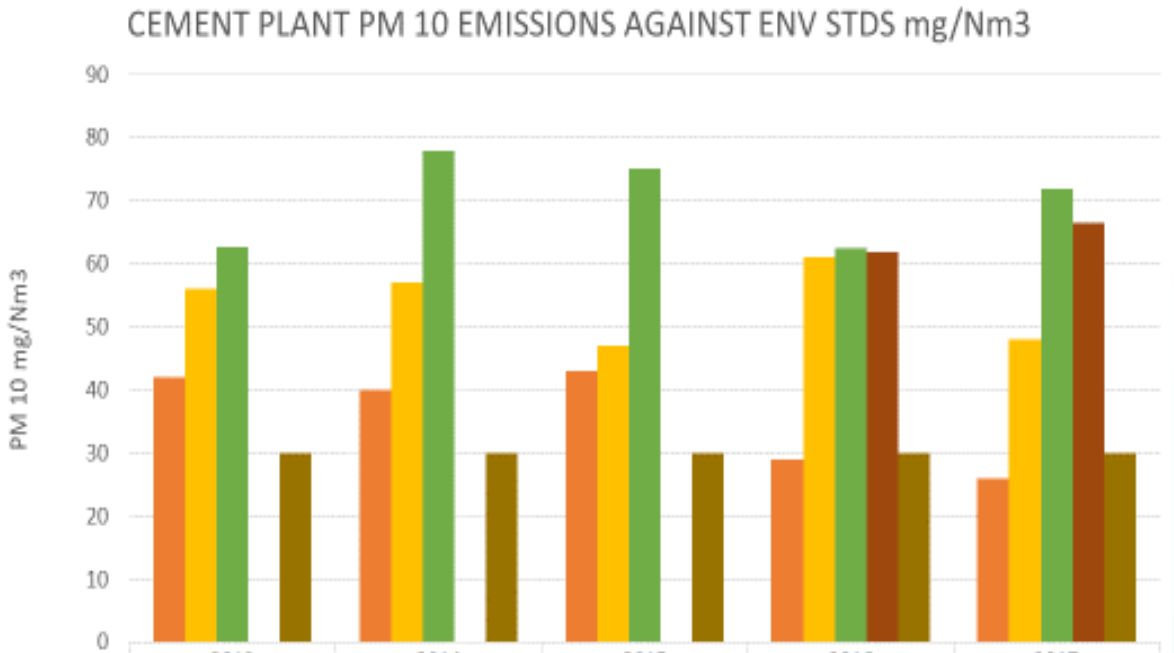
Table 5



[32] P. Edwards, Global Cement Environmental Standards, GLOBAL CEMENT MAGAZINE, March, 2014, available at www.globalcement.com. (last visited June 11, 2018).

Table 5 above shows the NOx (Nitrogen Oxides) emissions of four different cement plants against the standards. The variations in the NOx levels are mainly due to adoption of alternative fuels like bulk drug and pharma waste. The NOx emissions have the tendency of reacting with the atmospheric Ozone and thereby resulting in acid rain - nitric oxide (HNO_3). It is an Ozone depleting substance, which also reacts with the Ozone. By adopting selective methods using catalysis, the NOx can be reduced to N_2 (dinitrogen)and H_2O (water). This atmospheric nitrogen can be mixed in the soil by Nitrogen Fixation Plants.[33]

Table 6



	2013	2014	2015	2016	2017
PLANT 1	42	40	43	29	26
PLANT 2	56	57	47	61	48
PLANT 3	62.67	78	75.2	62.54	72
PLANT 4	0	0		61.9	66.5
ENV STDS	30	30	30	30	30

Table 6 above shows the PM_{10} particulate emissions by four different cement plants against the standards.

The Particulate matter emissions in the cement plant can be controlled by using ESP (Electrostatic Precipitators and Filter Bags). The particulate matter emissions catch the attention of the media thereby resulting in adverse publicity against the industry. It also causes morning smog in the atmosphere thereby decreasing the Air Quality Index (AQI). The particulate matter emissions may cause respiratory illnesses as well.[34]

[33] *Ibid.*
[34] *Ibid.*

Table 7

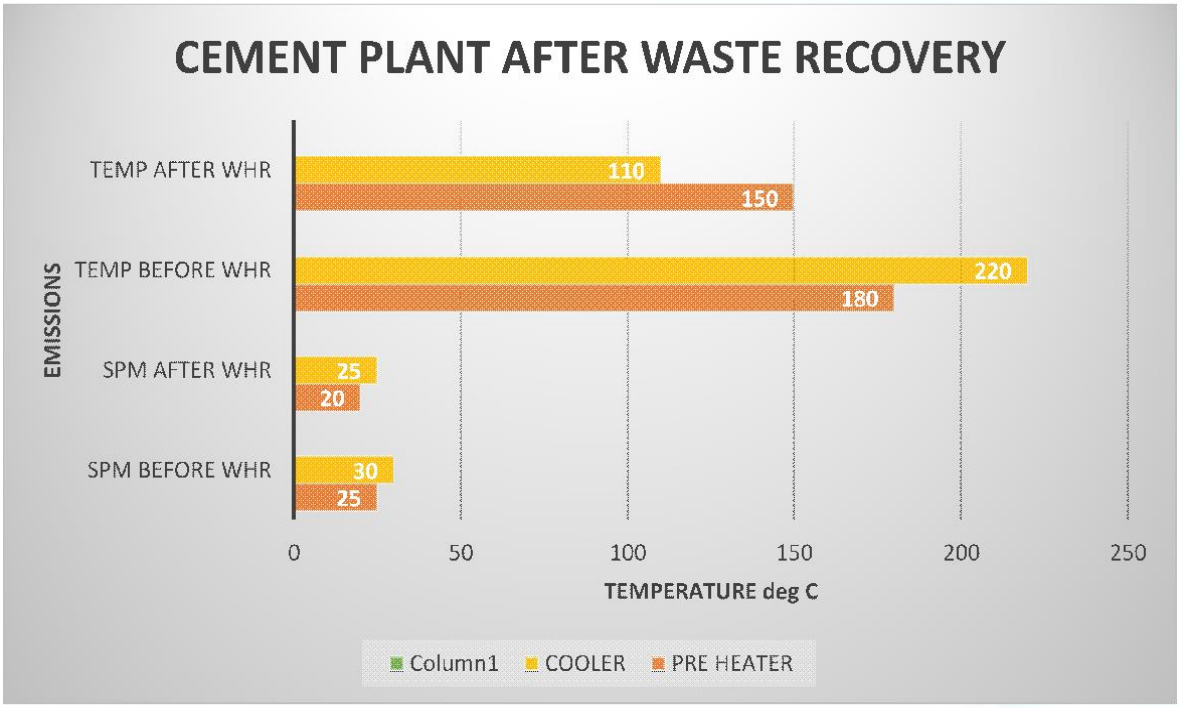


Table 7 above, shows the particulate emissions and exhaust gases temperatures before and after recovery of the waste heat from the stack emissions. The waste is utilised in steam generation and expanded in a turbine for the generation of electrical energy at no costs. Due to this technical upgradation by the cement plants, the energy is conserved.

As a part of the Energy Conservation Act, 2001 and BEE Standards, most of the cement plants are recovering the waste heat from the pre-heater stacks and from the clinker cooler stacks, instead of letting it into the atmosphere. Without consuming fossil fuels, the plants are generating energy for their self-sustenance. Thereby achieving zero emissions of GHGs in electrical energy generation. But earlier it was not the case and the plants were letting the waste heat gases escape, without recovery of the latent heat of the stack emissions. After technological upgradation, the cement plants are generating electrical energy in compliance with the PAT cycle 1, as the targets given by the BEE, India.

The cement plants are also adopting energy efficient programmes for energy conservation by replacing the under loaded high kW motors with lower kW motors for the bag filter fans. Air leakages are arrested in the compressor lines for efficient usage of energy, higher wattage lights are replaced with LED lights, and circuits are provided with timers in the plants.

C). Indian Coal Based Thermal Power Plants: Indian Coal has high ash and low sulphur contents. The MoEF notification dated 7th December 2015 prescribed emission standards which were in line with the global standards prescribed by USA, Europe and China. In compliance with these standards, the existing thermal power plants are expected to cut down emissions and quantify the usage of water. For the first time the emission norms for SO_2, NOx, particulate matter and mercury were added for lessening of the GHGs. Most of the Indian

plants are falling below 500 MW capacities and they must upgrade technologies, for sulphur reduction in the flue gases, particulate matter and NOx. Although adopting these technologies would be cost effective in the long run, but sufficient space is required in the existing plants for altering the layouts carrying out the modifications.[35]

The Tables 8, 9 and 10 shows the emissions from the coal based thermal power plants of capacity less than 500 MW, against the environmental standards given in Table 11.

Table 8

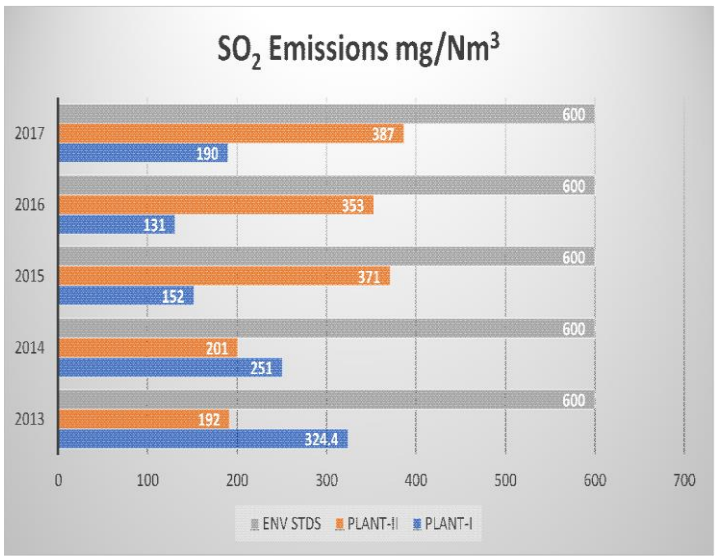


Table 9

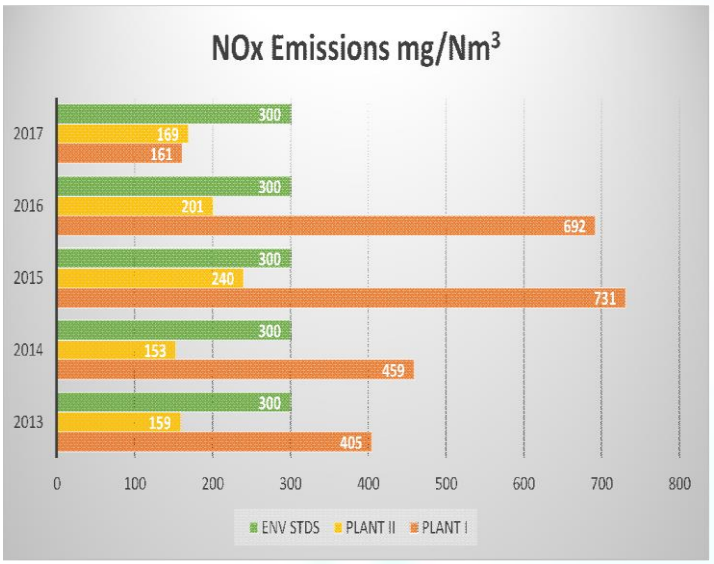


Table 10

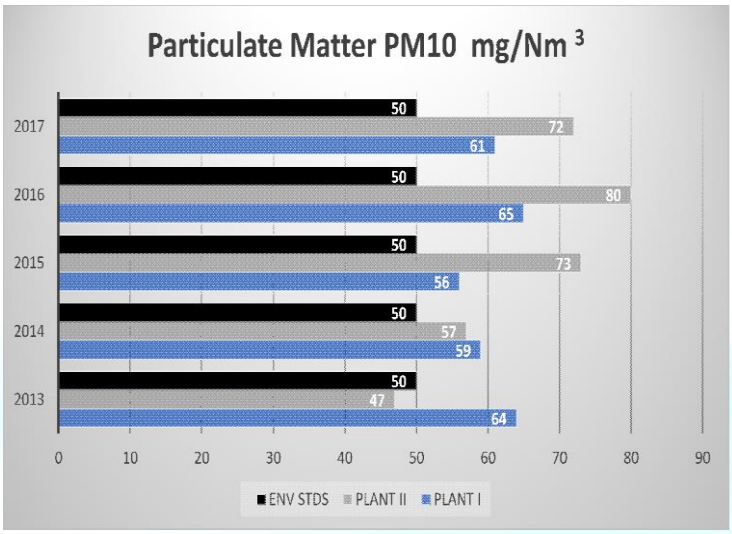


Table 11

	Existing (prior) Standards	TPPs installed till Dec 31, 2003	TPPs installed between Jan 1, 2004 and Dec 31, 2016	TPPs to be installed from January 1, 2017
Sulphur Dioxide	No standard 100 mg/Nm3	600 mg/Nm3 (for units < 500 MW) 200 mg/Nm3 (for units >= 500 MW)	600 mg/Nm3 (for units<500 MW) 200 mg/Nm3 (for units>500 MW	100 mg/Nm3
Oxides of Nitrogen (NOx)	No standard	600 mg/Nm3	300 mg/Nm3	100 mg/Nm3
Mercury	No standard	0.03 mg/Nm3 (for units >= 500 MW)	0.03 mg/Nm3	0.03 mg/Nm3
Particulate Matter (PM)	150-350 mg/NM3	100 mg/Nm3	50 mg/Nm3	30 mg/Nm3
Water Consumption	not available	3.5 m3 /MWh	3.5 m3 /MWh	2.5 m3 /MWh

[35] Tongia, Rahul; Seligsohn, Deborah, *Challenges and Recommendations for Meeting the Upcoming 2017 Standards for Air Pollution from Thermal Power Plants in India*, BROOKINGS INDIA IMPACT SERIES, Research Paper No. 022017. February 2017.

The thermal power plants are also adopting innovative projects for technological upgradation and for replacement of existing overrated drives with less ratings, thereby conserving electrical energy. The plant's air compressor lines are replaced with a new one for preventing air leakages and overrated compressor drives are altered with one that has less rating to conserve the energy. By carrying out three innovative projects for conservation of energy, on an average the plant has gained 9,97,920 units per annum. They are also disposing ash free of cost to the neighbouring brick manufacturers.

Thus, the coal based thermal power plants are also adopting energy conservation measures and thereby supporting the global cause of prevention of climate change by lessening GHGs emissions.

CONCLUSIONS AND RECOMMENDATIONS:

a) A separate enactment related to climate change and global warming needs to be promulgated, thereby addressing all related issues under one legislation,

b) The Green House Gases (GHGs) should be listed under the enactment,

c) Periodic awareness has to be created among the public, related to the adverse effects of climate change and global warming, thereby making them responsible for mitigation of climate change,

d) The small and medium scale industries are to be motivated for cutting down of their GHGs emissions,

e) The existing energy intensive industries are to be transformed into energy mix industries by installing solar energy plants and windmills to cut down the per unit consumption of electrical energy as generated by the fossil fuel consumptions.

f) Under the Make in India Programme, greener technologies, cleaner production methods are to be adopted for lesser emissions by the industry,

g) The CO_2 emission norms and standards are to be prescribed under the Schedule of the Environment (Protection) Rules, 1986,

h) Periodical monitoring of GHGs emissions standards should be conducted across metropolitan cities and data should be publicised for creating awareness,

i) New and efficient CO_2 sinks are to be developed,

j) Energy incentives are to be promoted for the industries, instead of subsidising it on capital investment,

k) Research Centres should be mandatorily established by energy intensive industries to promote research activities in the context of climate change and global warming.

l) The BEE Authority needs to be supported for carrying out meaningful energy audits and following up of the recommendations made there in for conservation of energy by the industry,

m) The status of GHGs emissions at the inception stage of the industry, can be made known to the public through the Environmental Impact Assessment Reports.

n) The technological upgradations and conversion of existing industries towards achieving of cleaner productions can be supported by announcing financial incentives.

o) Environmental Audit, Environmental Impact Assessment Report under the Environment Protection Act, 1986 and Energy Audit should be read together for achieving of the effective measures in conservation of energy by the industry.

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NATURE VS PEOPLE: LEGAL FRAMEWORK OF CLIMATE CHANGE

*Thiyagarajan.B & Saravanan.R**

INTRODUCTION:

India has been ranked sixth in the Global Climate Risk Index,[1] which reflects the extent to which countries have suffered by the ramifications of weather-related deprivation. United Nations Framework Convention on Climate Change (UNFCCC) defines climate change as, change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods.[2] It is an interminable physical phenomenon of nature, predominantly induced by anthropogenic agents and signifies an alteration in the statistical distribution of weather over periods of time ranging from decades to millions of years.

Since the dawn of the 20th century, there has been an increase in the annual mean temperature globally by 1.8°C[3] and in India by 1.2°C. Due to drastic increase in temperature, India has endured higher frequency and intensity of weather-related disasters- droughts, floods, heat waves. During the 2017 winter, southern India experienced one of the worst droughts of the century with the average temperature being 2.95°C higher than the 1901-1930 baseline. With the annual mean temperature in India increasing rapidly since 1995, it will breach the 1.5°C mark, the target set under the Paris Agreement, within the next two decades.[4] Therefore, addressing climate change necessitates an unprecedented degree of liaison between countries and also among different levels of the Government, private entities and individuals, failure of which would result in crossing the danger mark, beyond which sustainable livelihood for the people would become unfeasible.

The paper has dealt with the legal framework of climate change under three parts. The first part identifies the Indian policies and laws to combat climate change. The second part discusses the different international agreements leading up to the Paris Agreement. The third part focuses on the Paris Agreement and its implication. The last part details the key facets of

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[1]David Eckstein et al., *Global Climate Risk Index 2018*, GERMAN WATCH, 6 (2018).

[2]FACT SHEET: CLIMATE CHANGE SCIENCE - THE STATUS OF CLIMATE CHANGE SCIENCE TODAY, UNFCCC, available at https://unfccc.int/files/press/backgrounders/application/pdf/press_factsh_science.pdf. (last visited June 9, 2018).

[3]*Global Climate Change,* NASA SCIENTIFIC VISUALIZATION STUDIO, available at https://climate.nasa.gov/.(last visited June 9, 2018)

[4]*On World Environment Day, CSE releases analysis of how India Has warmed over the years – from 1901 till 2017*, CENTRE FOR SCIENCE AND ENVIRONMENT, available at https://www.cseindia.org/on-world-environment-dat-cse-releases-analysis-of-how-india-has-warmed-over-the-the-years-from-1901-till-2017-6960 (last visited June 9, 2018).

Sweden's climate policy, which is deemed to be the leading country in climate change action. The paper concludes by providing suggestions to improve the existing climate change policy.

INDIA ON CLIMATE CHANGE:

No country is immune from the impacts of global warming and climate change. Climate change is regarded as a cardinal threat for developing countries like India, which encounter large climate variability and are subjected to enhanced chance of risks from climate change. Ancient India recognized the importance of environmental management as evidenced in the scriptures and smritis.[5] Thus, in order to curb global warming and minimize climatic change patterns, the Government of India has taken measures right from the pre-constitutional era by establishing various norms in order to protect environment and biodiversity.

A) Constitutional Provisions: The Constitution of India clearly emphasizes on the welfare of its citizens. Thus, the State is under an obligation to provide clean and healthy environment for its citizens. The framers of the Constitution had identified the need for legislative safeguard for the environment and have incorporated articles within the Constitution to that effect. In particular, Part III and Part IV of the Constitution play a significant role when it comes to environmental issues.

Article 21 of the constitution of India confers on its citizens the fundamental right to life and personal liberty. The Apex court in the case of *Maneka Gandhi* v. *Union of India*[6] held that provisions of part III (i.e., fundamental rights) of the Constitution must be interpreted in such a manner that would expand the scope and ambit of the fundamental rights and not restrain or limit their application by judicial interpretation. This led to the expansion of the application of Article 21 to encompass right to clean and healthy environment as an integral facet of right to life.[7]

Further, in *Virender Gaur* v*. State of Haryana,*[8] the Supreme Court observed that Article 21 of the Constitution includes the protection and preservation of environment, ecological balance, and freedom from pollution of air and water, sanitation within its scope, without which life cannot be enjoyed. Any contract or action, which would lead to environmental pollution, should be considered as a violation of Article 2l.

The Hon'ble Supreme Court in, *Delhi Vehicular Pollution Case*[9] delivered a landmark judgement by burdening the Government with the responsibility of controlling pollution.

Article 48A of the Constitution directs the State to safeguard the environment from damages and conserve forest and wildlife of the country.[10] As this principle is laid down in Part IV of the

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[5]S SHANTHAKUMAR'S, INTRODUCTION TO ENVIRONMENTAL Law 75 (2nd ed., Nagpur, Wadhwa and Company, Reprint 2009).
[6]Maneka Gandhi v. Union of India, 1978 AIR 597.
[7]Subhash Kumar v. State of Bihar, A.I.R 1991 S.C 420, 423
[8]Virender Gaur v. State of Haryana, (1995) 2 SCC 577.
[9]M.C. Mehta v. Union of India and Ors, 1991 SCR (1) 866, 1991 SCC (2) 353.
[10]INDIA CONST. art. 48A.

Constitution, which in turn is regarded as fundamental for governance of the country, the state is under compulsion to protect and preserve environment from all kinds of damages.

With regard to the application of Directive Principle of State Policies (DPSP), in *C. B. Boarding and Lodging* v. *State of Mysore*[11] it was held that "*there was no conflict on the whole between the provisions contained in Part III and Part IV"* and that *"they are complementary and supplementary to one another".* The decision was reiterated in *Minerva Mills Ltd* v. *Union of India*[12] where the Supreme Court held that *"harmony and balance between fundamental rights and directive principles is an essential feature of the basic structure of the Constitution".*

Article 51A: The 42nd Constitutional amendment incorporated a new part into the Constitution, namely part IV-A which provides Fundamental Duties of citizens. With the introduction of Article 51A(g), the constitutional obligation to protect and improve the environment was imposed not only upon States but upon citizens as well.[13] Article 51A(g) managed to integrate Buddhist and Gandhian environmental ethics of preserving the natural environment and displaying compassion to all living things.

In *L. K. Koolwal* v. *State of Rajasthan*[14]the Court held that, when every citizen has a constitutional duty to protect the environment (Article 51A), then citizens must be entitled to Court's aid in enforcing the duty against obstinate State agencies.

Articles 48A and 51A (g) together impose two-fold responsibilities. It not only prescribes directions to the state to preserve and improve environment but also imposes a duty upon every citizen to assist in protecting the natural environment. This combination of right and duty creates a platform for the establishment of a *sui generis* enviro - constitutional jurisprudence.[15]

Article 142: To curb environmental degradation and uplift environmentalism, the Supreme Court of India in addition to Article 32 and 226 took into consideration Article 142 of the Constitution.[16] This was evident in the case before the Supreme Court, *Consumer Education and Research Centre* v. *Union of India*[17], where the Court issued orders against thirty asbestos mines and seventy-four asbestos related industries to abide by ergonomic principles. The order was supported by judicial obligations under Article 142.[18]

The Indian Constitution does not consider mere protection as sufficient, but rather aims to bestow a solemn Constitutional commitment to enhance the environment, along with its natural entities, flora and fauna with kindness and compassion. The Constitutional conscience

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[11]C. B. Boarding and Lodging v. State of Mysore 1970 AIR 2042, 1970 SCR (2) 600.
[12] Minerva Mills Ltd v. Union of India 1980 AIR 1789, 1981 SCR (1) 206.
[13]INDIA CONST. art. 51A.
[14] L. K. Koolwal v. State of Rajasthan, AIR 1988 Raj 2.
[15]Md Zafar Mahfooz Nomani*, Enviro-Constitutional Ethos in right duty discourse: Towards the creation of an equitable and sustainable socio-legal order*, 1I.J.E.L., 65 (2000).
[16]INDIA CONST. art. 142.
[17]Consumer Education and Research Centre v. Union of India, 1995 AIR 922, 1995 SCC (3) 42.
[18]*Supra note* 16, at 5.

is evidenced from the promotion of moral aspects such as solicitude and benevolence towards environmentalism.[19]

B) Legislative Portfolio:

Environment legislations are considered as 'beneficent' legislations which are enacted in furtherance of the DPSP enshrined in Article 48A of the Constitution. These beneficent legislations impose a duty upon the court to observe an interpretation advocating ecological preservation. Thus, the Indian government has enacted various national laws to combat global warming and climate change emphasizing on prevention and control of industrial and urban pollution.

Indian Penal Code 1860: Even during the pre-constitutional era criminal sanctions were prescribed to activities that were detrimental to the environment as evidenced in Chapter XIV of the Indian Penal Code 1860 which deals with offences affecting public health, safety, convenience, decency and morals which invariably covered water, air and noise pollution.

Public nuisance can be defined as any act or omission, which causes any common harm to the public or to any person who is in a position to use a public right. Thus, any act affecting the environment can be considered as public harm and can be brought under the ambit of public nuisance.[20] In addition to this, any person who voluntarily corrupts any public spring or reservoir thus making them unfit for ordinary use is said to have committed an offense punishable with imprisonment for 3 years or fine of Rs. 500 or both under Section 277[21]. This section directly recognizes acts which pollute and degrade public water bodies. Further, Section 278 punishes a person with fine of Rs. 500, if he voluntarily by any act, vitiates the atmosphere making it unfit and injurious to the health of any persons who may be within the vicinity of such debased neighbourhood.[22]

The Environment Protection Act (EPA), 1986*:* The EPA is regarded as an 'umbrella' legislation which establishes a system for Central Government to control the Central and State authorities formed under past enactments, such as the Water Act and Air Act. It delegates power to the Central Government to frame essential rules and regulations to protect and improve the quality of the environment.[23] 'Environment' is defined to include water, air and land and the inter relationships which exists among water, air and land, and human beings and other living creatures, plants, micro- organisms and property, thus the scope of the EPA is broad.[24]

The Environment Impact Assessment (EIA) was established under this Act which is regarded as the first attempt to constitute a comprehensive statutory EIA programme which focuses on

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[19]*Ibid.*
[20] Indian Penal Code, 1860, Act No. 45 of Year 1860, S. 268.
[21]*Ibid.,* S. 277.
[22]*Ibid,* S. 278.
[23] P K. GOEL & K P. SHARMA, ENVIRONMENTAL GUIDANCE & STANDARDS IN INDIA 66 (1st ed. Jaipur, Techno Science Publications, 1996).
[24]The Environment Protection Act, 1986, Act No. 29 of Year 1986, S. 2 (a).

assessing the inter-seasonal and inter-annual variability of environmental parameters.[25] The Act also propounded the 'Eco mark' Scheme which promotes manufacturers to produce environment friendly products, reward measures to reduce hostile environmental impacts and help consumers in order to make educated and responsible decisions while purchasing goods.[26]

The Electricity Act, 2003: The Electricity Act, which provides a comprehensive framework for power sector development, indirectly deals with the activities which have environmental implications.[27] This Act mandates that all new projects should obtain a formal sanction from the Ministry of Power (MoP).[28] The Act acknowledges the need for renewable energy in the country's National Electricity Policy and in stand – alone systems.

Moreover, the Act instigates the formulation of National Energy Policy and National Tariff Policy aimed at achieving optimal utilization of resources such as coal, natural gas, nuclear substances or materials, hydro and renewable sources of energy.[29]

The Energy Conservation Act (ECA), 2001: The Act prescribes certain initiatives at both Central and State level to promote energy efficiency by way of establishing supervisory mechanisms, legal frameworks and institutional procedures. It stipulates norms and standards and if a consumer's energy consumption is less than the provided specification, then the Central Government is empowered to award Energy Savings Certificates.[30]

The ECA consists of five essential provision which relate to Designated Consumers, Standard and Labelling of Appliances, Energy Conservation Building Codes, Creation of Institutional Set-up (Bureau of Energy Efficiency) and Establishment of Energy Conservation Fund.

National Green Tribunal (2010): The enactment of the National Green Tribunal Act, 2010 led to the establishment of the National Green Tribunal which is mandated to resolve disputes with regard to environmental protection and preservation of forests and other natural resources in an efficacious and diligent manner. It provides an avenue for the enforcement of environmental legal rights and means to avail compensation and other reliefs for injury to persons or property and other incidental matters. In furtherance of such purposes, the Tribunal is endowed with all requisite expertise fundamental to deal with environmental cases, which may be inclusive of multi-disciplinary issues. This specialized body is only bound by the

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[25] *Environment Impact Assessment (EIA),* MINISTRY OF EARTH SCIENCES, available at http://www.moes.gov.in/programmes/environmental-impact-assessment-eia. (last visited June 9, 2018).

[26] SHYAM DIWAN &ARMIN ROSENCRANZ, ENVIRONMENTAL LAW AND POLICY IN INDIA 70-71 (2nd ed., New Delhi, Oxford University Press, 2001)

[27] *Environmental Regulations and Legal Framework in India,* CARETRUST, available at http://www.caretrust.in/Environmental%20laws.pdf. (last visited June 9, 2018).

[28] The Electricity Act, 2003, Act No.36 of 2003, S. 68 (1).

[29] Michal Nachmany et al., *Climate Change Legislation in India: An Excerpt from the 2015 Global Climate Legislation study, A Review of Climate Change Legislation in 99 Countries, LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE*, available at http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2015/05/INDIA.pdf. (last visited June 9, 2018).

[30] *Ibid.*

principles of natural justice and its scope is not restrained by the procedure laid down under the Code of Civil Procedure, 1908.

The Tribunal is under obligation to dispose all applications and appeals within 6 months from the date of filing thereby ensuring swift environmental justice and also alleviating the burden of higher courts. The principal Bench of the Tribunal is in New Delhi and the other four Benches of the Tribunal are at Bhopal, Pune, Kolkata and Chennai.[31]

C) Executive Portfolio:

Apart from Acts, the Indian Government has also formulated policies to counteract climate change. Thus, apart from legislation, India has also developed a policy process to specifically target climate change.

National Action Plan on Climate Change **(NAPCC):** India, being a signatory to the UNFCCC[32] has built a framework to reduce emission of Greenhouse Gases (GHGs) by enacting a policy called National Action Plan on Climate Change (NAPCC) in 2008. India despite being only a non-Annex I country under Kyoto Protocol, which has no obligation to frame a draft on emission reduction, has developed the said policy in order to specifically address climate change. NAPCC enlists the current and future policies and programmes aimed at climate change mitigation and adaptation.

The NAPCC proposes that, the approach India must take is, "a directional shift in the development pathway", that "promotes development objectives while also yielding co-benefits for addressing climate change effectively."[33]

Prime Minister's Council on Climate Change, which is regarded as the High-Level advisory group, was set up by the then Prime Minister, Dr. Manmohan Singh and it comprises of both Government representatives and Non-Government members. National Action Plans for assessment, adaptation and mitigation of Climate Change were formulated by the Council. The Council further provided advice on proactive procedures to the Government with regard to climate change and expedited inter-ministerial coordination.[34] The Ministry of Environment and Forests manages the NAPCC and it is implemented through the Nodal Ministries in specific sectors/areas. The Advisory Council is made responsible for the mission's progress and it is expected to submit the reports periodically. The Council is assisted by the Secretary Executive Panel, which also overlooks the implementation of the missions.

The plan identifies eight core 'National Missions' *viz*:

a) ***National Solar Mission:***

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[31] http://www.greentribunal.gov.in/history.aspx

[32] India signed the agreement in June 1992 and ratified the same in November 1993.

[33] *National Action Plan on Climate Change (NAPCC)*, THE GOVERNMENT OF INDIA, available at http://www.moef.nic.in/downloads/home/Pg01-52.pdf. (last visited June 9, 2018).

[34] *Climate Change-India's Perspective*, LARRDIS available at http://164.100.47.193/intranet/CLIMATE_CHANGE-INDIA's_PERSPECTIVE.pdf. (last visited June 1, 2018).

The Indian Solar Mission is a comprehensive solar energy programme extending from 2010 to 2022. The project encourages electricity generation from both small and large-scale solar plants. The plan's ultimate aim is to make solar energy competitive with fossil-based energy.

The object of this mission is to axiomatically increase the proportion of usage of solar energy in the total energy mix. Furthermore, it intends to launch Research and Development programmes in view of producing affordable and more convenient solar energy systems and promote innovations for sustained long – term storage and use of solar power.[35]

b) ***National Mission for Enhanced Energy Efficiency:***

The Mission aims to achieve growth with ecological sustainability by formulating cost effective strategies for end-use demand side management. The Ministry of Power (MoP) and Bureau of Energy Efficiency (BEE) have been assigned the responsibility of preparing the implementation plan for the mission and to create and sustain market for energy efficiency.[36]

c) ***National Mission on Sustainable Habitat:***

The Mission intends to promote energy efficiency practices by adoption of these three initiatives:

- Designing energy conservation building code for addressing both new and existing large commercial buildings stock to optimize their energy demand by retooling.
- Recycling urban and material waste and producing power through waste by technological development.
- Adopting long term transport plans, resulting in modal shift to public transport and formulating better plan for urbanization.

Furthermore, the mission aims to refine and improve the resilience of existing infrastructure, community-based disaster management, and the warning system for extreme weather events in order to adapt to future climate change.[37]

d) ***National Water Mission:***

The National Water Mission was established to ensure integrated water resource management by focusing on conserving water, minimizing wastage and adopting a more equitable distribution within and between states. The Mission seeks to formulate a framework to increase water use efficiency by 20% through regulatory mechanisms with differential entitlements and pricing, while taking into consideration the provisions of the national water policy. It seeks to address water needs in urban and coastal areas with inadequate sources of water through recycling of wastewater and adopting of new and germane technologies such as low temperature desalination technologies, which makes ocean water consumable. The policy

[35] *Supra* note 34, at 8.
[36] *Ibid.*
[37] *Ibid.*

is subject to revision to meet the variations due to climate change. It also focuses on improving the efficiency of irrigation systems and creating incentive structures to promote water positive technologies.[38]

e) ***National Mission for Sustaining the Himalayan Ecosystem***

This Mission focuses primarily to advance management procedures for preserving the Himalayan glacier and mountain eco-system. The mission envisages the extent of recession of Himalayan glaciers and formulates means to address the predicament. Freshwater resources and health of the ecosystem is to be evaluated by an observational and monitoring network in cooperation with neighbouring countries. Incentives are to be provided to community organizations and panchayats for preserving and improving forested lands thereby promoting a community-based management of these ecosystems. The mission further aims to sustain two-thirds of the area under forest covers to avert erosion and land degradation.[39]

f) ***National Mission for a Green India:***

This mission was launched to enhance ecosystem services including carbon sinks. The Mission is to be act upon degraded forestlands by afforestation through direct action by communities, organized through joint forest management committees and guided by the Departments of Forest in State Governments. Specific funds have been allocated for such purpose through the Compensatory Afforestation Management and Planning Authority (CAMPA).[40]

g) ***National Mission for Sustainable Agriculture:***

The mission prioritizes in developing strategies to increase the resilience of Indian agriculture to climate change. It further focuses on identifying and developing new varieties of crops with specific traits such as thermal resistance and alternative cropping patterns which are characterized to endure extreme weather, flooding, variable moisture availability and periodic dry spells. To facilitate the development of agriculture, new credit and insurance mechanisms have been adopted and it integrates traditional knowledge and practice systems, information technology, geospatial technologies and biotechnology within its scheme.[41]

h) ***National Mission on Strategic Knowledge for Climate Change:***

This mission aims to collaborate with the global community in research and technology development through various means and establish its own research agenda assisted by climate change related institutions and a climate research fund. It emphasizes on devising a strategic knowledge mission designed to identify and address the challenges of climate change and allocates appropriate funding and research to various facets of climate change.

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[38] *Ibid.*
[39] *Ibid.*
[40] *Ibid.*
[41] *Ibid.*

The mission is provided with climate science research fund to carry forward its research on climate change. In addition, through venture capitals, private sector initiatives are encouraged to develop innovative technologies for the purpose of adaptation and mitigation of climate change.[42]

These eight national missions, provide the policy framework to the country to adapt to climate change and instigate the economy on a route that would lead to progressive and substantial mitigation through avoided emissions.[43]

NAPCC has been further extended to include four new missions which are yet to receive the approval of the Prime Minister's Council on Climate Change – the National Human Health Mission; the National Wind Energy Mission; the National Waste-to-Energy Mission, and the National Coastal Resources Mission.[44]

The Indian Network for Climate Change Assessment (INCCA): The Indian Network for Climate Change Assessment (INCCA) consists of 127 research institutions entrusted with conducting research on the science of climate change and its impacts on various sectors of the economy in India. The INCCA, in 2010, released a "4*4" assessment of the effects of climate change on four sectors – water resources, agriculture, forests and human health – in four significant regions of India – the Himalayan region, the North East, Western Ghats and Coastal India.

National Environmental Policy, 2006: The National Environment Policy, 2006 is considered to be a key policy in India's action against climate change emphasizing on identification of the impacts and effects of climate change in India on various resources, following the principles of common and differentiated responsibilities of different countries and promoting Indian industries to take part in Clean Development Mechanism (CDM).[45]

D) Role of Judiciary:

Advancement in the enforcement of environmental legislation came with the growth of judicial activism, evidenced by the increase in environment-related public litigation cases where the Courts have resorted to shutting down of factories adding to pollution.[46] Legislative measures have been taken to stifle human actions which deteriorate the environment, but the Judiciary has taken the onus upon itself to balance man's development with the environment.

Nowadays, Judiciary has emphatically resorted to constitutional environmentalism to deal with the issues related to the environment. The Supreme Court and High Courts of India, through Articles 32 and 226 of the Constitution, have reaffirmed the legal basis of enforcement of environmental laws through public interest litigation (PIL). The orders issued by the Court, in exercise of judicial activism, not only act as remedy to a given case but also lay down policies

[42] *Ibid.*
[43] *Ibid.*
[44] *Supra* note 30, at 7.
[45] *Supra* note 35, at 8.
[46] *Supra* note 24, at 6.

which have widespread implications for both the regulatory agencies and regulated communities.

In *M. C. Mehta v. Union of India,*[47]the Supreme Court took up the role of public educator where it directed the media to focus and broadcast environmental messages and information and include environmental studies as a compulsory subject in schools and colleges.

The judiciary has propounded and incorporated numerous environmental principles in various landmark decisions some of which are as follows:

Precautionary Principle: The Precautionary Principle is a better – safe - than – sorry approach, which states that, in case of existence of some perilous risks, capable of damaging humans and/or the environment, absence of irrefutable, conclusive, or substantial scientific proof cannot be a ground for inaction. It emphasizes on anticipating and avoiding environmental harm when there exists a mere chance of such uncertain impacts from any activity.

Corresponding to this principle, the Hon'ble Supreme Court in Taj Trapezium case[48] (TTZ), observed that 'Precautionary Principle necessitates that environmental measures must anticipate, prevent and attack the cause of operation, which are prejudicial to the environment. Further, the Supreme Court based on the reports of various technical experts, ordered for the relocation of Mathura refinery industries and other industries emitting sulphur dioxide outside TTZ or as an alternative directed the industries to changeover to natural gas as their industrial fuel.

Polluter Pays Principle: The 'Polluter Pays Principle' is an international environmental law principle which is regarded as the curative approach concerned with repairing ecological damage. According to this principle one who pollutes the environment should be made accountable to bear the costs involved for remedial or clean up measures. This principle sets the Government free from its responsibility to meet the costs of undertaking remedial action and for preventing environmental damage, thereby shifting the financial burden from incidental taxpayers to the concerned polluter.

The Hon'ble Supreme Court had recognized this principle in the case, *Indian Council for Enviro-Legal Action v. UOI & Ors.*[49] and held that, *"absolute liability of harm to the environment extends not only to compensate the victims of pollution, but also to the cost of restoring environmental degradation. Remediation of damaged environment is part of the process of sustainable development."*

The Doctrine of Public Trust: The doctrine of Public Trust states that certain natural resources like air, sea, water are intended for general use and their privatization cannot be permitted as they should be preserved for the public. The doctrine is meant for two purposes: it makes

[47]M.C. Mehta v. Union of India, AIR 1992 SC 382.
[48]M.C. Mehta *v.* Union of India, AIR 1997 SC 734.
[49]Indian Council for Enviro-Legal Action v. UOI & Ors, AIR 1996 SC 1446.

affirmative state action for effective management of resources mandatory and permits citizens to criticize ineffective management of natural resources.

This doctrine was accepted by the Supreme Court in *M.C. Mehta* v. *Kamal Nath*[50] . The Court held that these resources are a gift of nature and the state is under obligation to preserve them in its capacity as a trustee. The State is the trustee, the general public the beneficiary, of such natural resources as sea, running water, air, forests, and ecologically fragile lands.

The Indian Judiciary in recent years has played a crucial role in the protection of environment through its interpretation of the Constitution and other laws. Each citizen has a right to clean air, water and surroundings and a well-balanced atmosphere. The Judiciary has moved itself to a position where it is capable of being in tune with the growing needs of environmental protection and has opened itself to be an avenue for people to lay claim for a cleaner and safer environment.

EVOLUTION OF INTERNATIONAL CLIMATE CHANGE ACTION:

The repercussions of climate change are globally recognized by all countries of the world. Since every country is responsible for such drastic changes in the climate, there was a need for an internationally coordinated action against climate change. This led to a series of international conventions, the most recent being the Paris Agreement which is considered as a culmination of a quarter-century of international climate diplomacy. Some of the key conventions leading up to the Paris agreement are as follows:

Intergovernmental Panel on Climate Change:

Global efforts to confront Climate Change took a significant turn when the World Meteorological Organization (WMO) and United Nations Environment Programme (UNEP) established the Intergovernmental Panel on Climate Change (IPCC) in 1988.

The IPCC is the international body for assessing the science related to climate change to facilitate policy making and periodically submits reports, the most recent being the Fifth Assessment Report with the Sixth Assessment Report expected in 2022. Thus, the IPCC urges governments at all levels to frame climate related policies by offering scientific suggestions and assessments. The assessments provide estimates of future climate change, its impacts and examines the ramifications of response options. These assessments are policy-prescriptive and not policy-relevant, and do not provide directions to policymakers. The reports of IPCC are subject to scrutiny by an expert panel in order to ensure that they are plausible and consolidative of the views of the whole scientific community.

IPCC Assessment Reports are divided into four parts, covering each Working Group and a Synthesis Report, which provide the complete scientific, technical and socio-economic evaluation of climate change. Specific issues may also be examined in Special Reports. The

[50]M.C. Mehta v. Kamal Nath, (1997) 1 SCC 598.

UNFCCC utilizes the Methodology Reports as practical guidelines whilst formulating greenhouse gas inventories.[51]

The United Nations' Framework Convention on Climate Change (UNFCCC):

The UNFCCC was adopted on 21 March 1994 at the "Rio Earth Summit." It was ratified by 195 countries and they were called Parties to the Convention. The Convention ultimately aims to balance GHG concentrations at a volume which ensures the avoidance of hazardous anthropogenic intrusion with the climate system within a time – frame sufficient to permit ecosystems to adapt naturally to climate change, to secure food production from any danger, and to facilitate sustainable economic development.

The developed countries, which are regarded as the originator of most of the present and past GHG emissions are made responsible to lead the way in curbing such emissions. There are 12 developed countries with "economies in transition" from Central and Eastern Europe. They are termed as Annex I countries and constitute the Organization for Economic Cooperation and Development (OECD). These Annex I countries have agreed to provide financial support against the action on climate change.

The Convention is in acceptance of the fact that the emissions from developing countries are set to increase in the coming years, but it strives to reduce such emissions in a manner that does not impede their economic progress in order to fulfil its overall objective.[52]

The Kyoto Protocol*:*

The Kyoto Protocol is an international agreement which requires its Parties to assign internationally binding emission reduction targets and is linked to the UNFCCC. The Protocol, in compliance with the principle of "common but differentiated responsibilities," imposes larger obligation on developed nations as they are identified as the primary contributors of the prevailing high levels of GHG emissions in the atmosphere.

On 11 December 1997, the Kyoto Protocol was adopted in Kyoto, Japan and it came into force on 16 February 2005. The "Marrakesh Accords" provided elaborate rules for executing the Protocol, which were adopted at COP 7 in Marrakesh, Morocco, in 2001. Its first commitment period was initiated in 2008 and lasted till 2012.

The Protocol requires member countries to meet their central targets through national measures. Apart from this, the Protocol offers other additional means to achieve their targets with reference to three market - based mechanisms: (i) International Emissions Trading (IET); (ii) Clean Development Mechanism (CDM); (iii) Joint Implementation (JI). These market – based mechanisms play a significant role in aiding the parties to achieve emission targets in an efficient manner and encourage green investment.

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[51]*IPCC Factsheet: What is the IPCC,* IPCC, available at http://www.ipcc.ch/news_and_events/docs/factsheets/FS_what_ipcc.pdf. (last visited June 9, 2018).
[52]*Supra* note 35, at 8.

At the time of the first commitment period, 37 industrialized countries and the European Community agreed upon to cut down GHG emissions to an average of 5% against 1990 levels. In the second commitment period, introduced after Doha Amendment, the Parties undertook to reduce GHG emissions by at least 18% below 1990 levels in the eight-year period from 2013 to 2020.[53]

The Bali Road Map:

In December 2007, at Bali, Indonesia, the 13th COP and the 3rd Meeting of the Parties took place and the Bali Road Map was adopted. The Road Map is a series of progressive decisions delineating tasks that are required to be done to preserve the climate under various negotiating "tracks." The Bali Action Plan, which is included in the Bali Road Map, plots the path for a new negotiating process intended to combat Climate Change.

The Bali Action Plan embodies an extensive process for the complete, sustained and efficacious implementation of the Convention through long-term cooperative action, till and beyond 2012. The Ad Hoc Working Group on Long-term Cooperative Action (AWG-LCA), a subsidiary group, was tasked by the COP to carry out the process. There are five key categories in The Bali Action Plan: Shared Vision, Mitigation, Adaptation, Technology and Financing.[54]

The Copenhagen Accord:

In 2009, at Copenhagen, Denmark, the 15th session of the COP to the UNFCCC and the 5th session of COP as Meeting of the Parties to the Kyoto Protocol took place, where they set up the Copenhagen Accord. It outlines the long term goal of restraining the maximum global average temperature increase to no more than 2 degrees Celsius above pre-industrial levels which was to be revised in 2015. It also recognized the primary claim of the developing countries to limit the temperature increase to below 1.5 degrees.

Developed countries had extended their helping hand to developing countries to minimize GHG emissions and adapt to the irrevocable effects of climate change by giving assurances to grant US $30 billion for the period 2010-2012, and further to issue long – term finance of US $100 billion a year by 2020 from a variety of sources.[55]

The Cancun Agreements:

On December 11 in Cancun, Mexico, at the 2010 United Nations Climate Change Conference, the Cancun Agreements was adopted, and it was regarded as a chief step towards the control of GHG emissions. It assists developing nations to safeguard themselves from impacts of climate change and to move towards sustainable development. The main objectives are as follows: (i) Mitigation; (ii) Transparency of actions; (iii) Technology; (iv) Adaptation; (v) Forests; (vii)

[53] *KP Introduction,* UNFCCC available at https://unfccc.int/process/the-Kyoto-protocol. (last visited June 5, 2018).
[54] *Bali Road Map Intro,* UNFCCC), available at https://unfccc.int/process/conferences/the-big-picture/milestones/bali-road-map. (last visited June 6, 2018).
[55] *Fact sheet: Copenhagen – Background information*, UNFCCC), available at https://unfccc.int/files/press/application/pdf/fact_sheet_copenhagen_background_information.pdf. (last visited June 6, 2018).

Capacity building; and (viii) Finance. It also introduces the Green Climate Fund for developing countries in order to aid them in mitigating climate change and adapting to its impacts by disbursing $100 billion per year by 2020.[56]

The Durban Agreement:

In 2011, the international community took a forward step in climate change negotiations in the United Nations Climate Change Conference held at Durban. The primary challenge that still remains is to advance climate action forward expeditiously both within and outside the climate change negotiations and to bridge the looming gap that exists between required and actual levels of action.

The Durban Agreement employs a road map for execution, which intends to overcome these challenges in a more connected manner. The map prescribes four key areas of coordinated and complementary action and implementation devised to protect and develop trust among countries viz. (i) Second commitment period of the Kyoto Protocol; (ii) Introduction of a new series of negotiations under the Convention to formulate a new and universal GHG reduction protocol, legal instrument or other outcome with legal force by 2015 for the period beyond 2020; (iii) Conclusion in 2012 of existing broad-based stream of negotiations; and (iv) To carry out a new Global Review of the evolving climate challenges, by employing modern science and data.[57]

The Doha Climate Gateway:

Parties to the Convention met for the 18th time at the 2012 UN Climate Change Conference in Doha, Qatar, where they integrated the gains of the preceding three years of International Climate Change negotiations and recognized the exigency for higher ambition and action at all levels. Key decisions taken by the Governments are:

- Set out a timetable to implement a universal climate agreement by 2015, which in turn would come into force in 2020.
- Initiate work on a 2015 agreement under a single negotiating stream in the Ad hoc Working Group on the Durban Platform for Enhanced Action (ADP) after the completion of obligations under Bali Action Plan.
- Improve their ambition to reduce GHG and to assist vulnerable countries to adapt.
- Introduce a new commitment period under the Kyoto Protocol, safeguarding the treaty's key legal and accounting models and complying with the principle that action to reduce GHG emissions is to be ushered by developed countries.

[56]*Intro to Cancun Agreements,* UNFCCC, available at https://unfccc.int/process/conferences/the-big-picture/milestones/the-cancun-agreements. (last visited June 6, 2018).
[57]*Essential Background - Durban outcomes*, UNFCCC, available at https://unfccc.int/process/conferences/the-big-picture/milestones/outcomes-of-the-durban-conference. (last visited June 6, 2018).

- Strive to advance financial and technological assistance and establish a new institution designed to promote clean energy investments and sustainable growth in developing countries.

As the governments had agreed to find ways to maximize their efforts to limit emissions by 2020, these decisions facilitated them to stay below the agreed 2 degrees Celsius temperature rise, beyond which drastic repercussions of climate change could be experienced.[58]

THE PARIS AGREEMENT:

International climate politics was revolutionized after the adoption of the Paris Agreement (PA) on 12 December 2015, which brought years of deadlock in negotiations to an end, advancing a universal action of engagement, follow-up, regular stock-take exercises and cooperative action. 196 Parties of the UNFCCC came together to form a legally-binding framework to combat climate change through international coordination. The agreement had helped to resolve various difficulties faced under the Kyoto Protocol, arising between developed and developing countries, industrialized nations inside and outside the Protocol and among those who had differences with regard to the credibility of market mechanisms. Despite these positive contributions, the Paris Agreement is still opined to be inadequate, lacking sufficient action or support, with individual States failing to meet the overall climate goal.[59]

The overall approach:

The Paris Agreement, unlike the Kyoto Protocol which entails individual Parties to fulfil emission reduction and limitation targets, prescribes an overall climate change goal[60] and requires Parties to commit to this goal. The Countries are given discretion to decide the means to fulfil the goal, in compliance with the *'principle of common but differentiated responsibility and respective capabilities, in the light of different national circumstances.*[61] The parties reconvene every 5 years to ideally set more ambitious targets.

The Conference of the Parties (COP), along with the Paris Agreement, have also brought in guidelines on pre-2020 arrangements and provided particulars with regard to implementation of the Paris Agreement before its entry into force (the Paris Decision or PD).

The Secretary General of the United Nations acts as depositary of the Paris Agreement.[62] Once 55 Parties submit their ratification instrument with the depositary which contributes to at

[58] *The Doha Climate Gateway,* UNFCCC, available at https://unfccc.int/process/conferences/the-big-picture/milestones/the-doha-climate-gateway. (last visited June 6, 2018).
[59] Charlotte Streck et.al, *The Paris Agreement: A New Beginning,* JOURNAL OF EUROPEAN ENVIRONMENTAL AND PLANNING LAW, Vol. 13 (2016).
[60] Paris Agreement, art.2.
[61] *Ibid.* art. 2.2.
[62] *Ibid.* art. 26.

least an estimated 55 percent of the total Global GHG emissions, the Agreement will come into force. [63]

Mitigation:

The objective of the PA is to limit global temperatures *'well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C'*.[64] The Agreement provides that global emissions peak must be achieved 'as soon as possible' emphasizing on expeditious emission reductions with an intent to balance anthropogenic emissions by sources and removals of sinks of greenhouse gases in the last half of the century.[65]

In order to meet the prescribed targets, two types of actions are provided:

1. GHG emissions must be reduced till there is a balance between emissions and sequestration;

2. Countries are tasked to maximize alternatives to sequester GHG emissions.[66]

There is no limitation with regard to sequestration to natural carbon sinks and the Article permits Parties to develop technology-based carbon sequestration solutions, such as carbon capture and storage as more residual GHG emissions are admissible if there is an increase in the rate of sequestration.

Nationally determined contributions:

Nationally Determined Contributions (NDCs) form an indispensable part of the PA and are key in fulfilling the long-term goals. NDCs represents each country's efforts and plans to limit national emissions and conform to the impacts of climate change. Every member country is under obligation to formulate, communicate and have account of their successive NDCs, which is communicated every 5 years. Developed Countries are tasked to set up economy wide absolute emission reduction targets with developing countries to follow course in time.[67] Each following NDC must constitute a progression when compared to the preceding NDC. The Paris Agreement and COP Decision prescribe binding, procedural rules for the formulation and evaluation of NDCs but remains silent with regard to its implementation and execution.

Parties also have a duty to account for their NDCs which ensures progression with each NDCs and environmental stability. Parties must also disclose information essential for clarity, transparency and understanding.[68] Such disclosed information is subject to a technical expert review.[69] This procedure ensures that each NDC has undergone sustained progression of

[63] *Ibid.* art. 21.1.
[64] *Ibid.* art. 2.1(a).
[65] *Ibid.* art. 4.1.
[66] *Ibid.*
[67] *Ibid.* art. 4.4.
[68] *Ibid.* art. 4.8.
[69] *Ibid.* art. 13.11.

ambition.[70] These NDCs may also be altered by the Parties at any time in order improve the level of its ambition.[71]

The agreement also permits voluntary partnerships where Parties can assist the mitigation efforts of other Parties. This may be through transfer of mitigation outcomes which another Party can use to accomplish its NDC.[72] The Agreement provides a sustainable development mechanism permitting public and private bodies to assist mitigation projects that create transferrable GHG emissions.[73]

Loss and damage:

The time-bound Warsaw International Mechanism for Loss and Damage is implemented in the Paris Agreement, assuring coordination in situations of loss and damage which includes early warning systems, emergency preparedness, and slow onset events, amongst others.[74]

As required by developed countries, the mechanism does not impose any liability or compensation.[75] The Executive Committee of the Warsaw International Mechanism was also requested in the Decision to provide a clearing house for risk transfer[76] and bring a task force to issue recommendations 'to avert, minimize and address' the risk of displacement.[77]

INDIA'S POST-2020 CLIMATE TARGETS:

On 2nd October 2016, India ratified the Paris Agreement and has undertaken to:

1. Reduce emissions intensity by 33 - 35% from 2005 levels by 2030;
2. Increase cumulative electric power installed capacity from non-fossil fuel energy resources to 40% by 2030;
3. Create additional carbon sequestration of 2.5 to 3 billion tons of carbon dioxide equivalent by 2030.[78]

MODEL LEGISLATION AND POLICY IN SWEDEN:

With the entire world under obligation to tackle climate change, many States have implemented policies to achieve such goals. On this account, Sweden has been ranked 4th in the Climate Change Performance Index (CCPI),[79] which examines and compares the climate protection performance of 56 countries and the EU. Sweden is the highest ranked country with

[70]*Ibid.* art. 4.3.
[71]*Ibid.* art. 4.11.
[72]*Ibid.* art. 6.2.
[73]*Ibid.* art. 6.4.
[74]*Ibid.* art. 8.
[75]Paris Decision, para 52.
[76]*Ibid.* para 49.
[77]*Ibid.* para 50.
[78]*The Paris Agreement on Climate Change*, NRDC, available at https://www.nrdc.org/sites/default/files/paris-climate-agreement-IB.pdf. (last visited June 7, 2018).
[79]Jan Burck et al., *The Climate Change Performance Index Results 2018,* GERMANWATCH, 4(2018).

the first 3 places deemed vacant as no country has acted sufficiently to thwart the impact of climate change, even after the implementation of Paris Agreement. Some of the key features of Sweden's climate policy include:

- ***Tax exemptions for Green Cars:***

In Sweden, "green cars" are exempted from vehicle tax for the first five years. This exemption is applicable to cars taken into service from 1 July 2009. "Green car" is inclusive of new petrol- and diesel-powered passenger cars that emit less than an average of 120 grams of carbon dioxide per kilometre.[80]

- ***Energy Performance Certificate Act:***

Sweden has enacted a law on Energy Performance Certificates for buildings based on Energy Performance of Buildings Directive. Owners of the buildings are burdened with the responsibility to disclose their energy use and certain specifications about the indoor environment. The main goal of the Act is to educate owners about cost – effective measures by which energy performance of the buildings can be improved.[81]

- ***Carbon dioxide tax:***

The carbon dioxide tax was introduced in 1991 with an intent to limit emissions of carbon dioxide. The tax is based on the fossil carbon content in the fuel, where the amount is proportionate to the calculated amount of carbon dioxide emissions derived from the fuel's fossil carbon content. The tax has been increased from SEK 0.25/kg (1991) carbon dioxide to SEK 1.13/kg (2017).[82]

- ***Climate Act:***

The Climate Act is the primary legislation with regard to climate change in Sweden. It came into force on January 1, 2018. The Government is required to submit an annual climate review to the Riksdag, the Parliament of Sweden. The report provides an account of emission developments, chief political climate decisions undertaken and areas which require further policies and means of its implementation. The Government is also required to formulate climate policy action plan, containing details of the planned policies to attain emission reduction, every four years.[83]

CONCLUSION:

India has been ranked 14th in the CCPI which is higher than global leaders such as China and USA, that were ranked 41st and 56th respectively.[84] Thus, India's climate actions are substantial

[80]*Sweden's Seventh National Communication on Climate Change,* UNFCCC available at https://unfccc.int/files/national_reports/annex_i_natcom_/application/pdf/6950713_sweden-nc7-1-swe_nc7_20171222.pdf. (last visited June 8, 2018).
[81]*Ibid.*
[82]*Ibid.*
[83]*Ibid.*
[84]*Supra* note 79, at 22.

and has been well recognized by the world. Despite these actions having a positive impact, there are certain facets that are open for improvement. India can follow Sweden by implementing carbon dioxide tax and give tax concession to green vehicles, encouraging the use of renewable energy and public transportation. Considering India's vast range of communities, there lies an opportunity to incorporate indigenous and community-led management of natural resources. Chemicals as a means of environmental degradation are yet to be given due recognition and policies to such effect could promote low chemical use practices and sustainable agriculture. Public education still holds key to the success of any action against climate change, which encourages the use of public transport, solar energy and other renewable energy etc. Though India has taken up the onus to curb climate change implementing the eight national missions, these missions still seem to exist in their own separate bins and a policy that could integrate them together could go a long way in achieving the ultimate climate goal.

The world we live in was once sufficient to meet the needs of all, but man's greed has forced nature, from exhibiting its beauty, to now showcasing its darker side, changing what was once deemed order. Climate change has been caused by man's action and it requires the same to preserve the ecosystem. With USA opting out of the Paris Agreement, signalling its lack of interest towards the subject, the world needs a leader to coordinate global action against climate change. India, by making the right moves, can become the forerunner in environmental sustainability.

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CLIMATE CHANGE AND THE CHALLENGES TO FOOD SECURITY

*Sanjana L B**

INTRODUCTION

According to the World Bank's report of 2017 (State of Food Security in the World), 793 million people remain malnourished in the world. This statistic is despite the fact that hunger and prevalence of malnutrition in children has decreased from forty to twenty six percent, a considerable degree of progress.[1] Global food security has been one of the impending issues for the international community to address, and as development progressed, the problem only seemed to get bigger. The introduction of various indices to assess development and progress aside from only economic and industrial development was a huge step towards building an inclusive and secure world. The United Nations Organization also introduced its own food programme called the World Food Programme that deals with food security and allied issues.

International attention towards the issue was renewed with the introduction of the Sustainable Development Goals- 17 in number, the second being 'Zero Hunger'. This goal seeks to end hunger, achieve food security, and promote sustainable agriculture. The organization has further provided eight targets to comply with, in order to achieve the goal. They are:

a) Ensuring universal access to safe and nutritious food,

b) Ending all forms of malnutrition,

c) Doubling the productivity and incomes of small-scale food producers,

d) Sustainable food production and resilient agricultural practices,

e) Maintaining genetic diversity in food production,

f) Investing in rural infrastructure, agricultural research, technology and gene banks,

g) Preventing agricultural trade restrictions, market distortions and export subsidies,

h) Ensuring stable food commodity markets and timely access to information.

The aforementioned targets are viewed as milestones, or as a designated path towards achieving the sustainable development goal. However, along with the problem of food security itself, over the years, the world has come to face another burning issue- climate change.

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[1] FAO, IFAD, UNICEF, WFP and WHO. 2017. THE STATE OF FOOD SECURITY AND NUTRITION IN THE WORLD 2017. BUILDING RESILIENCE FOR PEACE AND FOOD SECURITY. ROME, FAO.

Climate change in simple terms refers to the change in the weather patterns over a long period of time, leading to an overall change in the average temperature of the earth, rainfall patterns, and global warming. The effects of climate change are now becoming more visible, as over a century and half of industrialization has led to the exploitation of natural resources, deforestation and a threat to biodiversity, among other things. The thirteenth sustainable development goal, 'Climate Action' pertains to tackling the issue of climate change. One of the most pressing effects of climate change is also going to be on food security, and this concern will only give more reason to worry through the future, unless action is taken immediately.

Food security essentially refers to the state of having reliable access to enough quantity of affordable and nutritious food. This implies that food security not only concerns availability and access to food, but also its production- agriculture. While the governmental and non-governmental organizations across different countries have been making efforts towards achieving food security and examining the effect that climate change may have on it, there is still a considerably long road left to cover. According to the World Economic Forum, by 2050 the demand for food will be 60% higher, however, the effects of climate change, soil degradation and urbanization would have shrunk the size of arable land.[2]

Climate change directly impacts food security in the sense that the production of food is directly dependent on the response and the factors provided by the natural ecosystem, such as the soil, rainfall patterns and wind patterns. Certain pests and the insects for pollination are also key factors to efficient and effective food production. The change in the quality of water available for irrigation and activities allied with fishery practices also determine the state of food security in a region. With the present conditions progressing at the same level into the future, large regions may not be able to feed themselves, leading to a large food security crisis.

While addressing the issue of climate change and food security, it is important to validate the role of legal frameworks, and the importance of states needing to align their legal frameworks in order to tackle climate change and the increasing food insecurity. The relevant legal context arises due to the fact that large sections of populations are food insecure as they are disadvantaged of their rights. These rights include the right to life, the right to access resources and the right to access just remedies upon deprivation.

ELEMENTS OF FOOD SECURITY AND THE IMPACT OF CLIMATE CHANGE ON THEM

Introduction to Food Security

Food security has been given various definitions by experts and organizations over the years. The purpose of defining it in the first place is to establish a concrete meaning and a standard to comply with, in order to ensure that there is safe and accessible food available for everyone. The 1996 World Food Summit defined food security as "a situation that exists when all people,

[2] Joseph Hincks, *The World Is Headed for a Food Security Crisis. Here's How We Can Avert It*, TIME, March 28th, 2018, available at http://time.com/5216532/global-food-security-richard-deverell/ (last visited May 31, 2018).

at all times, have physical, social and economic access to sufficient, safe and nutritious foods that meets their dietary needs and food preferences for a healthy life."[3]

Food security is a global challenge, and there are a variety of global concerns that affect it overpopulation, climate change and urbanisation. The scattered population distribution has left some areas of the world having the highest birth rates and population growth. As a natural phenomenon, the local ecosystems provide adequate resources for food production, health, environmental management and water; however, exceeding the carrying capacity of the ecosystem results in its stress, and eventual breakdown.[4] This means that most regions of the world exceeded the carrying capacities of their respective ecosystems as a result of rapid population growth, urbanisation and industrialisation. Over-farmed soils dried up and contaminated water sources and denuded grazing lands are signs of such breakdown.

Food insecurity may arise as one of the consequences of such breakdown, as communities are no longer able to self-sustain, and provide for themselves with the locally available resources. The lack of availability of food, causes exacerbation of health by causing immune suppression, thereby causing the population to be more prone to illness. Increased disease and illness put a greater demand for energy on the body and the requirement for nutrients that are not available. This deadly cycle consequently reduces lifespan, productivity and the ability to tackle the effects of the changing global environment.[5]

Urbanisation and industrialisation have also been massive contributors to the struggle to ensure food security across the world. In 2016, the number of undernourished people went up to 815 million people, from an estimated 777 million people in 2015. This increase is alarming, even though the numbers have still not touched previous highs.[6] Urbanisation and industrialisation have been seen as essentials in the process of development, even though organizations and scholars around the world view urbanization as a chronic social and economic problem. Feeding large cities has become more difficult than ever, and the natural knowledge developed among farmers to deal with short periods of drought is no longer adequate.

The world economy has also taken advantage of the rural-urban migration trend, leading more and more people to look for jobs in the urban sector, giving up their roles in the rural area. A majority of the urban population increase is composed of the low-middle income classes, and a static feature that has remained is their inability to access quality and nutritious food and water. While food availability is one area of concern for urban areas, food accessibility is

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[3] Havas, Karyn & Salman, Mo., *Food security: its components and challenges*., INTERNATIONAL JOURNAL OF FOOD SAFETY, NUTRITION AND PUBLIC HEALTH, VOL.4, NO.1, January 2011.

[4] *Ibid.*

[5] Tribes in Ethiopia, especially, faced this crisis between 2011 to 2015, causing over 10 million people to suffer from the effects of drought: Martin Cuddihy, 10 million people facing food shortages as drought grips Ethiopia, ABC News, 10th December 2015 available at http://www.abc.net.au/news/2015-12-10/drought-and-food-shortages-in-ethiopia/7015688(last visited May 31, 2018).

[6] FAO, IFAD, UNICEF, WFP and WHO. 2017. THE STATE OF FOOD SECURITY AND NUTRITION IN THE WORLD 2017. BUILDING RESILIENCE FOR PEACE AND FOOD SECURITY. ROME, FAO.

another.[7] Industrialisation has aided the process of migration and has in many cases made it difficult for the rural population to progress with their source of livelihood. The exploitation of natural resources, dumping of factory and untreated waste into local water bodies and contamination of groundwater has made it more difficult to carry out agriculture and allied activities, making the occupation itself more challenging and less rewarding. This is one of the major factors leading to their migration to cities in search of employment.

Elements of Food Security

A basic introspection into the definition of the term 'food security' will provide a brief understanding of the elements that make up the concept of food security. The challenges in achieving food security are direct or indirect problems encountered in fulfilling any of these elements. Law, policy and global interest has played an important role in creating a framework for achieving food security. Efforts are made at the global level, at national as well as local levels in order to tackle the issue of food insecurity, and each level presents a different set of challenges. In order to understand these challenges, it is first essential to understand the elements that make up food security.

The first element, or pillar, of food security is the physical availability of food. This dimension addresses the supply side of the chain and is the first step towards assessing the level of food security in a particular region. Production activities such as agriculture, poultry, aquaculture and fisheries form a part of the sources of supply of food. Along with quantity, the quality of such supply must also be considered, as quality of the supply is what makes it nutritious, and usable.

To assess food availability would mean to assess whether the availability of food in a particular region is enough to feed the total population of the region. The availability and production are assessed through precipitation records, food balance sheets, food market surveys, health indices, food storage and others. Along with this, it is also important to consider whether the production resources are well managed, and if they are sustainable.

The physical availability of food does not always ensure that all populations have access to it. This brings in the second element- access. This refers to the economic and physical access to food and affordability. The role of distributors, retailers and smallholders is maximised over here, as they form the link between producers and consumers, and the market conditions for food access are largely dependent on these stakeholders. Legal and policy tools are used to maintain market conditions, and to ensure that unfair trade practices such as hoarding and overpricing are minimised.

The third element to food security is food utilisation. Food utilisation refers to how the body of a consumer absorbs and utilises the nutrients that food is supposed to provide. A person's health, feeding practices, food preparation, diversity of their diet and intra-household

[7] David Satterthwaite, Gordon McGranahan & Cecilia Tacoli, *Urbanization and its implications for food and farming,* PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY B: BIOLOGICAL SCIENCES, Vol. 365, No. 1554, September 2007
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distribution of food all affect a person's nutrition status. Improving food utilisation or absorption includes improving nutrition and food safety, maintenance of diets, reducing post-harvest loss, and adding value to food. The most effective way to achieve this element would perhaps be to organize household education and bring in awareness education into curriculums, in order to teach populations, the importance and meaning of food utilisation.

The final element of food security is food stability. While the other three elements determine food security at an instance, this element ensures that the other three elements are stable over a period of time. Food security cannot be a reality unless it is the state for a considerable period of time. This is perhaps the element that most regions of the world really struggle with, and the element that is most endangered by the threats to food security. Some of its indicators include the Global Information Early Warning System, food price fluctuation and pre-harvest food practice.[8]

The four elements mentioned above together make up the concept of food security. While their breakdown and study make it easy for understanding and helps create policy frameworks and a step-by-step method to achieve food security, the element do not exist distinct from each other. Food security is a global goal, and the elements mentioned are only the broad categories of targets to be achieved in the process.

How Climate Change Affects the Elements of Food Security

Climate change has been a phenomenon to reckon with, and the concerns associated with its adverse effects have only begun to unravel. The world has examined the possibility of climate change and the effects it will have on the future of mankind and the planet for decades. Food security and the continuation of the present crops, their cycles and climate suited for them have been brought under scrutiny. Climate change affects food security in complex ways, and in all of its dimensions. However, the existent literature mostly focuses on the effects that climate change has on the production aspect of food, pertaining to the ecosystem and the changing weather and precipitation patterns.[9]

However, the other elements will be considerably affected as well, leaving an all-round crisis to deal with. The most immediate impact of climate change will be on production of food, as climate change severely affects the availability of water and rainfall patterns. Many parts of the world already struggle with water scarcity due to scanty rainfall and few available renewable sources of water. Climate change will eventually make this scarcity worse, as even groundwater will see faster depletion. Along with the effect that water scarcity will have on agriculture, the cropping patterns across the world will also have to adapt to the changing

[8] Yadav Sharma Bajagai, *Basic Concepts of Food Security: Definition, Dimensions and Integrated Phase Classification, Food and Environment*,:available at http://www.foodandenvironment.com/2013/01/basic-concept-of-food-security.html (last visited June 2, 2018).

[9]Expert Stakeholder Workshop for the USDA Technical Report on Global Climate Change, Food Security, and the U.S. Food System, June 25-27, 2013 Reston, VA, Government of USA: available https://www.globalchange.gov/sites/globalchange/files/Climate%20Change%20and%20Food%20Security%20Expert%20Stakeholder%20Mtg%20Summary%20%28Final%29.pdf, (last visited June 2, 2018).

weather patterns, and farmers and agriculturalists will have to adapt to the unpredictability of climates and natural occurrences.

With the increase in the possibilities of natural disasters, a large section of the populace will find itself more vulnerable than before. This increased risk will also leave many regions of the world harbouring less productivity than it did before. The change in the composition of the atmosphere will also create more intense effects of global warming. The increase in the average air temperature will increase crop water demands, and the stresses on livestock.[10] Land usage conditions will also change, and changing climatic conditions will decrease soil quality, and with the existing rate of deforestation, soil erosion will become more common. The indirect effects also include the change in the dynamics of the ecosystems, as increasing carbon dioxide in the atmosphere is good for some species, while detrimental to others.

While food prices and market conditions are not strictly only affected by environmental dynamics, the global, national and regional food price spikes are affected by the effects of climate change, in turn affecting food security.[11] The urban regions are more affected by the economic impacts of change in environmental conditions. While production will be affected, the social and economic effects are also a cause for concern. The access to food becomes a challenge as production suffers, not just due to the reduction in availability, but also due to the fact that the market factors will kick in, affecting the affordability of quality food.

As time progresses, the effects of climate change are predicted to only get more severe, but the role of global food aid is expected to increase. Poor, undernourished and vulnerable sections of the population will require more support from governments, welfare organizations and their respective communities. It is imperative for the international, national and local authorities to gear up with policies that will mitigate the effects and ensure a more inclusive pattern of growth and sustenance for the future. The current economic patterns, focusing largely on capitalism, may not be enough- creating an impending cause for concern.

IMPLICATION OF CLIMATE CHANGE ON FOOD SECURITY: THE ROLE OF POLICY

Food security is dependent directly and inevitably on agriculture and its allied practices. However, with climate change looming over the planet, it is imperative to address the climate-oriented losses and problems that agriculture is already facing and could potentially face in the future. While the problem of food insecurity may grow in the future, the worst hit would be the underdeveloped regions of the world, which are already grappling with food insecurity. The advancement in agricultural technology and the innovations leading to new ways to maximise yield and reduce losses will probably mitigate a large part of the damage; however, climate-oriented problems will still persist, unless mechanisms to counter the same are not devised before-hand.

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[10] *Ibid.*

[11] Vermeulen SJ., *Climate change, food security and small-scale producers. CCAFS Info Brief*, CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Copenhagen, Denmark: available at https://cgspace.cgiar.org/bitstream/handle/10568/35215/IPCC_info_note-3April14.pdf (2014) (last visited June 2, 2018).)

Climate change, as studies suggest, has already reduced growth in crop yield by 1-2 percent per decade over the past century, and the impacts are only set to become more adverse.[12] The objective of devising policy methods to tackle the inevitable effects that climate change will bring is to firstly reduce the vulnerability of agriculture to climate change, and conversely to improve the pliability of agriculture.[13] This would essentially mean that agriculture must be made more flexible through better economic and scientific systems put in place, while also remaining functional to meet increasing demands. The challenge is therefore twofold: first, to create better systems, and second, to implement these systems on a large scale.

Mitigating damage to agriculture would, of course, begin with adopting measures to reduce the pace and adversity of climate change itself. Reducing carbon emissions and the carbon footprints as a whole is one of the key elements pertaining to soil and water. Improved farming practices, animal production, more efficient management of irrigation systems, afforestation and reforestation and the restoration of degraded land are some ways to do this. The role of policy is magnified here, due to the fact that adaptation measures have to be locally defined and specific. Secondly, it is critical that there is an increase in the investments made in infrastructure, extension services and research. A deep and more comprehensive understanding of how consumption patterns affect food security and how irrigation and water supply can be made more efficient could effectively help prepare for the effects of the future.[14]

Another factor to consider is that while reducing emissions and trying to maximise sustainable development, the same must also be applied to agricultural emissions. For example, the emissions of methane from rice paddies need to be managed more efficiently, while also maintaining the irrigation systems meant for rice paddy. The nature of these approaches is specific to the environmental conditions, crop choices and soil conditions of every region, and is therefore within the ambit of the local administration to manage. While doing so, the policy approach must also provide a more stable, desirable and favourable economic climate for those involved in agriculture. For instance, the present trends of farmer suffering in India are detrimental to any measures that may be taken up for damage mitigation. The massive trend of rural to urban migration in search of better social and economic opportunities may also not create a favourable situation in the future.

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[12] Keith Wiebe et al. *Food security: its Components and Challenges*, INTERNATIONAL JOURNAL OF FOOD SAFETY NUTRITION AND PUBLIC HEALTH, (2011).

[13] Louis Bockel & Marianne Tinlot, *Climate Change and Agricultural Policies*, FOOD AND AGRICULTURAL ORGANIZATION, available at http://www.fao.org/fileadmin/templates/ex_act/pdf/ppt/Climate_Change_and_Agricultural_Policies_ppt.pdf (last visited June 3, 2018).

[14] Meridian Institute. 2011. "*Agriculture and Climate Change Policy Brief: Main Issues for the UNFCCC and Beyond*" Edited by Donna Lee; *Adapted from* "AGRICULTURE AND CLIMATE CHANGE: A SCOPING REPORT" by Bruce Campbell et al available at www.climate-agriculture.org. (last visited June 3, 2018).

Figure the multi-dimensional role of policy

The above depiction signifies that only a synergy between the three processes of adaptation, mitigation and continued increase in food production will create an ideal policy framework for food production in a future with climate change.

Along with creating efficient policy approaches, there is a need for better institutions, governance and funding mechanisms that can provide a stronger incentive.[15] In regions of the world where the production of food lags behind or is not nearly enough to feed the total population, there is a need to maximise this factor and create more secure regulations. Involvement at an international scale, along with compliance to international regulations and standards may go a long way.

Financing and funding schemes will be a large part of maintaining and gradually increasing food production. Funding schemes are not only necessary for maximisation of yield through better production methods, but also for research, infrastructure and population growth. The Food and Agriculture Organization of the United Nations (FAO) estimates investment needs of US$9.2 trillion by mid-century (US$210 billion annually from 2005 – 2050).[16] While studies have proven that a majority of investment for the sector comes from the public sector, there is a need to remove investment barriers and facilitate private investment. Capital flowing into the farmland and agricultural infrastructure is expected to grow two to three times beyond the current level (US$28 – 42 billion annually) within five years.[17]

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[15] *Ibid.*

[16] Schmidhuber, J., J. Bruinsma, G. Boedeker. Capital requirements for agriculture in developing countries to 2050. ROME: UN FOOD AND AGRICULTURE ORGANIZATION, ECONOMIC AND SOCIAL DEVELOPMENT DEPARTMENT (2009), available at ftp://ftp.fao.org/docrep/fao/012/ak974e/ak974e00.pdf (last visited June 3, 2018).

[17] High Quest Partners, United States. 2010. Private financial sector investment in farmland and agricultural infrastructure OECD Food, Agriculture and Fisheries Working Papers, No. 33. Paris: OECD Publishing

The world witnessed the importance of good governance for the agricultural sector in the 1980s and 1990s. The lack of macroeconomic policies, along with unstable political environments is the foundations for governance problems. This in consideration, there is a need to liberalise the agricultural sector, and allow private investment and stakeholders to play a larger role. The need for sound governance necessitates accountability, transparency and unbiased policy regulations.[18] An improvement in governance would facilitate better investment and implementation, creating a more favourable scenario for achieving food production targets that are expected to rapidly increase over the years, while resources remain scantier.

Along with creating national policies, countries may also have to create coordinated and coherent policies, in order to address the sharing of resources and final output. For instance, the policy coherence advocated by the OECD (Organisation for Economic Co-operation and Development)[19] provides for two components- ensuring that OECD country policies have effects which support – or at least do not undermine – food security in developing countries. This is a question about policy impacts. A second aspect relates to the coordination of policies across sectors and ministries, so that they are mutually supportive as opposed to offsetting.[20] The European Union's Common Agricultural Policy (CAP) has been criticized for a few distortions; however, the distortions that it projects on the world markets are smaller than before due to successful CAP reforms.[21] As a step and an example, coherent agricultural policies can have an impact on increasing food security across the world.

INTERNATIONAL EFFORTS TO TACKLE THE EFFECTS OF CLIMATE CHANGE ON FOOD SECURITY

The challenges and risks that climate change has presented to the goal of achieving food security are diverse and complex. The role of policy in tackling these effects has been highlighted in the previous section, along with the importance of international cooperation and coherence of policies. Such coherence also implies that along with each region of the world acting specifically towards the challenges that affect them the most, there is also a need for comprehensive international efforts. This would mean the involvement of international organisations, formation of alliances and the creation of conventions and treaties that will facilitate the process.

There have previously been many efforts towards addressing the issue of food security, through the Food and Agriculture Organization of the United Nations, the World Food Programme, and many other organisations and conventions. While these have addressed the

[18] UNEP, GOVERNANCE AND AGRICULTURE, COP 9 MOP 4, Bonn Germany, 2008

[19] The Organisation for Economic Co-operation and Development (OECD; French: Organisation de coopération et de dévelopement économiques, OCDE) is an intergovernmental economic organisation with 37-member countries, founded in 1961 to stimulate economic progress and world trade.

[20] Jonathan Brooks, *Policy Coherence and Food Security: The Effects of OECD Countries' Agricultural Policies, Global Forum on Agriculture,* 26th November 2012: available at https://www.oecd.org/tad/agricultural-policies/JB-PCD%20and%20Food%20Security%20Paper.pdf, (last visited June 4, 2018).

[21] Alan Matthews *The European Union's Common Agricultural Policy and Developing Countries: The Struggle for Coherence*, JOURNAL OF EUROPEAN INTEGRATION, (2008).

stress that climate change may bring on food security across the world, there is still a need to devote attention, research and investment towards the specifics of the implications of climate change on food security. One of the major objectives of international efforts aside from attempting to create more sustainable models of development has been to reduce vulnerabilities. This is key to reducing final impacts of climate change on food security (such as starvation, famine, etc), and also to reduce the long-term effects.

Historically, international trade and trade agreements have reduced the risk of food insecurity by connecting regions with limited agricultural potential to regions with comparative advantages in agriculture.[22] Perhaps the most comprehensive international authority in the international cooperation to achieve food security is the International Food Security Treaty (IFST) (1993)[23], which embodies the spirit and the need for strong international anti-hunger law, in order to truly enforce the Right to Food (sometimes also called the Right to Freedom from Hunger). The principles of the treaty are few, and are as follows:[24]

1) *Guarantee at least minimal nutrition* for people within its borders who cannot get access to it on their own;

2) *Contribute to a world food reserve and resource centre* for any nation needing emergency help to meet that guarantee;

3) *Establish and enforce law* against the use of hunger as a weapon;

4) *Support UN food security enforcement actions* if it is proven that any nation is unable or unwilling to enforce that law on its own.

However, the treaty has received criticism due to its absolution. It has been observed through history that nation states often are resistant towards making strong international commitments that may not always be aligned with their approach. It has also been opined that the foreign aid clauses of the treaty invite corruption, along with the possibility of triggering international conflicts. The measures proposed in the treaty are also expected to cost more than many nations can afford or are willing to spend. The potential opposition to implementation to key nations such as the United States of America, has also put most implementation procedures on hold.

The United Nations Framework Convention on Climate Change recognizes that global food security can only be achieved through a coordinated policy approach to hunger, poverty and climate change. The resulting talks of the convention have avidly recognized that the three need to be seen as causes and effects of one another; they are also a part of the Sustainable

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[22] Antoine Bouet and David Laborde, *Building Food Security Through International Trade Agreements, International Food Policy Research Institute*, December 12th, 2017: available at http://www.ifpri.org/blog/building-food-security-through-international-trade-agreements, (last visited June 4, 2018).

[23] John Teton, *The Armless Hand: The Call for Anti-Hunger Law and the International Food Security Treaty*, 7 YALE JOURNAL OF INTERNATIONAL AFFAIRS (2012).

[24] The International Food Security Treaty: available at www.treaty.org (last visited June 4, 2018).

Development Goals of the 2030 Agenda, goals 2, 1 and 13, respectively.[25] The UNFCCC has enumerated elaborate guidelines pertaining to resilience, adaptation and mitigation of the effects of climate change for all of its member parties.

As per the guidelines of the UNFCCC, parties to the UNFCCC have to formulate, implement, publish and regularly update national and regional programs containing measures to facilitate adequate adaptation to climate change.[26] The development of such domestic policies has been guided through the guidelines for the preparation of National Adaptation Programmes of Action (NAPAs), aimed specifically to aid the lesser developed countries of the world. However, neither the UNFCCC nor the Kyoto Protocol mention any sector-specific adaptation commitments. The UNFCCC also provides for an obligation for all members to cooperate in the adaptation to the impacts on climate change.

The Paris Agreement and Food Security

In 2015, after intense and long courses of negotiation, nearly 200 nations agreed on a global climate change agreement to replace the nearly obsolete Kyoto Protocol. The agreement was a breakthrough, and most importantly, sought to keep the rise in global temperatures well below 2 degrees celsius by 2020. The importance of food security in terms of climate change in the Paris Agreement was important to address due to the fact that food production is not only affected by climate change, but also is one of the causes of it. As discussed before, the sharp expected increase in the demand for food will make food insecurity a bigger concern than it would have been, if it goes unaddressed. In the context of greenhouse gas emissions, the agricultural aspect is one of the major issues to address.

The Preamble of the Agreement itself makes specific reference to the concepts of food security, the particular vulnerability of food production systems and ending hunger. The conclusions arrived at by the COP21 negotiations were expected to offer many opportunities for action on food and farming, for the global agricultural community. This was the first time that food security had made it to an international climate change accord.

The agreement also laid down ambitious targets for temperature rise contexts, aiming for a 1.5-degree celsius. The difference between a 1.5 degree increase and 2 degrees increase in temperature provides different outcomes for agriculture, and consequently food security. For instance, staple crops maize and wheat both show a trend towards greater yield losses at two degrees celsius when compared to an increase by 1.5 degrees celsius.[27]

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[25] UN Climate Press release, Climate Action Priority for Food Security and Zero Hunger, United Nations Climate Change, 14th November 2017: available at https://unfccc.int/index.php/news/climate-action-priority-for-food-security-and-zero-hunger#main-content (last visited June 5, 2018).

[26] Article 4(1)(b), UNFCCC Guidelines

[27] Vanessa Meadu, Isabelle Coche, Sonja Vermeulen and Anette Engelund Friis, *The Paris Climate Agreement: what it means for food and farming*, CGIAR CCFAS, December 2015, available at https://cgspace.cgiar.org/bitstream/handle/10568/69225/CCAFS%20info%20note%20AgCop21.pdf?sequence=1&isAllowed=y (last visited June 5, 2018).

However, the dismal aspect remains that there was comparatively lesser attention paid to the issue of agriculture and food security in the Paris Climate Agreement, which is to set the pace for the coming years. It does not change the strained relationship between agriculture policies and climate policies that we have already witnessed under the UNFCCC and the Kyoto Protocol. Under the UNFCCC, there is little attention to reducing emissions from agriculture.[28]

CONCLUSIONS AND PROBABLE SOLUTIONS

Climate change, therefore, massively affects food security and agriculture. The world is becoming increasingly aware of the effects that climate change will have on the future of humanity. The catastrophic projections for the future have to be analysed in order to prepare and try to mitigate the forthcoming risks. The elements of food security are affected by climate change in different ways; the most affected being the availability and the accessibility aspects. However, while the world has recognized food security and climate change as separate issues to address, there is little attention paid towards the nexus of the two.

The role of policy in this nexus is magnified. It is imperative to increase the rate of production while also adapting and optimising the technologies and methods used for the same in order to cope with increasing demand. To facilitate and ensure this, stronger and more flexible policy is essential. At the same time, to ensure that the benefits of this optimised and increased production reach everyone policies that affect even the most vulnerable sections will pave the way.

The implications that climate change can have on food security, have been summarised in the foregoing provisions. In light of this, some recommendations have been suggested, which are as follows:

- Emphasis must be equally laid on accessibility and stability elements of food security, other than just the effects on food production. For instance, there is a need to evolve and develop further all the existing economic and social models.
- While most policy changes take a long time to take effect fully, climate change and food security policies must begin at the grass-root level, where implementation can be the most effective.
- Synergy between the three processes of adaptation, mitigation and continued increase in food production will create an ideal policy framework for food production in a future with climate change.
- The nature of these policy approaches must be specific to the environmental conditions, crop choices and soil conditions of every region, and are therefore within the ambit of the local administration to manage.

[28] Verschuuren, Jonathan, *The Paris Climate Agreement: Agriculture and Food Security* (February 11, 2016). Australian Centre for Climate and Environmental Law Conference: 'The Legal Implications of the Paris Agreement', 2016; Tilburg Law School Research Paper No. 07/2016. available at SSRN:https://ssrn.com/abstract=2759128. (last visited June 5,2018).

- Organizing household education and bringing in awareness and education into curriculums, in order to teach populations, the importance and meaning of food utilisation, will go a long way in achieving the communitarian aspect of food security.
- The Paris Agreement, for example, concentrates very briefly on the nexus between climate change and food security. Policies and international law must be developed keeping in mind the direct relationship between hunger, climate change and poverty, instead of addressing them as separate issues.
- The development of stronger multilateral relations between different countries should be facilitated to enhance cooperation.
- Scientific and financial investment must be directed towards devising ways to increase production while also adapting to the changing climatic patterns. As predicted, crop cycles are expected to change due to the different atmospheric and geographical conditions that climate change will bring- along with a sharp scarcity of water; this in consideration, food production needs to evolve, trying to create higher yields from more efficient usage of resources.
- Funding schemes are not only necessary for maximisation of yield through better production methods, but also for research, infrastructure and the population growth. While working towards this, there is a need to break the barrier of the public sector and allow private investment as well.
- International as well as national and local tools developed to address the issue must be coherent with each other, and cooperative approaches must be adopted over distinct approaches. There is a need to recognize that resources are scarce, and this scarcity will only increase in the future, and an approach that promotes peace and collective responsibility is the only way to achieving the goal of global food security.

The steps taken towards mitigating damage and adapting to the effects of climate change must be widened to include the vision of food security, amidst a changing and potentially chaotic environmental scenario that will grip the planet in the future.

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FOOD SECURITY AND CLIMATE CHANGE: THE INTERWOVEN INTRICACIES AND ITS LEGAL IMPLICATIONS

Prathiksha Chandasekhar &

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INTRODUCTION:

The Right to Food has evolved over the years, and in the modern-day human rights perspective it has been equated to the right to an adequate standard of living. The Universal Declaration of Human Rights of 1948 asserts that "everyone has the right to a standard of living adequate for the health and well-being of himself and his family, including food"[1] UN Secretary General, Ban Ki-Moon declared climate change to be the "most defining issue of our time". This statement captures the true nature of climate change as a contentious issue in the global circles influenced by strong political opinions and that has been inadequately addressed in the various international frameworks.[2] Climate change was defined as "the difference between long term mean values of a climatic parameter or statistic, where the mean is taken over a specified interval of time, usually a number of decades", in the World Climate Conference in 1979. There has been a considerable shift from the statistical definition given in the conference to a more comprehensive definition of this dynamic phenomenon. For instance, the United Nations Framework Convention on Climate Change (UNFCCC), has defined climate change as: "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods."

Climate change as a global phenomenon has wide ranging impacts as enunciated in the objectives of the Paris Agreement. One of the objectives of the Paris Agreement is to recognize the priority of ensuring food security and reducing the vulnerability of food production from the impacts of climate change. Food production is invariably linked to climate, as it plays a major role in determining the yield and prices of the commodities. The fluctuation in price is an attribute of a functioning of a competitive market. This price volatility in the agricultural markets is largely due to the yield volatility.[3]

The risk that emanates from yield volatility is known as "production risk", which is caused as a result of the unpredictable nature of weather and performance of crops.[4] In light of examining price volatility under the Cobweb Theory, it is clear that prices get stuck in a web of ever

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[1]Article 25(1) of the Universal Declaration of Human Rights of 1948.

[2] Henrick Selin et al., Environmental Policy: New Directions for the Twenty-First Century 288(10th ed. 1999).

[3]FAO OF UN, PRICE VOLATILITY IN AGRICULTURAL Markets, FAO available at http://www.fao.org/docrep/013/am053e/am053e00.pdf (last visited June 11, 2018).

[4] Hardaker & J.B. Huirne et al. *Coping with Risk in Agriculture*, Wallingford: CAB International (1997).

increasing volatility especially in the agricultural markets.[5] Thus, food prices depend upon a complex series of speculations and are vulnerable to volatilities in the market created by fluctuations in climatic conditions.

It is a well-established fact that developing countries are more vulnerable to the impact of climate variability and change as compared to developed countries.[6] The developing countries are vulnerable to certain factors such as fragile ecological environment, higher susceptibility of such economic systems to risk, low income of the citizens which calls for assessment of various climatic mitigation and adaptation factors in order to strike a balance between climate change and enabling food security. [7] Agriculture plays four important roles in climate change: [8]

1. Farming emits greenhouse gases (GHGs)
2. Changes in agricultural practices have a big potential to be carbon sinks
3. Changes in land use, caused by farming have great impact on GHG emissions.
4. Agriculture can produce energy and bio-derived chemicals and plastics, which can replace fossil fuel

This paper essentially seeks to explore the interrelation between food security and climate change and its impacts. It traces whether the intergenerational principle is kept in mind while framing legislations. There is an increasing need to shift from an anthropocentric approach to an eco-centric approach while framing any environmental policy and framework. The paper also attempts to view environmental policy frameworks from an economic standpoint. It also brings out an analysis of the climatic considerations in the National Food Security Act, 2013, while attempting to analyse whether the Indian food security enactment is climate change resilient or not.

THE IMPACT OF CLIMATE CHANGE ON INDIAN AGRICULTURAL SECTOR

The Malthusian theory of Population is based on the traditional Food Availability Decline approach which states that while the population increases in a Geometric Progression, the food supply relative to the increasing population grows only in an Arithmetic Progression.[9] This happens to be particularly relevant in a country like India with a population of 1.35 billion wherein ensuring food security to the entire population is a herculean task. As far as the long-term projections for the Indian food demand and supply goes up to 2026, the increase in food demand owing to reasons such as increasing population, cannot be in tandem with the low yield growth.[10] This situation when coupled with climate change factors throws light on the eco-scarcity theory also popularly known as an extreme Malthusian thought, which highlights

[5] Modecai Ezekiel, *The Cobweb Theorem*, 52 Q.J. of Econ. 255,255 (1938).
[6] Architesh Panda, Assessing Vulnerability to Climate Change in India,44 E. P.W. 105, 106 (2009).
[7] Ibid.
[8] G. Rundgren Garden Earth – From Hunter and Gatherer Society to Global Capitalism and Thereafter (2011)
[9] Shenggen Fan, *Can we free the world of hunger and Malthus's shadow forever?* , Agonsearch, available at http://ageconsearch.umn.edu/bitstream/152407/2/Fan2012.pdf. (last visited June 1, 2018).
10 Surabhi Mittal, Demand-Supply Trends and Projections of Food in India, Working Paper No. 209, Indian Council of Research on International Economic Research, available at http://indiaenvironmentportal.org.in/files/WORKING%20PAPER%20209.pdf (last visited June 11, 2018).

the environmental factor in addition to the growth in population combined with unequal access to food which ultimately leads to social unrest.[11] Sufficient emphasis has to be laid on the fact that climate change may have its impact at various stages of the food chain-ranging from primary production right up to consumption.[12]

Going by the fact, that the agrarian sector is largely dependent upon the climatic conditions, ensuring food security by ignoring climate change considerations is an exercise in futility. According to the Food and Agriculture Organisation, there is a need to examine both the biophysical as well as the social vulnerabilities in order to understand the impact of climate change on agriculture.[13] The impact of climate change on Indian agriculture can be understood by the report of the Intergovernmental Panel on Climate Change (IPCC) in 2007 that echoed similar concerns on wheat yield and stated that 0.5°C rise in winter temperature is likely to reduce wheat yield by 0.45 tonnes per hectare in India.[14]

The reason why India is likely to be more vulnerable than other countries is owing to the fact that majority of its farmers in rural areas depend on mono-cropping, which barely provides food security over few months.[15] The changes in the quality of crops that occur due to climate changes will accelerate the largely neglected epidemic known as "hidden hunger" or micronutrient deficiency.[16] Micronutrient deficiency is known as ''hidden hunger'' because it causes irretrievable damage to the health of individuals, commonly affecting children. Such deficiencies make the individuals who are affected by the same highly susceptible to infectious diseases, and affect the primarily undernourished population, making it a vicious circle.[17] The increased vulnerability of climate change in the Indian scenario makes food security a challenge, which needs to be analysed in light of the policies and legislations that ensure food security in the Indian context.

ADEQUACY OF CLIMATIC CONSIDERATIONS IN POLICY MAKING: AN ANALYSIS OF NATIONAL FOOD SECURITY ACT

In order to understand the interplay between climate change and food security in India having examined the importance of climate change considerations in food security, it is imperative to analyse the National Food Security Act. The Lok Sabha Committee Report clearly highlighted the intent behind enacting a legislation for ensuring food security. It stated that, "food security

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[11] Marc. F. Bellemare, Rising food prices, food price volatility, and social unrest, AMER. J. AGR. ECON, at 1(2014).
[12] M.C. Tirado et al., *Climate change and food safety: A review,* 43 FRI. 1745, 1745(2010).
[13] "Climate change and food security: risks and responses", Food and Agriculture Organisation, 2016, available at http://www.fao.org/3/a-i5188e.pdf (last visited June 10, 2018).
[14] W. E. Easterling et al., "Food, fibre and forest products", in Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report the Intergovernmental Panel on Climate Change, (M. L. Parry et al. eds.,) available at https://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-chapter5.pdf (last visited June 5, 2018).
[15] Nira Ramachandran, Persisting Undernutrition in India: Causes, Consequences and Possible Solutions, (2016).
[16] Samuel S. Myers et al., Rising CO2 threatens human nutrition, NATURE available at https://www.nature.com/articles/nature13179 (last visited June 7, 2018).
[17] Revati K. Phalkey et al., Systematic review of current efforts to quantify the impacts of climate change on undernutrition, Proceedings of the National Academy of Sciences of the United States of America, available at http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4547305/ (last visited June 8, 2018).

means availability of sufficient food grains to meet the domestic demand as well as access, at the individual level, to adequate quantities of food at affordable prices." [18] The intent as highlighted in the report is clear in terms of the vision it aims to achieve by covering all aspects of food security, such as demand, access, availability and affordability. The report further added that "legislation marks a paradigm shift in addressing the problem of food security—from the current welfare approach to a right based approach".[19] This depicts the change in the attitude of the legislators towards food security as food security is no longer considered as a means to ensure welfare of the people of India, but is envisioned with a broader scope in terms of a right-based approach. Jurisprudentially speaking, when there is a right vested in the people to adequate, affordable and accessible food, it casts a duty upon the State to ensure that all the aspects of food security are implemented for the benefit of all the people in the country.

It is quite surprising that the term 'climate or climate change' does not find mention in the legislation. Essentially, a legislation ensuring food security must have components concerning climate change considering the intertwined nature of climatic conditions and agriculture. The Indian agriculture is largely monsoon-driven and negating or ignoring the effect of El Niño-Southern Oscillation (ENSO) would make the food security policy incomplete and inaccurate.

In order to assess the impact of El Niño on Indian agriculture, it is pertinent to analyse the phenomenon of the monsoon cycle. The monsoon cycle is largely influenced by varied heating of land and ocean, the change in the moisture levels in ocean, land and atmosphere impacted by the rotation of the Earth. El Nino has a direct influence on the harvest of major crops such as food grains and thus causes immense market instability with respect to prices in the markets of the world due to price speculation. One of the well-known disruptions it causes is famines and droughts worldwide. Although there are abundant stocks of rice with key producers – India and Thailand, El Nino is likely to affect the output of the Asian population's staple food.[20] Since the Indian agriculture continues to largely depend on the monsoon rainfall, climate induced effect will definitely have an impact on the agricultural output.[21]

The Act, however, is not completely divorced from climatic considerations. Though there is no express provision which highlights the importance of climate change on agriculture, the inclusion of coarse grains along with rice and wheat in the definition of "food grains" is a huge step in this regard. [22] Coarse grain includes millets, sorghum, and maize, and prior to this law only "fine grains" such as rice and wheat were sourced. The inclusion of "coarse grains" within the ambit of "food grains" is to be seen as a means of promoting its cultivation. It is estimated that over 31 million Indian farmers grow these crops, and their production contributes to climate adaptation and food security as these crops are highly climate resilient.[23]

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[18] 27th Report of Standing Committee on Food, Consumer affairs and Public Distribution at 6 (2013).
[19] *Ibid.* at 9.
[20] Louise Bohn & Mike Hulme, *El Niños: The Heartbeat of Climates*,53 THE WORLD TODAY. 306, 307(1997).
[21] K. Krishna Kumar, Unravelling the Mystery of Indian Monsoon Failure during El Niño, 313 SCIENCE, NEW SERIES. 115, 117 (2006).
[22] S. 2(5) of the National Food Security Act ,2013
[23]Research Program on Climate Change, Agriculture and Food security, available at

Whether climate resilient agriculture or agriculture with due regard to the climate change factors has been adequately addressed in India is a question that looms large as there is a huge agrarian crisis due to climate variations. The legislations and policies must sufficiently address the climate change factors and ensure that the agrarian sector is well equipped to deal with various climatic variations.

CONCLUSION AND SUGGESTIONS-

The conclusions and suggestions in this section effectively focuses on possible solutions to make the climate change legislations more effective.

(1) Need for a shift from anthropocentric to an eco-centric perspective in law making

Environmental law and policy need a dynamic and multi-disciplinary approach as it needs to accommodate conflicting interests in order to produce optimal results. Therefore, prior to the analysis of the legislative style while drafting environmental policies and reforms it is pertinent to analyse the legislative intent and approach used by law and policy makers. One such traditional approach used is called Anthropocentrism. Anthropocentrism basically envisions superiority and the unlimited potential in the technological progress of the humanity without giving due consideration to the environment.[24] In contrast to this approach, the eco-centric approach provides a more nature oriented approach and it attributes intrinsic value to nature.[25] These notions play a very major role in policy and legislation formulation. In order to gain more clarity in these considerations it is essential to compare the Objects and Reasons of the Indian Environment Protection Act 1986[26] with the Australian Environment Protection and Biodiversity Act 1999.[27] The major difference between these two legislations can be interpreted in a number of ways such as the use of differential language in their Statement of Objects and Reasons. The Indian legislation mainly focuses on aspects such as protection and improvements to human environment as envisioned in the decisions taken at the United Nations Conference on the Human Environment held at Stockholm in June, 1972 .This clearly mirrors an anthropocentric view whereas the Australian legislation talks about protection of the environment and also seeks to promote ecological and sustainable development. The legislation further talks about interdependence of the species and their ecosystems and also the role of indigenous people in conservation and management of the environment. The traces of anthropocentrism can also be seen in various International environmental frameworks such as the Stockholm Declaration of 1972 which spoke about "conserving natural resources for the use of future generations "which clearly demonstrates a view that is centred around the continued progress of humanity. [28] In contrast to this the World Charter for Nature in 1982

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https://ccafs.cgiar.org/research/results/india-promotes-climate-resilience-through-its-food-security-bill#.WyJ-KIozbIX. (last visited June 6, 2018).

[24] Wim Zweers et al., Ecology technology and culture, 279(1994).

[25] Pim Martens et al., Climate Change: an Integrated perspective, 293(1st ed. 1999).

[26] S. 21, environment protection ACT, 1986.

[27] S. 91, environment protection and biodiversity act, 1999.

[28] Washington H, Taylor B, Kopnina H, Cryer P and Piccolo JJ, *Why Ecocentrism is the key pathway to sustainability*, THE ECOLOGICAL CITIZEN, available at

represented a more eco-centric approach by stating that humanity and culture forms an intrinsic part of nature.[29] Thus, this essentially recognizes the interdependence between the species and the environment. Adopting a more eco-centric approach to environmental legislation is the need of the hour as it recognizes the value of nature distinct from its usefulness to mankind.

(2) Need for incorporation of the concept of climate change justice

Climate change has the power to alter global food production patterns which creates a divide between the developing and the developed countries in terms of their trade and food security.[30] The Paris Agreement in its preamble also reiterates the goal of ensuring food security and its resolve to end hunger whilst adopting policies of climate change. Due consideration for climate change has been given in the Agreement which aims at ensuring food security. Therefore, while it is important to analyse the connection between climate change and food security, it is also important to look into the aspect of climate change justice. The concept of climate change justice rests on rebuttal of the basic argument that the rich countries have a moral obligation to bear a huge burden under any Climate Change Agreement.[31] The basic premise that the climate change justice seeks to bring forth is that principles of justice should be adhered to while effectively formulating a climate change agreement. This idea was evolved in a book titled "Climate change justice" wherein the authors attempt to analyse pillars of a successful climate change treaty which are welfarism and feasibility. [32] Further, the authors also talk about the ethical and pragmatic principle of *Paretianism* which should be adhered to while formulating International treaties as it basically advances the interests of all the states that are to be the parties of a treaty without making any one state worse off.[33] This line of reasoning attempts to apply the economic concept of Pareto efficiency which believes that, in an ideal world no individual can be made better off without making at least one individual worse off.[34] International Paretianism is similar to Pareto optimality but is not the same as a project that makes one set of citizens in a state better off might make the other set of citizens worse off thus it is not a weak ethical principle.[35]Thus in the book they essentially contend that any climate change treaty should adhere to the concepts of distributive and redistributive justice which would then have a binding effect on all the states that are parties to such an agreement. The concept of redistributive justice emanates from criminal justice which essentially outlines that

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https://www.researchgate.net/profile/Helen_Kopnina2/publication/315580893_Why_ecocentrism_is_the_key_pathway_to_sustainability/links/58d4f350458515337851475O/Why-ecocentrism-is-the-key-pathway-to-sustainability.pdf (last visited June 11, 2018).

[29] *Ibid.*

[30] Aziz Elbehari et al., Climate change and food systems: Global Assessments and Implications for Food Security and Trade, Food Agriculture Organization of the United Nations (FAO), 13(2015), available at https://reliefweb.int/sites/reliefweb.int/files/resources/a-i4332e.pdf (last visited June 11, 2018).

[31] Malthias Frisch, *Climate Change Justice* ,40, PHIL. & PUB. AFF., 225, 226(2012).

[32] Eric Posner et al., Climate Change Justice, 6, (2010).

[33] *Ibid.*

[34] John Leach, A Course in Public Economics, 22(2004).

[35] Eric Posner, International Paretianism –A Defence, (Coase-Sandor Institute for Law & Economics Working Paper No. 606, 2012).available at https://chicagounbound.uchicago.edu/cgi/viewcontent.cgi?article=1277&context=law_and_economics(last visited June 11, 2018)

anyone who causes a problem should be made responsible for it.[36] Another dimension that needs to be looked into is the intergenerational equity principle which essentially points towards the fact that beneficiaries of an effective implementation of a climate change treaty would be the future generations.[37] Thus, according to a welfare approach an effective climate change treaty should follow two steps. The first step should be to conduct a cost benefit analysis undertaken to analyse the abatement costs against the reduced carbon emissions it seeks to achieve. The second step should be that the global abatement costs should be distributed among the states according to the principles of International Paretianism.[38]

(3) Climate Smart Agriculture

Climate Smart Agriculture promotes a coordinated approach by involving the interest of a variety of stakeholders- farmers, researchers, private sector, civil society and policymakers towards climate-resilient pathways. The goal of ensuring food security is achieved by focussing on four main action areas: (1) building evidence; (2) increasing local institutional effectiveness; (3) fostering coherence between climate and agricultural policies; and (4) linking climate and agricultural financing.[39] Agriculture as an activity also leads to emission of a variety of greenhouse gases (GHG) which is again a principal contributor in climate change. Total non-carbon-dioxide (CO_2) greenhouse gas (GHG) emissions from agriculture in 2010 are estimated at 5.2–5.8 Giga tonnes of CO_2 equivalent per year (ref. 13), making up about 10–12% of global anthropogenic emissions.[40] The emission growth can impact biodiversity and ecosystem services such as water quality and soil protection.[41] The most promising climate financing sources for CSA include: (1) the Adaptation Fund, an innovative financing mechanism that focuses on the needs of the most vulnerable communities and the possibility of direct access; (2) the Global Environment Fund (GEF); and (3) the Green Climate Fund (GCF).[42] Four main areas need public support to complement private efforts: such as (1) extension and information dissemination, particularly on using evidence to adapt practices to local conditions; (2) coordinated efforts where practices generate positive spill over benefits, for instance by reducing flood risks or pest outbreaks, or preserving biodiversity; (3) comprehensive risk-management strategies for managing extreme weather events that affect many farmers simultaneously; and (4) reliable, timely and equitable access to inputs to

[36]Mathew Patterson, *Principles of Justice in Context of Global Climate Change,* available at http://graduateinstitute.ch/files/live/sites/iheid/files/sites/admininst/shared/doc-professors/luterbacher%20chapter%206%20106.pdf (last visited July 30, 2018).
[37] Malthias, *supra* note 31, at 228.
[38] *Ibid.*
[39]Leslie Lipper et al., *Climate-smart agriculture for food* security, available at https://www.researchgate.net/profile/Bruce_Campbell2/publication/275952424_Climate_Smart_Agriculture_for_Food_Security/links/570c11c908ae8883a1ffe370.pdf (last visited June 10, 2018)
[40] . Smith, P. et al. in Climate Change 2014: Mitigation of Climate Change Ch. 11 (IPCC, Cambridge University. Press, 2014).
[41] *Ibid* at 38
[42] FINANCING CLIMATE-SMART AGRICULTURE 375–406 (Climate-Smart Agriculture Sourcebook Module 14, FAO, 2013).

support resource-use efficiency.[43] This type of agriculture focuses on the collective effort in order to bring about a positive change.

(4) **Need for food security policies which consider the GHG emissions and its impact**

Agriculture as an activity generates high levels of greenhouse gases. The highest emitting agricultural categories are enteric fermentation, manure deposited on pasture, synthetic fertilizer, paddy rice cultivation and biomass burning.[44]

For the successful implementation of any expansionary policy such as the food security policy, the economic impacts of such a policy must be productive as well as sustainable. However, the effective implementation of the National food Security Act itself leads to high levels of water and air pollution due to the large levels of GHG emissions which again results in climate change.[45] The process of enacting a legislation in order to ensure food security and protection from the ill effects of climate change and the subsequent increase in agricultural productivity leading to climate change makes it a vicious cycle without a plausible solution.

India, being on the path to realise the reduced rate of GHG emission by 2030 in order to honour its obligations under the Paris Agreement needs to effectively relook the entire structure of ensuring food security in India. Food Security in India is an achievable goal despite the climate change factor, provided that a more eco-centric, climate friendly and viable food security policy is formulated.

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[43] Arslan, A., McCarthy, et al., Adoption and intensity of adoption of conservation farming practices in Zambia. AGR. ECOSYST. ENVIRON. 187, 72–86 (2013).
[44] *Ibid* at 38
[45] Priyam Sengupta and Kakali Mukhopadhyay, *Economic and Environmental Impact of National Food Security Act of India,* AGRICULTURAL AND FOOD ECONOMICS at 15, 16. (2016).

TAKING CLIMATE CHANGE SERIOUSLY: STRATEGIZING TO ADDRESS THE EVIL OF FARMER SUICIDES IN THE WAKE OF CLIMATE CHANGE

Abhijit Rohi[*]

INTRODUCTION

Climate change has been debated both internationally and nationally. It was with the first Assessment Report based on scientific evidences by Intergovernmental Panel on Climate Change (IPCC) released in 1990 that the debate on matters of climate change began to get more serious at the international level. This report highlighted the challenging nature of climate change and with substantial evidence pressed for the need of international cooperation to handle the consequences of climate change. Human induced climate change is posing major threat to the human being themselves.[1] The Assessment Report became the point of origination followed by various developments at international level such as United Nations Framework Convention on Climate Change (UNFCCC), Kyoto Protocol, Paris Accord, etc. All these developments are indicative of a concern for protection of environment and ensuring that human activities do not increase the pace of climate change and to plan and implement the ways of avoiding climate change which is perceived to be the greatest tragedy of the commons at the global level.[2]The national governments have also made attempts to address the concerns raised by climate change, although the adequacy or efficacy of such plans, policies and attempts are highly debatable.

The impacts of the climate change in India are real and can be witnessed within its own territory. Thus, Indian policies which are aimed at addressing the concerns raised and vulnerabilities caused by climate change along with strategies for adaptation should ideally be holistic in their approach, in order to achieve the goal of environmental justice or 'climate justice'.[3] If realization of climate justice is to be assured, jurisprudentially, there are two major approaches that have to be analysed before choosing an approach. The approaches to justice advocated by John Rawls and Amartya Sen are to be scrutinized in the context of climate justice.

With this backdrop, in contextualizing the analysis, and to emphasize on the adverse impact of climate change, the link between climate change and farmers' suicides in the state of Maharashtra, are relied upon. The first part of the paper throws light on the increase in

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[1]*Climate Change: How do we know? NASA Global Climate Change Vital Signs of Planet*, available at https://climate.nasa.gov/evidence/#footnote_1 (last visited June 5, 2018).

[2]Battersby S. News Feature: Can humankind escape the tragedy of the commons? Proceedings of the National Academy of Sciences of the United States of America. (2017)

[3] The Paris Agreement, *infra* note 15.

farmers' suicides in the wake of climate change and the nexus between the two. In analysing the adequacy of governmental strategies and approaches, reference is made to the action plan of the Government of India and of the Government of the state of Maharashtra and the initiatives taken for dealing with vulnerabilities and effects of climate change. This analysis highlights that the issue of climate change was never relied upon while dealing with the issue of farmers' suicides. The second part of the paper deals with the two approaches by John Rawls and Amartya Sen viz. Rawls' 'Transcendental Institutionalism' and /or Sen's 'Realization-focused Comparison', in order to choose an effective model for strategizing for climate justice, followed by a conclusion.

PLACING FARMER SUICIDES ON THE CANVAS FOR DEBATING CLIMATE CHANGE POLICIES

In July 2017, a research published by Proceedings of the National Academy of Sciences of the United States of America (PNAS) indicated the link between fluctuations in climate, particularly temperature and the farmers' suicide rate. After analysing the data for 47 years, it was found that a 1°C increase in a single day's temperature causes ~70 suicides, on average and it was estimated that 30 years of warming is responsible for 59,300 suicides in India.[4] In this backdrop, the paper looks at the statistics made available by the Government of India concerning farmers' suicides with special reference to the policies of Government of state of Maharashtra.

According to National Crimes Records Bureau (NCRB) Reports a total of 2,568 farmers' suicides were reported in Maharashtra in the year 2014, and the same Report states that during 2014, 'Bankruptcy or Indebtedness' was one of the major cause of suicides among male farmers which accounted for 21.5%.[5] Bankruptcy and indebtedness is directly linked with either the poor agricultural produce or the inadequate value for the same. The traditional farming depends heavily on the environmental phenomenon. Inconsistent, inadequate and untimely rains are some outcomes of the environmental phenomenon. The consequent impact of this is observed in the poor agricultural produce. Similarly, the Accidental Deaths and Suicides in India (ADSI) Report of 2015 by NCRB notes three pertinent issues concerning agriculture and farmers' suicides in India. First, agriculture is the principle source of livelihood for 55% of the population, involving more than 50% of the workforce in the agriculture sector, contributing merely 14% to the GDP of the country. Second, majority of the suicides by persons engaged in farming sector were reported in Maharashtra (4,291 suicides). And third, 'Bankruptcy or Indebtedness' and 'Farming related issues' are reported as major causes of suicides among farmers/cultivators, accounting for 38.7% and 19.5% of the total suicides respectively for the year 2015.[6] The 2015 Report, interestingly, identifies 'farming related issues' as an independent criteria covering 'failure of crops' due to 'natural calamities' and 'due

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[4] Tamma A. Carleton, *Crop-damaging temperatures increase suicide rates in India*, available athttp://www.pnas.org/content/114/33/8746 (last visited July 31, 2017).

[5] *Farmer Suicides in India,* CHAPTER 2A, ADSI REPORTS OF PREVIOUS YEARS, NATIONAL CRIMES RECORDS BUREAU, MINISTRY OF HOME AFFAIRS, GOVERNMENT OF INDIA, available at http://ncrb.gov.in. (last visited June 1, 2017).

[6] *Suicides in Farming Sector (Reasons: Bankruptcy, Farming, Family Issues, Illness, Drug Abuse & Others),* CHAPTER 2A, ADSI REPORTS OF PREVIOUS YEARS, NATIONAL CRIMES RECORDS BUREAU, MINISTRY OF HOME AFFAIRS, GOVERNMENT OF INDIA, available at http://ncrb.gov.in. (last visited June 1, 2017).

to other reasons' which, for the whole of India, are reported to be 879 and 673 cases of suicides respectively.[7] The element of natural calamities though can be squarely related to the effects of climate change on the environment but this analogy still does not conclusively establish the directly proportional relationship between increase in temperature due to anthropogenic climate change and farmers' suicides. Moreover, because of the over-dependency on monsoon rainfall, the ill effects of natural calamities are felt with greater severity.

National Action Plan on Climate Change (NAPCC) was released by the Government of India in 2008,[8]and in 2009, the states were directed to develop State Action Plans on Climate Change guided by and consistent with the structure and strategies of the NAPCC. The Government of Maharashtra had entrusted the task of formulating Maharashtra State Adaptation Action Plan on Climate Change (MSAAPCC) to 'The Energy and Resources Institute (TERI). The Report of TERI titled 'Assessing Climate Change Vulnerability and Adaptation Strategies for Maharashtra: Maharashtra State Adaptation Action Plan on Climate Change (MSAAPCC)' was published in 2014.[9] The report while looking at the detailed statistics from 1991-2001 and then comparing yearly data on rainfall, types crops and land under cultivation etc. for period between 2001-2010 under the head 'Agriculture in Maharashtra: Climate Change Impact and Adaptation',[10] observed that "statistics show that despite lack of adequate water for irrigation and recurrent droughts in the state, the agricultural production has been more or less stable in the state."[11] In its conclusion on the agriculture in Maharashtra the report suggests, "regardless of increasing rainfall in the near future, policy interventions need to be strengthened to encourage usage of water efficient irrigation techniques innovative methods need to be developed which can safeguard the crops against extreme rainfall events, which pose a major threat to the entire agrarian system of the state."[12]

Unlike the research by Tamma A. Carleton[13], the TERI Report does not clearly hint at or analyse the link between climate change and farmers' suicides. Incorporation of technologically advanced means of farming have been considered effective in addressing the threats posed by climate change.[14] But it is to be noted that genetic modifications of the seeds and plant varieties have had debatable success in terms of ensuring economic welfare of the farmers. The environmentalists have been wary of the genetically modified (GM) seeds and plant varieties citing scientific evidences that have indicated environmental imbalances created by GM plant

[7]*Ibid*.
[8]National Action Plan on Climate Change (NAPCC), Government of India available at http://www.moef.nic.in/downloads/home/Pg01-52.pdf (last visited June 1, 2017).
[9]TERI, 2014, Assessing Climate Change Vulnerability and Adaptation Strategies for Maharashtra: Maharashtra State Adaptation Action Plan on Climate Change (MSAAPCC), New Delhi: The Energy and Resources Institute, available at:
http://www.moef.gov.in/sites/default/files/Maharashtra%20Climate%20Change%20Final%20Report.pdf (last visited June 2, 2017).
[10]*Ibid*. at 120-189.
[11]*Ibid*. at 132.
[12]*Ibid*. at 150.
[13]Tamma A. Carleton *supra* note. 4.
[14]TERI, 2014, MSAAPCC, *supra* note. 9, at 150.

varieties. GM plant varieties might arguably be one of the adaptation strategies but from the point of view of environmental sustainability, it must be used with utmost caution.

Thus, with respect to farmers, their social, economic and political justice is inadvertently dependent on the realization of environmental justice for them. Due to human-induced climate change the most sacred right to human life is under serious threat.

ADAPTING A STRATEGIC MODEL FOR ENVIRONMENTAL JUSTICE: RAWLS' 'TRANSCENDENTAL INSTITUTIONALISM' AND /OR SEN'S 'REALIZATION-FOCUSED COMPARISON'

At the international level, the Paris Agreement[15] was entered into with the aim of keeping 'the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels' in order to reduce the risks and impacts of climate change.[16] China, USA and India are among those countries whose total CO2 emission has increased in 2013 as compared to their CO2 emission in 1990.[17] The major responsibility lies on the countries with higher rate of CO2 emission. While under President Donald Trump's administration, USA has decided to formally withdraw from the Paris Agreement,[18] it is important that the other countries follow the obligation undertaken by them under this Agreement.

During negotiations at the Paris Agreement, benefits were being sought by the developing countries by placing reliance on historical and intra-generational equity considerations. Though this may have served well, in the past, politically, it may not be considered to be a beneficial approach in handling the current environmental concerns including that of the climate change. This may have been a good strategy if the impact of these environmental issues would not have affected the developing countries directly in the present. The conclusive evidentiary research, establishing a direct nexus between anthropogenic climate change and farmers' suicides in India indicates the direct link between the human induced climate change and suicide rate of farmers. It is the present concern for the country to address the issue of farmers' suicides. Thus, a holistic policy framework which will address this concern has to be evolved. The strict adherence to intra-generational equity principle is counterproductive to the holistic policy framework.

The implications of climate change will have distorting effects on all attempts to achieve the goal of environmental justice.[19] Environmental justice, also known as 'ecojustice' is justice

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[15] The Paris Agreement, Conference of the Parties Twenty-first session, Paris, 30 November to 11 December 2015, available at https://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf. (last visited June 2, 2017).
[16] *Ibid*. Article 2, The Paris Agreement.
[17] EU EDGAR, CO2 time series 1990-2013 per region/country, available at http://edgar.jrc.ec.europa.eu/overview.php?v=CO2ts1990-2013. (last visited Oct. 30, 2017).
[18] Brad Plumer, *What to expect as US leaves Paris Accord?* available at (https://www.nytimes.com/2017/06/01/climate/us-paris-accord-what-happens-next.html. (last visited June 1, 2017).
[19] Bridget Lewis, *Balancing human rights in climate policies*, in OTTAVIO QUIRICO AND MOULOUD BOUMGHAR (EDS.) CLIMATE CHANGE AND HUMAN RIGHTS: AN INTERNATIONAL AND COMPARATIVE LAW PERSPECTIVE, 40 (Routledge, London and New York, 2016).

which is both intra-generational and intergenerational at the same time.[20] And, in the context of climate change, the express reference is made to the concept of 'climate justice' in the preamble of the Paris Agreement.[21] Respecting human rights is one of the major considerations while addressing the challenges of climate change. The relationship between human rights and climate change has some unique features. The most important for this essay being that 'climate change is likely to affect most severely those who are least responsible for its causes and least capable of responding to its effects.'[22] This issue has also been governmentally recognized in India.[23] From the farmers' point of view this observation is substantiated. The class of people who are comparatively farther away from development which is environmentally unsustainable, away from the benefits of urbanization, consumerism, and lacking the control of the natural resources, like farmers for the purposes of present essay, are the ones who are most affected.

In this context the remaining part of the paper analyses the two models which are suggested in the political philosophy for the purpose of achieving the goal of climate justice for the farmers in the state of Maharashtra. The first approach is advanced by John Rawls in his book 'A Theory of Justice', which is identified by Amartya Sen as 'transcendental institutionalism;' and the second model is suggested by Sen himself in his book 'The Idea of Justice' which will be referred to as 'realization-focused comparison' model. The paper puts forth the claim of devising the hybrid model by adopting both the models simultaneously and advocates against the water-tight and binary perception of these two approaches.

The transcendental institutionalist approach identifies an ideal of justice and then, establishes the institutions based on such principles if justice. The social contract theories are the basis of transcendental models. Transcendental institutionalism aims at ideal of justice which Amartya Sen criticizes with his non-ideal justice formulation[24] which is otherwise known as 'realization-focused comparison' approach.

For Rawls, "once the principles of justice are derived, however, the contract doctrine does establish certain limits on the conception of the good these limits follow from the priority of justice over efficiency and the priority of liberty over social and economic advantages."[25] Rawls while talking about the 'economic systems' brings in a distinction (conceding it to be an arguable one) between public and private goods.[26] According to him public goods have two major characteristics, those are, indivisibility and publicness.[27] Environment may then by an

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[20] Laura Westra, ENVIRONMENTAL JUSTICE AND THE RIGHTS OF UNBORN AND FUTURE GENERATIONS: LAW, ENVIRONMENTAL HARM AND THE RIGHT TO HEALTH, 3 (Earthscan Publications Ltd., 2006).
[21] *Supra* note. 15.
[22] *Supra* note. 19 at 40.
[23] National Action Plan on Climate Change (NAPCC), Ministry of Environment and forest, Government of India, available at http://www.moef.nic.in/modules/about-the-ministry/CCD/NAP_E.pdf. (last visited June 1, 2018)
[24] Alan Thomas, *Sen on Rawls's "transcendental institutionalism": An analysis and critique*, 3 EUROPEAN JOURNAL OF POLITICAL THEORY241-263. (2013).
[25] JOHN RAWLS, A THEORY OF JUSTICE 230 (Belknap Press of Harvard University Press Cambridge, Massachusetts, 1999).
[26] *Ibid*. at 235.
[27] *Ibid.*

analogy be considered as a public good. Any public good may face two major problems, as per Rawls, one is that of free-riders and other is that of externalities.[28] It is in this context, Rawls suggests that the state should legislate on the issue and with the assumption that the public good is to everyone's advantage, the use of coercion is perfectly rational from each man's point of view. Rawls believes that even in this context enforcement of rules by the state are still needed.[29] In the broader sense environment and related rights are the primary goods and can squarely fall within the scope and characterization thereof. The distribution thereof and the protection of primary goods is the responsibility of the state.

An overarching legislation addressing the issues related to climate change, vulnerability and adaptations etc. on the lines on the objectives of Article 2 of the Paris Agreement, will be addressing the issue from Rawlsian perspective. Thus, for the purposes of protection of rights of farmers in Maharashtra, the Government of Maharashtra and of India are expected to legislate and enforce the laws so created. The law, in the Rawlsian perspective, has to be based and aimed at achieving the goal of climate justice.

This model for regulation is then critiqued by Amartya Sen as for him justice is not ideal, but it is non-ideal thus comparative and so is a spectrum than a binary concept. Transcendental institutionalism cannot be relied on the sector specific situations and can lead to institutional regimentation failing to achieve the intended goal.

On the other hand, Amartya Sen, perceives that there is, 'a strong case for moving from focusing on primary goods to actual assessment of freedoms and capabilities' owing to the wide variations in the capability of the people in converting the primary goods in good living.[30] This indicates a major concern for the farmers as even when the climate justice is a goal to be achieved through the realization of rights relating to the environment. Jurisprudentially, the environmental rights of one person or the group of persons have a corresponding duty towards the whole of human global community. While addressing the issue of sustainable development and environment, which he has addressed as an independent sub topic in the chapter titled 'Lives, Freedoms and Capabilities,' he states that 'the environment is not only a matter of passive preservation, but also one of active pursuit' and that 'development is fundamentally an empowering process, and this power can be used to preserve and enrich the environment, and not only to decimate it.'[31]

While expressing his fear and at the same time, highlighting the role of reason, with an example of environmental concerns, Amartya Sen states;

"deterioration of the natural environment is, as is increasingly clear, a hugely serious problem and one that is closely linked with the negative effects of human behaviour…. And yet, through lack of reasoned engagement and action, we do still fail to take adequate care of the environment

[28] *Ibid*. at 236.
[29] *Ibid*.
[30] AMARTYA SEN, THE IDEA OF JUSTICE, 66 (the Belknap Press of Harvard University Press Cambridge, Massachusetts 2009).
[31] *Ibid*. at 249.

around us and the sustainability of the requirements of good life. To prevent catastrophes caused by human negligence or callous obduracy, we need critical scrutiny, not just goodwill towards others."[32]

The 'goodwill towards others' may reflect transcendental institutionalism but merely that in his opinion is not enough. Moving away from this approach, Amartya Sen as one 'who claims that a transcendental theory is neither necessary nor sufficient in order to frame comparative judgments'[33] suggests the adoption of 'realization-focused comparison' approach.

Amartya Sen's approach 'does not pursue a sequential and prioritized scenario of the unfolding of a perfectly just society'.[34] This is the reason for his approach being inadequate for addressing the concerns of climate change as in the absence of sequential and prioritized scenario; the efforts of reducing anthropogenic climate change may remain directionless. A comparative approach cannot exist by itself, without a transcendental dimension.[35] Thus, the goals adopted in the Paris Agreement based on the scientific evidences are required to be pursued through the institutional setup based on these ideals.

Dismissal of transcendental institutionalist model as completely ineffective and inefficient may not lead to any concrete result in case of climate justice. First, for the reason that in the absence of the ideal goal to be achieved the attempts may be directionless. Second, enactment of specific legislations establishing the institutions for implementation and monitoring is a stronger argument to be ignored in relation to addressing the issues of climate change. Third, to understand and decide the nature of regulation and monitoring, some parameters or the baseline for comparison can only emanate from setting up the ideal of climate justice applicable to all. Success of international, national and local collective and collaborative efforts depends on appropriate goal setting. To this effect there is a specific role the ideal oriented institutions are set to perform for addressing challenges posed by climate change.

Realization-focused comparison though also encompasses the consequentialist approach latently; it majorly emphasizes building capabilities of the vulnerable sections is the process. In the case of farmers and agriculture sector, for dealing with vulnerabilities and strategizing adaptability efforts are to be based on principles of equity and preference of *nyaya* over *niti*.[36]

CONCLUSION

Employing either one of the models for environmental justice may seem to be an inappropriate approach and thus ineffective. The model has to have transcendental ideals and the institutions must aim to achieve these ideals but at the same time the approach adopted by these

[32] *Ibid*. at 48.
[33] Ragip Ege, Herrade Igersheim and Charlotte Le Chapelain, *Transcendental vs Comparative Approaches to Justice: A Reappraisal of Sen's Dichotomy,* available at http://www.beta-umr7522.fr/IMG/UserFiles/Igersheim/Revision_EJHET_def3.pdf. (last visited May 28, 2018).
[34] *Supra* note. 30 at 262.
[35] *Supra* note 33.
[36] *Supra* note. 30 at 48.

institutions can be based on realization-focused comparison. To address concerns of farmers' suicides, the agriculture sector is required to be strengthened. For strengthening the agriculture sector holistic approach needs to be taken at the policy level with an objective of protection and promotion of agrarian economy, creating world-class facilities and undertaking research and its affordable dissemination must be ensured. Identifying the vulnerabilities of the agriculture sector and target oriented strategy implementation and monitoring may result in protection of right to life of the Indian farmers. The reliance on the equity principles in seeking concession in the deployment of environmentally sustainable policies for realization of climate justice should be discouraged. The collective efforts for realizing the goals envisioned in the Paris Agreement may be adopted in the form of policies protecting the interests of farmers, in order to address the issue of farmers' suicides.

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EXAMINING THE COMMUNITY COST IN CLIMATE CHANGE: A CASE STUDY OF PINDAR VALLEY

*Krishna Mohan Poddar**

IDEA OF DEVELOPMENT AND ENVIRONMENT

In the 21st century, mankind has seen economic growth and development. In pursuit of growth and development the cost that society has paid for it, has been forgotten. P. S. Gopinathan Nair in "*Earth in Peril*"[1] highlighted the impact of environmental degradation as reflected from the findings of the report of World Bank (1995-1996) by two researchers namely- Carter Brando and Christian Homan. According to this report, India faces monetary loss as a result of environmental degradation which accounted for 4.5 % of the Gross Domestic Product (GDP) in 1992. Development is often achieved at the cost of the environment, and it is obvious that the current loss to the environment is much higher than the profits received. Trees have been uprooted, ground water level has depleted, and rivers and ponds have been polluted.

Jean Dreze and Amartya Sen in their book "India, Development and Participation"[2] have advocated development for the enhancement of human freedom. The components of life which are dependent on the environment include clean water to drink, air to breath and the surroundings in which we live. The quality of life that people cherish, and value largely depends on the environment. Therefore, any effort made towards development should take into account the impact on the environment. However, the current state of affairs in the country reflect that developmental efforts are completely divorced from the efforts made in the direction of environment conservation.

The Brundtland Report (1987)[3] defined 'sustainable development' as the development that meets the needs of the present generation without compromising on the ability of the future generations to meet their own needs. Robert M. Solow[4] (1991) sharpened the definition and described the sustainability as the obligation to the future. He further discussed that it is a moral obligation that we owe to the future generations. Also, UNESCO documents says – "every generation should leave water, air and soil resources as pure and unpolluted as when it came on earth". All-natural resources should be preserved for the future generations.

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[1] NAIR, P.S. GOPINATHAN EARTH IN PERIL. (New Delhi: Publications Division, Ministry of Information and Broadcasting, Government of India, 2009).

[2] J. DREZE, & A. SEN, INDIA: DEVELOPMENT AND PARTICIPATION. (Oxford: Oxford University Press, 2010).

[3] WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT OUR COMMON FUTURE. (Oxford University Press, 1987).

[4] SOLOW, ROBERT M. SUSTAINABILITY: AN ECONOMIST PERSPECTIVES. (Massachusetts Institute of Technology 1991).

Historian Ramchandra Guha in his book "How Much Should A Person Consume"[5] precisely describes the development process in independent India. The book talks about the socio-ecological model of consumption which fundamentally rests on the opposition between two groups - the omnivores and the ecosystem people. The primary factor that distinguishes the two groups is the size of their 'resource catchment'. Industrialists, rich farmers, state officials, and the growing middle class based in the cities have been categorized as omnivores who rely on and feed on the natural resources of the entire country. On the other hand, the ecosystem people Ecosystem people, on the other hand comprise of nearly two-third of the rural population and are mostly, small and marginal farmers, landless labourers, hunter gatherers, animal herders and the like, mostly rely on the resources available in their vicinity. This glaring disparity between the ecosystem people and the omnivores has in essence coloured the process of development in independent India, which has primarily served the interests of the rural and the urban omnivores. The community especially the poor are standing at the crossroads. The current development practice has resulted in environmental degradation and has displaced large number of people from their homes. Rural people have been left landless which has ultimately forced them to migrate to the cities in search of newer means of livelihood as a result of environmental degradation. This has created a community of ecological refugees who are paying the price for the efforts made in pursuit of development. This paper explores the perspectives of the community residing in Pindar Valley of Uttarakhand and the problems encountered by them owing to climate change and environmental degradation.

GEOGRAPHICAL CHALLENGES AND DEVELOPMENT: A CASE OF UTTARAKHAND

The agenda of development is fulfilled only when it's positive effects reaches the very last person without negatively impacting the others. But recent environmental disasters have shown the bitter side of development. The peripheral regions especially the physically remote areas have benefited the least from development and have been worst affected by it. The floods that ravaged Uttarakhand in 2013 were one of the worst environmental catastrophes to hit the Himalayan area. Change in climatic patterns triggered by global warming impact precipitation thereby affecting the rainfall and snowfall patterns, the effect of which is ultimately borne by the community.

Uttarakhand, one of the Himalayan States in India covers a geographical area of about 53,483 sq.km. According to the 2011 census, the state has a population of 10,086,292. More than three-fourth (78 percent) of its total population is dependent on natural resources for their means of income generation. Owing to its hilly terrain, undulating topography, fragmented farmlands, small and marginal holdings, agriculture in Uttarakhand is mostly based on subsistence farming. Hence, when the agricultural land gets affected owing to the natural disasters or climate change, there is little option left with the local community but to migrate to the plains for alternative employment opportunities.

[5] GUHA, RAMCHANDRA HOW MUCH SHOULD A PERSON CONSUME? (THINKING THROUGH THE ENVIRONMENT) (Hachette Book Publishing India Pvt. Ltd., Gurgaon, 2010).

The state of Uttarakhand was separated and carved out of Uttar Pradesh to fulfil the long-standing demands of the local people to give more impetus to the economic and industrial development of the hilly regions. The *Chipko Andolan, a* mass movement that was led by the local community of Uttarakhand in 1973 had demanded for development that would be environmentally friendly and involve the active participation of the local people. They advocated the idea of community ownership over the forest and forest produce that would ensure the availability of fuel wood and fodder all the year round, thereby ensuring employment opportunities within the local area, in the vicinity of their villages.

But year after year after, the development agenda of the State Government has run counter to the aspirations of the local people and their demand for development that is environmentally sustainable. Roads, tunnels and bridges have been built in vulnerable areas along the mountain slopes that has led to large scale deforestation, and the consequent damage to the fragile ecology of the state. Although economic progress has been made, it has been done at the cost of environmental degradation, with the interior regions of the mountains being worst affected.

The Pindar Valley[6] is one such cluster located in the bed of the Himalayas surrounded by the Pindar, Kafni and Sundar Dunga Glaciers. The course of development has taken an unusual pace in this valley due to its extreme geographical and environmental conditions. The region is inaccessible for about three months in the year due to road blockages as a result of heavy rainfall, snowfall and landslides. Employment and income generation in the state is highly dependent on tourism. Farming is practiced on landholdings of varied sizes across the valley. There are some villages in the valley where everything is cultivated starting from oil to wheat while there are others, in which the residents have to procure everything they eat from the market.

The valley is also home to several medicinal plants, vegetables and grains. The water of the valley is rich in minerals. Motorable roads connect Kharkia and Badiyakot at the two extreme ends of the valley. All the villages beyond Kharkia and Badiyakot are only accessible by foot. Electricity and network facilities vary according to the weather conditions and are reinstalled on temporary basis. For a region lacking various conventional amenities often synonymous with development, it is utmost importance to understand the effects of development on climate.

COMMUNITY IN DEVELOPMENT: PROVOKING CLIMATE CHANGE

The Uttarakhand Action Plan on Climate Change[7]of 2014 highlights that annual rainfall in the Himalayan region may vary between 1268±225.2 mm and 1604±175.2 mm. The level of precipitation forecasted shows a net increase of 5-13% in annual rainfall in the 2030s as compared to the 1970s. The following Table-1 depicts the declining trend in the usage of land in Uttarakhand.

[6] The information on Pindari Valley was collected from interaction and Focus Group Discussions (FGDs) with the community of the same valley.
[7] Government of Uttarakhand, Uttarakhand Action Plan on Climate Change (2014).

Table-1: Land Usage *(in hectares)*

Year/Period	Culturable waste land	Fallow Land	Current Fallow	Fallow land other than current fallow	Barren & Unculturable land
2008-09	303144	106128	35161	70967	224480
2009-10	309466	114244	34009	80235	224503
2010-11	310390	127793	43295	84498	224764
2011-12	311124	135412	48444	86968	224851
2013-14	316898	142921	56760	86161	228016
2014-15	316984	143610	57276	86334	228200

Data Source: http://des.uk.gov.in/pages/display/61-uttarakhnad-at-a-glance.

As per the Census Report of 2011[8], 1053 out of 16793 villages of Uttarakhand have no habitants and 405 villages have a population of less than 10. The number of such villages popularly termed as "Ghost Villages" have increasingly risen due to different natural disasters such as earthquakes, flash floods, landslides etc. Shreeshan Venkatesh (2015) reported in Down To Earth about a village named Saniyar located 20 kilometres from the *Pauri* district headquarters. The village is completely abandoned, and trees and undergrowth have engulfed most its houses.[9] Abandonment of villages increases the area of culturable wasteland, with most members of the community migrating to the cities and towns, away from the practice of agriculture. This has greatly impacted the land holding pattern in the state.

The above figures suggest that marginal holdings are increasing, and large holdings are decreasing. This shows that land is getting fragmented and divided leading to low agricultural productivity which ultimately pushes the community to abandon agriculture. Since majority of the people in the state are dependent on agriculture and other means of livelihood that draws heavily from the natural resources and produce of the state, the adverse impact of climate change on these resources affects the inhabitants and makes them highly vulnerable.

METHODOLOGY FOR THE STUDY

To understand the impact of climate change on the local community, and the relationship of the inhabitants with the forest and its changing nature, an empirical study was conducted in the Pindar Valley with the aid of a questionnaire. 61 habitants of the *Pindar* Valley were selected for the survey and divided into two clusters formed on the basis of age. Respondents below the

[8]CENSUS OF INDIA (2011), GOVERNMENT OF INDIA, http://censusindia.gov.in./2011census/censusinfodashboard/stock/profiles/en/IND005_Uttarakhand.pdf

[9]Shreeshan Venkatesh, *Why this abandoned village is a threat to Uttarakhand*, available at https://www.downtoearth.org.in/coverage/economy/why-this-abandoned-village-is-a-threat-to-uttarakhand-52154 (last visited Jan. 5, 2016).

age of twenty-five formed one group and those above the age of twenty-five formed another group. Purposive sampling was done within these clusters to ensure that respondents of all genders and social strata are included.

Secondary data on land usage, farming etc. collected from the websites of the Government of Uttarakhand (GoU) was also used to validate the findings and analysis of the primary data collected. Primary data was collected over a period of one year from five Gram Sabhas namely Badiyakot (Dannupatti), Badiyakot (Kallupatti), Khati, Kilpara and Teekh. These Gram Sabhas were chosen via purposive sampling as they cover the farthest extents of the valley and the central region of the valley, in an attempt to cover the voices of the people of the entire region.

Participatory Rural Appraisal (PRA) was also used to gather the people's perspective of their villages and the development agenda. Robert Chambers[10] describes PRA as approaches and methods used to enable local people to express, enhance, share and analyse their knowledge of life and conditions, to plan and to act. It includes the tools of Social Mapping, Transact Walk and Venn diagram. Focussed Group Discussions (FGD) were also used to gather the perceptions of the local people.

COMMUNITY COST: GROWING COST IN CLIMATE CHANGE

As has already been discussed in the foregoing provisions**,** the development model that does not accommodate the interests of the community including the local ecology creates obstructions to the path of sustainability.

Table 3: Development Priorities of the Village

Priorities Level	**Road and Transport**	**Natural Resource**	**Electricity and Telecommunication**	**Employment**	**Health Services**
First	98%	0%	0%	2%	0%
Second	0%	17%	70%	11%	2%
Third	0%	0%	30%	70%	0%
Fourth	2%	13%	0%	16%	69%
Fifth	0%	72%	0%	0%	30%

It is evident from the above table that the maximum number (98%) of people put road and transport facilities as the first priority for the development of the village. It was found during the FGD that the majority the villages of Pindar Valley are neither connected by road nor have

[10] Chambers, Robert *Participatory Rural Appraisal (PRA): Analysis of Experience*, 22 WORLD DEVELOPMENT, 1253-1268 (1994).

electric supply. So, the major demand of the locals is the construction of roads, for better connectivity. Construction of roads requires felling of trees, which in turn is weakening the soil resulting in landslides and depletion of groundwater. Here the development interest is conflicting with nature and resulting in environmental degradation. The trees are being uprooted and water bodies are drying up which is forcing the community to abandon their villages. It was revealed by the elders during the FGD that the Pine trees have taken the place of native forest trees like Burans (Rhododendron) which were useful to conserve water and hold the soil.

The local community revealed during the FGD that they have to venture at least 4 kilometres into the forest to fetch fuel wood and fodder and this distance is gradually increasing year by year. Generally, only women fetch fuelwood and fodder from the forests which weigh between 20 kgs. to 50 kgs. Sheep herders take sheep outside their villages for open grazing. Goats are fed on the naturally occurring forest mosses. The local community is dependent on the forest for fodder and fuel wood. The constant and uncontrolled pressure on the forest is so alarming that the forest cover is depleting every year. Forests in this region are a source of livelihood for rural residents and provide resources such as fodder, fuel wood, green manure and construction timber. These resources are critical for the household economy, which would suffer in their absence

The community revealed that there is dearth of water during the last stage the winter and the whole of summer. The elders of the village also revealed in the FGD that earlier the springs had sufficient amount of water discharged round the year but now the sources have depleted.

Table 4: Distance Covered to Fetch Water

S.N.	Seasons	Distance (in Kilometre)
1	Summer	2
2	Monsoon	1
3	Winter	1.5

In the recent years, snowfall in this area has been delayed by 15 days to 1 month. During the last five years, snowfall has been heavy only once or twice in winters. As the snowfall has reduced, the snow fed rivers receive less water during summer leading to shortage of water.

Table 5: Agriculture Progress during last five years

S.N.	Response Type	Response Percentage
1	Yes	48%
2	No	52%

The change in climate has also affected agricultural production. The FGD revealed that the older respondents were the last generation of farmers in the area. Several factors such as low productivity, low profit and agriculture being perceived as an unimportant occupation, has led the community to move away from the practice of agriculture.

Figure 2 shows that main workers in agriculture are decreasing and marginal workers are increasing. This reflects that people are choosing other forms of livelihood as against agriculture. Although agriculture is the backbone of the rural economy but recent trends in the agriculture practice are alarming. People are no longer reliant on agriculture as a means of livelihood. The size of agricultural land holdings in the mountainous regions are small which ultimately results in low productivity and increases the dependency of the community on the markets.

Data Source: http://des.uk.gov.in/pages/display/61-uttarakhnad-at-a-glance

The area has witnessed the migration of people due to ever growing problem of water, land and forest. Uttarakhand Rural Development and Migration Commission Report[11] suggest that about 20% of the workers migrate for better economic prospects in the urban areas. It was also found during the FGD with the villagers that on an average every household has 3 to 4 family members who have migrated from the hills to the plains.

Development at the cost of the environment has left the local community at the crossroad of climate change. The community of Uttarakhand is facing challenges on many fronts. The world has adopted and defined the development in terms of economic growth. But exclusion of environmental considerations has resulted in lower agriculture production, deforestation and depletion of groundwater level. Contemporary developmental needs are taking an edge over traditional means of livelihood.

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[11] Uttarakhand Rural Development and Migration Commission Report (2018), Government of Uttarakhand.

CLIMATE REFUGEES – THE NEED FOR DEVELOPMENT IN THE LAW

*Akhilesh Talluri**

INTRODUCTION

For many decades, the occurrence of 'climate change' was furiously debated. While its effects were relatively unknown for most parts of the 20th century, the phenomenon is becoming increasingly prevalent in the 21st century. Levels of atmospheric carbon dioxide have reached a staggering 400,000 ppm, the most ever recorded in over a century's time.[1] Global temperatures are rising- both atmospheric[2] and ocean;[3] ice sheets, snow covers are reducing,[4] and sea levels are rising.[5] Higher sea levels displace the surrounding population, and increasing temperatures render localities inhabitable. Masses of population now find themselves without a place to stay, and often without their means of livelihood.

Migrants due to climate change or climate refugees[6] are those persons who flee their homes due to circumstances caused by change in climate. This displacement may be due to rising sea levels, extreme weather conditions, natural disasters and the like. The reason why one must stress upon the issue of climate change-based migration is that the number of climate refugees is predicted to overtake the number of traditional refugees by 2050.[7] In 2016, several new internal displacements were caused, of which 6.9 million persons were displaced due to conflict and almost 24 million persons were displaced due to weather related events.[8] It is important for states to exercise foresight at this hour to mitigate the consequential damages.

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[1]Kevin Loria, *CO2 levels are at their highest in 800,000 years*, WORLD ECONOMIC FORUM, available at https://www.weforum.org/agenda/2018/05/earth-just-hit-a-terrifying-milestone-for-the-first-time-in-more-than-800-000-years. (last visited May 9, 2018).

[2]United nations Framework Convention on Climate Change (UNFCCC), The Cancun Agreements, I.2, (15 March 2011).

[3]Levitus, et al, *Global ocean heat content 1955–2008 in light of recently revealed instrumentation problems*, GEOPHYSICAL RESEARCH LETTERS, 36, (2009).

[4]C. Derksen and R. Brown, Spring snow cover extent reductions in the 2008-2012 period exceeding climate model projections, (2012) available at http://nsidc.org/cryosphere/sotc/snow_extent.html. (last visited May 9, 2018).

[5]Church, J. A. and N.J. White, *A 20th century acceleration in global sea level rise*, GEOPHYSICAL RESEARCH LETTERS, 33, (2006).

[6]UN HIGH COMMISSIONER FOR REFUGEES (UNHCR), LEGAL CONSIDERATIONS ON REFUGEE PROTECTION FOR PEOPLE FLEEING CONFLICT AND FAMINE AFFECTED COUNTRIES, available at http://www.refworld.org/docid/5906e0824.html. (last visited April 5, 2017).

[7]Bonnie Docherty and Tyler Giannini, *Confronting A Rising Tide: A Proposal for A Convention on Climate Change Refugees*, 33 HARVARD ENVIRONMENTAL LAW REVIEW, (2009).

[8]Internal Displacement Monitoring Centre, more than 31 million people displaced within their own country in 2016, (May 22, 2017).

CLIMATE REFUGEES – A STATISTICAL ANALYSIS

Internationally

It has been observed that a major share of the migration in the world due to climate change is internal.[9] From 2008 to 2015, on an average 26.4 million people were internally displaced due to natural disasters per year, [10] which means one person was displaced every second in the world. Typhoons, floods, and hurricanes are the disasters that caused the most displacement.[11]

Estimates show that the global average sea level will rise between thirty centimetres and one metre by 2100, with a possible increase of up to two metres in some regions.[12] With eight of the world's ten largest cities located in low coastal areas and having population growth higher than the global average, rise in sea level can pose a great risk to habitation in the coastal regions around the world.[13] The effect of this is especially profound in small developing island states such as Maldives, which, owing to its ground level elevation of only 8 feet above the sea level, resorted to negotiations with Australia, Sri Lanka and India to evacuate its population in case of a rise in sea level as early as 2008.[14]

Domestically

The effect of climate change is profound in India. It is amplified by existing vulnerabilities such as poverty, illiteracy, weak governance mechanisms etc. With the advent of climate change, India might see two types of displacement and migration. First, disasters like drought, sea level rise, desertification, water scarcity, low food productivity, and melting glaciers may result in increased migration within the country. Second, the country may witness an influx of migrants to its territory due to climate change induced migration from neighbouring countries.

In the first class of climate refugees, India's own vulnerability to climate change is the source. Recent studies suggest that a meagre one-metre increase in the sea level can displace as many as 7.1 million people in India.[15] Several cases of displacement due to climate change have been reported in recent years. It has been asserted that 70,000 people out of the 4.1 million living in the Indian part of the Sundarbans islands would be rendered homeless by 2020.[16] The coastal

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[9]Greenpeace Germany, Climate Change, Migration and Displacement, 9, available at, https://www.greenpeace.de/sites/www.greenpeace.de/files/20170524-greenpeace-studie-climate-change-migration-displacement-engl.pdf. (last visited May 30, 2017).

[10]Internal Displacement Monitoring Centre, Global Estimates 2015: People Displaced by Disasters, 8, available at http://www.internal-displacement.org/sites/default/files/inline-files/20150713-global-estimates-2015-en-v1.pdf (last visited July 30, 2017).

[11]*Ibid*.

[12]Intergovernmental Panel on Climate Change, IPCC 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)], 151, IPCC, Geneva, Switzerland.

[13]Greenpeace Germany, Climate Change, Migration and Displacement, 15, available at https://www.greenpeace.de/sites/www.greenpeace.de/files/20170524-greenpeace-studie-climate-change-migration-displacement-engl.pdf. (last visited May 15, 2017).

[14]RANDEEP RAMESH, PARADISE ALMOST LOST: MALDIVES SEEK TO BUY A NEW HOMELAND, (2008).

[15] Ministry of Environment and Forests, Government of India, India's Initial National Communication to the UNFCCC, 114, (2004), available at https://unfccc.int/resource/docs/natc/indnc1.pdf(last visited May 15, 2017).

[16]Architesh Panda, *Climate Refugees: Implications for India,* 45 EPW, 76, (2010).

regions of India are most vulnerable to increased sea levels, cyclones and storms. Increasing adversities caused by climate change along the Indian coasts may prompt masses of people to flee from the low-lying areas in search of safety. India is estimated to have the second-largest population located in the low elevation coastal zone of 63 million and seventh in terms of area.[17]

The second source of climate refugees is the refugees who have migrated from neighbouring countries. India has continually struggled to cope with illegal migrants from its neighbours. In fact, the conclusions of the Global Report on Internal Displacement, 2017[18] is a cause of concern for the country. India is ranked third in terms of the numbers of people displaced internally due to natural disaster amongst its four neighbouring states, i.e., Sri Lanka, Myanmar, Bangladesh and China that also report high internal displacement rates. The likelihood of India being burdened with climate refugees from other states is likely. The country must emphasise securing its porous borders before it can devise plans to rehabilitate climate refugees within its territory.

CLIMATE REFUGEES FROM BANGLADESH

Bangladesh is prone to disasters. Their ill-preparedness makes India an attractive shelter for climate refugees. Scientists have predicted that Bangladesh could lose about 17% of its land to the effects of climate change, leaving the country with as many as 20 million migrants over this course.[19] Over 50,00,000 people in Bangladesh are living in areas which are highly vulnerable to natural calamities and disasters.[20] Furthermore, as little as a 10 cm rise in the sea level in Bangladesh can result in the flooding of the country.[21]As a result, 20 million people are migrating from Bangladesh to India annually.[22] Given the already existing problem of illegal migrants from Bangladesh, climate change can potentially cause a fresh wave of migrants to enter into India, which is detrimental to the interests of the country.

CURRENT LAW

International Conventions and Agreements

International conventions for refugees[23] and other environmental law conventions and protocols such as the Kyoto Protocol under the UN Framework for Climate Change[24] (UNFCCC)

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[17]Gordon Mcgranahan, *the rising tide: assessing the risks of climate change and human settlements in low elevation coastal zones,* (April 1, 2007).

[18]INTERNAL DISPLACEMENT MONITORING CENTRE, GLOBAL REPORT ON INTERNAL DISPLACEMENT, 2017, 37, (2017), available at http://www.internal-displacement.org/global-report/grid2017/pdfs/2017-GRID.pdf. (last visited May 15, 2017).

[19]Bayes Ahmed, who takes responsibility for the climate refugees? International Journal of Climate Change Strategies and Management, 1, Vol. 10 Issue 1, (January 2017).

[20]Warner Koko, Climate Change, Environmental Degradation & Migration, (2010)

[21]International Organization for Migration, International Dialogue on Migration, Expert Seminar: Migration and the Environment, 26, (2008).

[22]Donald Brown, Climate Change, Vulnerability and Adaptation, (2009).

[23]Convention Relating to the Status of Refugees, July 28, 1951, 189 U.N.T.S. 150; The Protocol Relating to the Status of Refugees, Jan. 31, 1967, 19 U.S.T. 6223, 606 U.N.T.S. 267.

[24]U.N. Framework Convention on Climate Change, May 9, 1992, 1771 U.N.T.S. 107.

etc. are inadequate to assist climate refugees. The Refugee Protocol of 1951 and Convention of 1967 do not account for climate refugees but provide for measures supporting those fleeing from persecution that may occur due to reasons of race, religion, nationality, membership of a particular social group or political opinion.[25] The Kyoto Protocol merely emphasizes on adapting to climate change and overlooks its consequence. Art. 19(b) for instance, requires '*national and regional programmes containing measures to mitigate climate change and measures to facilitate adequate adaptation to climate change*'. While this would be relevant the situation of climate refugees, it lacks the requisite detail.

The Rio Declaration of 1992 calls for the protection and support to refugees and displaced people.[26] It further calls for a long-term strategy to accommodate these persons.[27] It however suffers from the same flaw that the other existing international laws suffer from- that it is far too broad to be regarded as the letter of the law in this matter.

In the 2010 Conference of the Parties (COP) in Cancun, States had finally acknowledged the correlation between climate change and displacement, wherein they agreed to take "m*easures to enhance understanding, coordination and cooperation with regard to climate change induced displacement, migration and planned relocation at national, regional and international levels*"[28] This was consequently reaffirmed in the Nansen Conference on Climate Change and Displacement.[29] However, the operationalization of such a clause was considered to be a significant drawback, owing to the existence of different disasters and varying natures of government.

Most recently, it was at the United Nations Summit for Refugees and Migrants (2016) wherein the member states addressed large movements of refugees and migrants and came up with a blueprint for a better international response. It introduced the New York Declaration which acknowledged the role, sudden or slowly occurring disasters play in displacing persons.

International efforts have been slow moving as governments are yet to take positive action to address the problem of climate change with respect to its migrants. Notwithstanding that these provisions have the force of 'weak law,' they are still inadequate by themselves, indicating that there lies a need for stronger regulation.

Indian Law

In India cross-border refugees fall under the ambit of the term 'alien'.[30] As a result, they are conferred with basic fundamental rights guaranteed under the Constitution. However, their separate status under law restricts their rights rather than confer them with benefits for their

[25]The Protocol Relating to the Status of Refugees, Art. 1(A), Jan. 31, 1967, 19 U.S.T. 6223, 606 U.N.T.S. 267.
[26]Rio Declaration on Environment and Development, Art. 5.21, 13 June 1992, 31 ILM 874 (1992).
[27]Rio Declaration on Environment and Development, Art. 3.5(c), 13 June 1992, 31 ILM 874 (1992).
[28]The Cancun Agreements: Outcome of the work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention, Decision 1/CP.16 Cl. 14(f), 15 March 2011, UN Doc. FCCC/CP/2010/7/Add.1.
[29]Norwegian Refugee Council/Internal Displacement Monitoring Centre (NRC/IDMC), The Nansen Conference: Climate Change and Displacement in the 21st Century, 10, (2011).
[30]Constitution of India, 1950, Art. 22, Para 3 and Entry 17, List I, Schedule 7.

rehabilitation and integration into the society. Refugee law lacks a stance of care and support but instead has the outlook of isolation and separate treatment.

It is important to note in this regard that India is not a signatory to either the Conventions of 1951[31] or Protocol of 1967[32] on the status of refugees. India instead is a party to human rights conventions which call for safeguarding the rights of the refugees. As for persons classified as migrants, no statute addresses properly the issues faced by migrants.

India's Current Approach towards Refugees

In *NHRC* v. *State of Arunachal Pradesh*,[33] the Government of Arunachal Pradesh was asked to grant citizenship to the Chakmas, a nomadic tribe which had migrated to modern day Arunachal Pradesh shortly after independence. This was met with widespread protests by local bodies who alleged that the Chakmas did not belong to India but must be considered as refugees as they immigrated from modern day Bangladesh. The Court had asked the Union Government to consult the local administrative bodies before arriving at a decision. The outcome of the case was that Chakmas were allowed to apply for citizenship. Shortly afterwards, a writ petition was filed in the Supreme Court, which held that the Chakmas are eligible for citizenship in *Committee for C.R. of C.A.P. & Others* v. *State of Arunachal Pradesh & Others*.[34] However, the matter took as many as 20 years to be decided by the courts, calling into question the attitude of the state in taking care of its refugees.

Most recently, in *Jafar Ullah and Anr.* v. *Union of India*,[35] the Court, in addressing the insurgency of Rohingya Muslims in the country from Myanmar, held that the basic rights of such persons must be upheld, and called for the appointment of Nodal Officers to safeguard the basic rights of the Rohingyas. Interestingly, the organs of the state have adopted conflicting views on whether the Rohingyas must be incorporated into the Indian society. The Government is hesitant to admit the Rohingyas into the mainstream society and have called for them to be sent back to Myanmar, believing them to have terrorist links, including with the Islamic State.[36] The Supreme Court, on the other hand, looks at it from a human rights perspective. India has obligations under various international conventions which impose obligations to uphold the rights of refugees.

India therefore faces its own internal conflict on how to deal with refugees. As a result, there is a serious delay in incorporating the refugees into the mainstream society. The Rohingya Muslims, for instance, are still not given a home, either in Myanmar or India. From the country's perspective, the objective must be to firstly adopt a sound policy for refugees which are in consonance with international law, to reduce the delay in dispensing justice.

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[31]Convention Relating to the Status of Refugees, July 28, 1951, 189 U.N.T.S. 150.
[32]The Protocol Relating to the Status of Refugees, Jan. 31, 1967, 19 U.S.T. 6223, 606 U.N.T.S. 267.
[33] NHRC v. State of Arunachal Pradesh, 1996 AIR 1234, (1996).
[34] Committee for C.R. of C.A.P. & Others v. State of Arunachal Pradesh & Others, W.P (Civil) No.510 of 2007, (2007).
[35] Jafar Ullah and Anr. v. Union of India, W.P No. 859/2013, (2013).
[36] Bhadra Sinha, Centre says Rohingya refugees have links with Islamic State and ISI, tells SC not to interfere with deportation, The Hindu, (19 September 2017).

RECOMMENDATIONS

Natural disasters take different forms under different circumstances. A uniform approach towards reducing the number of climate refugees or the impact of climate induced disasters is not practical. In this light, the author advocates international law to assist states in the structure of their law and guide them with principles on this subject. On the other hand, state law must provide for unique, specific solutions which must best be left to its discretion. Keeping this in mind, the author proposes the following changes to the law.

1. Expanding the definition of the term 'refugee'

Until the UNHCR declared migrants due to climate change as refugees,[37] such persons had no formal protection under law. With the current refugee status, however, migrants due to climate change are entitled to asylum in the country they flee to, along with other economic, political and social rights granted under the 1951 Convention regarding the status of refugees.

A problem with this approach is ascertaining the causal relationship between a weather event and climate change, which has no specific method or criteria of being established. As a result, a person seeking asylum due to a disaster caused by climate change can simply be refused these rights by denying climate change as the cause of the relationship.

The author proposes the introduction of a broad term of refugees displaced by disasters, regardless of its cause. This is for the reason that a person displaced by any other disaster is on no different footing than one displaced by a disaster induced by climate change. The protection measures should remain the same, and the enforceable rights should also remain to uphold the principle of equality.

2. Risk Reduction Measures and Relocation Mechanisms

The damage due to climate change related events can be minimized, both before and after disasters. Deliberations on this front have already been crystalized through the Sendai Framework,[38] which lays down strategies for risk reduction of disasters. The objectives of this framework include the reduction of economic losses and disaster mortality rates, improved warning systems, co-ordination between states etc. Other international agreements include the 2030 Agenda on Sustainable Development,[39] which aims to reduce the vulnerabilities of the poor against disasters and increase their resilience by 2030.

As for relocation, it may be undertaken before or after the disaster in a planned manner. However, it must be undertaken only as a last resort, being that relocation comes with social problems of cultural detachment, sustaining livelihood, identity problems etc.

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[37]UNHCR,Legal considerations on refugee protection for people fleeing conflict and famine affected countries, (2017), available at http://www.refworld.org/docid/5906e0824.html. (last visited May 15, 2017).
[38]Framework on Disaster Risk Reduction 2015 – 2030, 18 March 2015, UN Doc. A/CONF.224/CRP.1.
[39]UN General Assembly, Transforming our world: the 2030 Agenda for Sustainable Development, 21 October 2015,A/RES/70/1, available at http://www.refworld.org/docid/57b6e3e44.html. (last visited May 15, 2017).

Currently, States already have in place a system for the rehabilitation of the victims of any disaster. In addition to this, states must establish or confer powers on existing regional bodies to take action for disasters and events caused by climate change. This body- preferably at a state level, must study high risk areas for the impact of climate change, either on the short run or long run, and consequently inform the disaster prevention authorities in the state. It may also map the region within its jurisdiction, to ascertain favourable uses for a land based on the effect that climate change may have on it. All in all, it must work parallelly with disaster management authorities to study disasters from a climate perspective.

3. Increasing the resilience of people

It is important to understand that climate change in itself does not cause displacement of persons. There are often other contributory factors which prompt one to relocate. These are often intangible, but some of them may be ascertained. Underdevelopment, conflict and instability, weak government, population growth, and poor urban planning are driving forces to migration as they weaken resilience, increase vulnerability and supplement the impacts of climate change. [40]

The potential for a disaster to lead to displacement is dependent upon a country's level of development. Low levels of development increase the chances of displacement.[41] Therefore there is a need to increase the resilience of people in any given area. This requires a two-legged approach. First, to increase the food security, education, healthcare, housing, access to basic resources etc. all of which provide a dignity of life. Second, to improve the infrastructure, connectivity, government schemes etc. through which warnings, evacuation and other disaster management measures can be carried out. Once the average resilience of a person is increased, displacement of people, regardless of the cause, would be reduced.

4. A nexus between developing and developed Countries

Developed countries are better equipped to tackle the stages before and after disasters. There is a prevalence of insurance policies, warning systems, and laws are in place to ensure minimal damage. For instance, in 2016, when there was a forest fire in Alberta, Canada, as many as 88,000 persons were forced to flee from their homes. In the span of 4 months, 95% of the displaced people had returned back to their homes, with the remaining awaiting the renovation of their homes.[42] The Canadian Government had stated that this was possible due to the existence of feasible insurance policies, which are not available in developing countries.

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[40] The Nansen Initiative, Global Consultation: Conference Report, 2015, available at https://www.eda.admin.ch/dam/eda/en/documents/aussenpolitik/menschenrechte-menschliche-sicherheit/Nansen-GCR2015-screen.pdf (last visited May 15, 2017).

[41] UNISDR, Global Assessment Report on Disaster Risk Reduction 2015, (2015) available at http://www.unisdr.org/we/inform/publications/42809. (last visited May 15, 2017).

[42] Greenpeace Germany, Climate Change, Migration and Displacement, 14, (2017), available at https://www.greenpeace.de/sites/www.greenpeace.de/files/20170524-greenpeace-studie-climate-change-migration-displacement-engl.pdf. (last visited May 15, 2017).

Developed countries may assist developing countries through aid, knowledge sharing, flow of manpower, expertise and mutual co-operation. Such a model has been successful before. In 1994, it was recognized that Small Island Developing States were highly vulnerable to the consequences of climate change.[43] Consequently, the United Nations met several times to impose obligations and commitments on all other states to reduce the impact that climate change might have.[44] A similar situation arises now, where there is a need for developed states to assist neighbouring vulnerable states to rehabilitate the victims of natural disasters within their country. There is an incentive for the developed country to act in such a way as the victims illegally seek refuge in neighbouring states when their home country is unable to rehabilitate them.

STEPS FOR INDIA

Disaster Management in India is governed by the Disaster Management Act, 2005. The Act creates a multi-tiered institutional approach at a regional, state and national level, to tackle disasters in a holistic manner. Under this Act, the Government of India has released a National Disaster Management Plan (NDMP) which provides specific measures for disaster management.

As per this plan of 2015, there is a reference to 'climatological disasters', which most closely relates to disasters caused by climate change. This includes droughts, extreme weather conditions, forest fires, cyclones etc. The mechanism for disaster management is state centric, with the central departments of the government providing supervisory functions. **Figure 1** consists of an overview of the disaster management mechanism. The mechanism can be understood through three phases.

Pre-Disaster Functions

The onset of disasters is mitigated through hazard risk vulnerability assessments carried out by various government departments for different disasters. These government departments are the Nodal Agencies, which are responsible for mapping rainfall deficit areas, forecasting of climatic conditions, research etc. to increase the preparedness before the onset of a disaster.

Disaster Relief Functions

In the event of a disaster, there are Disaster Response forces at the national and state levels, which are deployed to give immediate relief. In addition to this, Disaster Management Authorities are to co-ordinate relief efforts, and request funds from the government if need be.

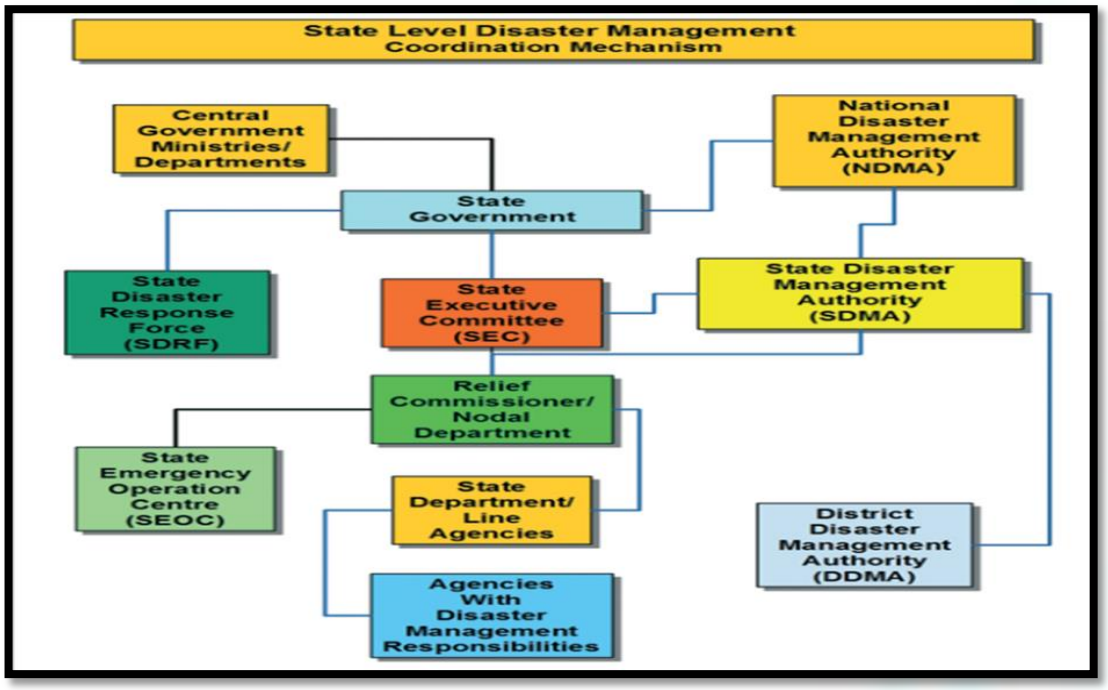
[43] Programme of Action for Sustainable Development of Small Island Developing States, 6 May 1994, UN Doc. A/CONF.167/9.

[44] Programme of Action for the Sustainable Development of Small Island Developing States, Annex II, 13, 6 May 1994, UN Doc. A/CONF.167/9, available at http://www.un.org/esa/dsd/dsd_aofw_sids/sids_pdfs/BPOA.pdf. (last visited May 15, 2017).

Rehabilitation

As for rehabilitation, the Plan extensively provides for rehabilitation- both mental and physical, to be carried out by the government. It also provides for planned relocation of the victims with the intention to undo the impact of the forced displacement.

Figure 1: *State Level Disaster Co-ordination Mechanism*[45]



CURRENT FRAMEWORK AND CLIMATE REFUGEES

Three years into the introduction of the National Disaster Management Plan, India still continues to displace a significant portion of its population from climate change related disasters.[46] While the provisions to combat displacement are more than adequate, the author believes that they are not suited to cater to the problem.

Firstly, before the onset of a disaster, research, warnings, and risk assessments are carried out by different governmental agencies based on the type of disaster. For instance, avalanches are under the jurisdictional authority of the Ministry of Defence while tsunamis are under the jurisdiction of the Ministry of Earth Sciences.[47] This creates a disconnect in the approach towards climate change as governmental bodies focus on the disaster type rather than its source.

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[45]National Disaster Management Authority, Government of India, National Disaster Management Plan, 2015, 17, (2016).
[46]Internal Displacement Monitoring Centre, Global Report on Internal Displacement, 2017, 37, (2017), available at http://www.internal-displacement.org/global-report/grid2017/pdfs/2017-GRID.pdf. (last visited May 15, 2017).
[47]National Disaster Management Authority, Government of India, National Disaster Management Plan, 2015, 15, (2016).

Secondly, rehabilitation is under the control of the state and central government. The Plan however only outlines the broad principles but lacks enforcement measures to ensure that it is followed. In fact, rehabilitation has been addressed in terms of assisting the victims of disasters in terms of the losses suffered by them rather than for cases of displacement.

Lastly, when the effects of climate change do not manifest as disasters, victims have no legal protection. As suggested previously, expanding the ambit of a refugee as per the Convention of 1951 would be of no avail to India as it is not a signatory to the Convention. India would be particularly helped by an increased resilience of its population, along with detailed relocation mechanisms. While the object of its relocation policy has been established, the state requires detailed procedures in this regard.

CONCLUSION

Climate Change is tipped to increase the current levels of displacement of persons manifold.[48] The disconcerting fact is the lack of a permanent solution to the problem, internationally, and poor legal mechanisms, internally. While international law on this subject requires certain adjustments, the author advocates a state-centric approach, with international law setting the broad principles and objects.

Above all, this issue is one that requires a comprehensive action plan which involves effective risk reduction mechanisms, increased resilience of the population, adequate disaster response systems, and detailed rehabilitation and relocation plans. In this light, states must co-operate in research and knowledge sharing so that the brunt of climate change is not felt by one state alone. It must also be mentioned that the effects of climate change are only in its nascent stages. Early action would be beneficial not only to the progress of nation states but also the health of the planet.

The consequences of climate change are often ignored as they occur slowly around us or manifest themselves in the form of disasters already known to us. This ignorance is also evidenced in states' legal system and policies, which are increasingly silent on climate refugees. States must be fully aware of their vulnerabilities to climate change, and accordingly device a plan to protect their environment. Therein lies a great need for the law to be developed immediately.

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[48]IDMC, more than 31 million people displaced within their own country in 2016, (2017).

NUCLEAR ENERGY: A STRATEGY TO MITIGATE CLIMATE CHANGE

Raagya Priya Zadu[*]

INTRODUCTION

Carbon dioxide levels now stand above their highest levels for the last 650,000 years. In early 2008 we learnt that the North Polar ice cap is melting so fast that some scientists are predicting that in seven years' time, it will completely disappear in the summer. This is alarming news which should galvanize us into urgent action. Each and every one of us has a responsibility to respond. The whole world is in this together and must act together. Global warming is a phenomenon wherein, due to various natural and anthropogenic factors, there is interference in the carbon dioxide and greenhouse gases present in the atmosphere, leading to an increase in the same and resulting in the rise in temperatures of the atmosphere. Gases such as carbon dioxide act as a blanket around the earth and trap the heat of the sun which is the reason for earth not freezing and for life to sustain on the planet. However, in the past decades, specifically post-industrialization period, there has been increased emission of this gas and plethora of other gases, due to the emissions from factories, industries, power plants and other vehicular pollution. It would not be entirely incorrect to deduce that excessive burning of fossil fuels is the prime reason for the discharge of these gases in the environment which leads to global warming and eventually, climate change. There are two kinds of climate change; natural climate variability and human/anthropogenic climate change. Natural climate variability is traced to the occurrences of natural disasters like volcanic eruptions, earthquakes, tsunamis etc.

These disasters occur relatively less frequently and the discharge of greenhouse gases due to this phenomenon is also relatively less. Also, such disasters are very area specific and only some parts of the world are prone to volcanoes. The focus of the global regulatory process is only on the second part. When the world leaders got together in 1972 for the Stockholm Conference, it was too early at that time to have such an assessment. It came only in 1988 with a United Nations General Assembly Resolution to consider climate change as a 'common concern of humankind'. It was in 1988 that the United Nations Environment Program along with the World Meteorological Department formed the Inter-Governmental Panel on Climate Change (IPCC). It was in 1992, during the conclusion of the Earth Summit or the United Nations Conference on Environment and Development (UNCED) when the United Nations Framework Convention on Climate Change was adopted and the world community came to a consensus that human activity and human disregard to the environment was leading to a global crisis.

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Taking a concrete step to develop measures to check climate change had become very important. In 1997, in Kyoto, Japan, the 'Kyoto Protocol' was formulated and adopted by the nations whereby they pledged to reduce their carbon emissions and other activities which were contributing to global warming and resulting in climate change. This protocol was adopted in 2005 and was enforced in 2008. The Kyoto Protocol was seen as an important first step towards a truly global emission reduction regime that would stabilize the Green House Gas (GHGs) emissions and provide the architecture for the future international agreement on climate change. The Conference of Parties, which was held in Lima, Peru, wound up without the delegates having reached any conclusion as there were disagreements between the developed and the developing countries which seemed to be lack of faith on the former by the latter on key issues, more significantly, on the issues relating to lowering the GHG emissions. Whereas the Paris Agreement (COP-21) was ushered to be a global event where the leaders were set to decide the working of the Kyoto Protocol, the meeting turned out to be more of a paper meeting, than being suggestive of decisive changes. While the biggest emitter of carbon, the United States of America refused to sign or ratify the Paris Agreement, majority of the countries became signatories and implemented their own tailored methodology to battle climate change in the coming times.

NUCLEAR ENERGY: THE ENERGY OF CHOICE

One of the biggest hurdles in the way of battling climate change and conserving the sanctity of the environment is the choice of energy resources of a country. Currently, the biggest resource exploited globally for generating power, is coal and fossil fuel, which not only is an environmental stressor, but also the main reason behind increasing global temperatures. The fundamental question here that needs to be answered is how effective an energy strategy for a country would be in aiding and mitigating climate change. The answer lies in Renewable Energy Sources (RES) such as hydropower, solar and wind power, which can be utilized instead of coal, but the only issue remains that RES do not provide stable energy security as their capacity is relatively lesser than coal, which forms the baseload of energy production and transmission. That quantum of energy could only be generated by coal fired thermal plants. The only alternative that can be considered is Nuclear Energy. An extremely powerful and potent source of power, it gained global recognition soon after the 'Atoms for Peace' initiative of the International Atomic Energy Agency. Developed countries with technology and resources started developing nuclear energy facilities and it was understood and proved that with a very less amount of fuel, a massive amount of electricity can be generated and that too with a Zero Carbon Footprint. Soon this form of energy generation and power production gained much prominence in European countries and the United States of America along with Russia and Australia following suit. It was scientifically proven that amidst the rising concentration of carbon levels in the environment, the use of nuclear energy to generate power, was the best option to mitigate the adverse effects of climate change and achieve the targets as set during the global meets for environmental concerns. The Paris Agreement in 2015, or the COP-21 of the UNFCCC, which marked the end of the Working Period of the Kyoto Protocol, was a very important development which took place in the global outreach for climate change. This Agreement brought together concerns of the rising temperatures and the

varying adversities of the climatic conditions across the world, stemming from anthropogenic causes. The main target as set under the Paris Agreement was that the global temperature shall be held under 2 degrees Celsius above the pre-industrial levels and efforts shall be made to limit the increase to 1.5 degrees Celsius above pre-industrial levels. It was a consensual belief that only then the risks and impacts of climate change shall be reduced.[2] The Agreement, among other requirements, stated firmly that each member country shall be releasing and adhering to their Nationally Determined Contributions (NDCs) which shall be planned efforts to mitigate climate change. Countries who ratified the Paris Agreement, submitted their NDC document and by the year 2018, 176 countries had ratified and their INDC's were turned into NDCs.[3] Many technical and technological deliberations later, a large amount of time was spent in analysing of market conditions as would be affected by reducing the carbon emission and averting climate change *versus* the ill-effects of climate change on the world economy and the terrible costs which shall have to be paid, not only monetarily, but also socially and economically. The one sector, which seemed to govern the solution to highly reduced carbon in the atmosphere, was the Energy Sector. It was also unanimously agreed that the energy-mix of a country, greatly reflects on that country's Carbon-Footprint and the lower this footprint is, the higher would the possibility of reducing carbon emissions in the world. This logically brings the attention to the four most polluting countries of the world in terms of carbon footprint; namely, China (27 percent), United States of America (15 percent), European Union(10 percent) and India (7 percent).[4]

According to the Report by the Global Carbon Project in 2017, the projections of these countries are only set to rise in the forthcoming times, as the main contributor of the energy mix in these countries, remains to be coal. The interesting facet of information comes from yet another observation within the United States of America, wherein the levels of carbon emissions have varied from State to State. New York, according to a report of the World Nuclear Association[5], has much lower emissions as compared to other states in America which are dependent on coal-fired thermal plants for their energy requirements. To measure the emissions from all phases of a nuclear power plant, right from construction, its operation and the decommissioning, the lifecycle assessment of the carbon emission is relatively much lower than the lifecycle assessment of a coal plant or any other conventional form of energy generation. This is what makes this source of power generation more environmentally benign. However, the downside of the same is, that there is a higher economic cost of developing a nuclear plant as it entails a detailed and meticulous environmental impact assessment and the project proponents, which is the country's government, must ensure public confidence in the project. Owing to the threat of nuclear plants being breached during natural or man-made disasters, as the ones experienced during Chernobyl and Fukushima, the risk of a catastrophe is feared more than the benefits of having a nuclear-powered society. The scientists promoting

[2] The Paris Agreement, Article 2.
[3] Climate Change and Nuclear Power, International Atomic Energy Agency Publication, 2018.
[4] Report by the Global Carbon Project, Research Partner for World Climate Research Programme, 2018.
[5] *See* http://www.world-nuclear.org/nuclear-basics/greenhouse-gas-emissions-avoided.aspx (last visited June 30, 2018).

nuclear energy, have ever since been working on evolving the nuclear safety mechanisms and the law makers have been continuously working on developing a water-tight liability law, only to instil confidence in the public that nuclear power plants, if planned meticulously and with developed technology, shall prove to be the saviour from the adversity of climate change and global warming. Numerous scientific and techno-legal research studies and documents have been made available on an international scale by the IAEA and by the Department of Atomic Energy/BARC and other atomic research centres in India. The technological experts are of the opinion that globally, the few companies which have developed and engineered the nuclear reactors, have learned positively from the Chernobyl disaster and the reactors are now designed to withstand any breach.

The same was reflected in the Fukushima disaster, where the nuclear facility at the epicentre of the earthquake and tsunami, the Onagawa Nuclear Reactor, did not suffer any breach during the earthquake and it shut down with precision. The number of deaths which are reported after the Fukushima reactor were caused during the evacuation of the population from the 12 kilometer radius as is the standard requirement. No deaths have been reported due to radiation exposure. India on the other hand, has earned international recognition for operating its nuclear plants with the maximum amount of safety and without major accidents or leaks. Recently, the Civil Nuclear Facility at Kaiga, Karnataka made a world record of running the reactor for 962 days uninterrupted, without any glitch. As for the Indian Nuclear Industry, it has been laid out in public domain, by Dr. R.B. Grover, that the Indian Nuclear Energy Programme, unlike the programmes in the Western Countries like USA, depends on a 'closed fuel cycle', which means, the nuclear fuel is used, reprocessed, refabricated, re-used and then discarded when the radioactivity is much lower and then stored in a contained and safe manner.[6] This is an environmentally and economically benign and sustainable plan. Shedding light on international dependency, he also stated that except for Light Water Reactors [LWRs], most of the equipment and components is manufactured by Indian industry. Forging facility has been set up as a joint venture (L&T, NPCIL). Only the Government of India owns and operates these plants. Similar is the condition in France and Russia, but not the same in USA and United Kingdom.

In an effort to understand the intention of the current government, a Draft National Energy Policy was released in 2017, which due to circumstances could not be inducted in a formal and official manner. This Policy conveyed a message that even though the power sector shall be dependent on coal for its basic energy requirement, the effort shall be pertinent on transitioning into 'Cleaner Coal Technology' and Carbon Sequestration Techniques. This implies that the Indian Energy-Mix shall continue to have the largest share of coal fired energy till 2040 but in the meantime, concrete efforts shall be made to revolutionize the technology in use and shift towards a cleaner and very sophisticated Generation IV technology. Various equipment and apparatuses which filter the ash content and the noxious gas emissions shall be installed to efficiently reduce the emissions and also cut-down on the use of water in these

[6] Dr. R.B Grover, Professor Emiritus, Homi Bhabha National Institute, Foundation Day Lecture, 2018. available at http://www.vecc.gov.in/writereaddata/upload/news/Grover_VECC__June_2018.pdf (last visited June 30, 2018).

plants. In furtherance of the same directive, the Ministry of Environment Forest and Climate Change has ensured stricter implementation of the 2015 Guidelines for Thermal Plants which now mandate the strict curtailing of noxious gas emissions (sulphur, nitrous, carbon), mercury discharge, fly-ash emission and usage of water. Unless the power plants incorporate these changes, the plants shall not be allowed to function or their consent to operate be renewed. This two-way approach concerning impetus on cleaner coal and the slow and gradual focus on strengthening the fleet of nuclear reactors in the country, the implication becomes strong that these two sources of energies are going to be the chief contributors in the energy mix of the country in the long run. The Government of India, through the Department of Atomic Energy and NPCIL, have entered into bilateral agreements with France, USA and Russia, to build ten more nuclear plants in the country till 2030-2040 and raise the contribution of nuclear energy by 50 GW (approx.). As per the Press Information Bureau Notification of 2018,[7] Union Minister of State (Independent Charge) Development of North-Eastern Region (DoNER), MoS PMO, Personnel, Public Grievances & Pensions, Atomic Energy and Space, Dr Jitendra Singh mentioned and gave information that for completion till 2032, five plants are under construction which are of a total of 6700 MW capacity and the in-principle approval and financial approval has been given to a collective capacity of 31,948 GW value of nuclear plants. The conforming bilateral agreements have been signed with the countries and the process of construction shall commence very soon. Nuclear energy will soon be the energy of choice for India and the dependence on its success is what the government believes to be the story of the future of India's energy independence.

Environmental Sustainability of Nuclear Energy

Nuclear energy cannot, as once believed, solve all of the world's energy problems, but it can play an important carbon-free role in the production of electrical energy. Fusion energy has the potential of becoming a long- term environmentally friendly and material efficient energy option. However, concerted scientific research and technology development on an international scale is required for fusion to become a cost-effective energy option in this century. Nuclear Energy is a potent source of energy which has its advantages and disadvantages. Its biggest disadvantage is that it is misused more than it is used for peaceful purposes. In the years of its evolution, the nuclear bomb has been used just twice which ended the Second World War. There has been only one major nuclear disaster at Chernobyl in the mid-1980's which caused many deaths and was cause for genetic mutations. However, no other hazard has recurred, and the technology has only grown to become a very secure and safe option. The most recent incident which exemplifies the safety and security of nuclear technology has been the accident at the Daiichi Nuclear Plant at Fukushima, Japan. Though graded as a 7 pointer on the I.N.E.S scale, there was no reported death due to radiation leaks, as the radioactivity was thoroughly contained and secured. Every individual has a right to development, and it is the solemn duty of the State to ensure that every citizen gets a deserving chance to be able to reap the benefits of a developed nation. Keeping that in mind, along with

[7], Press Information Bureau, Government of India, Department of Atomic Energy available at http://www.pib.nic.in/Pressreleaseshare.aspx?PRID=1540091. (last visited June 30, 2018)

the right to development, the right to a clean and healthy environment is also an irretraceable human right. The technology development towards a nuclear era must be welcomed as a positive sign towards a ecologically sustainable move which would prove to be beneficial and very successful if understood correctly.

i. *No Carbon Emissions*: The environment is suffering and bearing a life-threatening challenge due to the increasing temperatures because of the increasing amount of emitted carbon dioxide and other gases which are causing the greenhouse effect. For decades nuclear power has been slated as being environmentally harmful. But with climate change emerging as the world's top environmental problem, the nuclear industry is now starting to enjoy a reputation as a green power provider, capable of producing huge amounts of energy with little or no carbon emissions.[8] The biggest advantage of harnessing nuclear energy is that this source of energy generation does not involve the release of carbon or any other greenhouse gas. Worldwide emissions of CO_2 from burning fossil fuels totals to about 28 billion tons per year. About 38% of this is from coal and about 43% from oil. Every 1000 MW power station running on black coal produces CO_2 emissions of about 7 million tons per year. If brown coal is used, the amount is about 9 million tons. Nuclear fission does not produce CO_2, while emissions from other parts of the fuel cycle (e.g. uranium mining and enrichment) amount to about 2% of those from using coal, and some audited figures show considerably less than this. Every 22 tons of uranium[9] saves about one million tons of CO_2 relative to coal. There is now a general agreement that we need resource strategies and energy policies in every country which will minimize CO_2 build-up. In respect to base-load electricity generation, increased use of uranium as a fuel is the most obvious such strategy, utilizing proven technology on the scale required. It is now left for one's own understanding that completely eradicating the carbon emissions is neither feasible nor possible but adopting methods and technologies which result in minimal emissions is possible. Using nuclear energy has two main benefits; one being that it does not emit any carbon in the atmosphere thus bringing down the carbon levels considerably, and second that it results in less consumption of the earth's natural reserves of fossil fuels like coal, natural gas and oil and thus causing less stress on the earth's holding capacity.

ii. *Management of Nuclear Waste*: A major concern which shrouds the process of nuclear energy generation is the accumulation, storage and disposal of nuclear waste. Nuclear waste is the spent fuel which is left after the use of uranium enriched fuel which is consumed by a nuclear reactor for the process of energy generation. Though being very less in quantity, this waste is highly radioactive and toxic, and it contains radioactive isotopes which if left negligently, tends to mix with groundwater, air or other mediums and becomes lethal for any and all life forms. Any industrial activity results in generation of some waste material. Nuclear industry is no exception and the presence of radiation emitting radioactive materials which

[8]Solomon, S. et al. (eds.) *'Climate Change 2007: The Physical Science Basis'*; Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (Cambridge University Press, Cambridge and New York, 2007); available at <http://www.ipcc.ch/pdf/assessmentreport/ ar4/wg1/ar4-wg1-spm.pdf>(last visited June 30, 2018)

[9]Available at http://world-nuclear.org/info/Energy-and-Environment/Environment-and-Health-in-Electricity-Generation/#_ftnref2. (last visited June 30, 2018)

may have adverse impact on living beings, and which is likely to continue to the subsequent generation as well is what sets nuclear or radioactive wastes apart from other conventional hazardous wastes. Another unique feature of the radioactive waste is the decay of radioactivity with time. This fact is gainfully exploited by the nuclear waste managers.[10] All parts of the nuclear fuel cycle produce some radioactive waste (rad-waste) and the relatively modest cost of managing and disposing of this is part of the electricity cost, i.e. it is internalized and paid for by the electricity consumers. At each stage of the fuel cycle there are proven technologies to dispose of the radioactive wastes safely. For low and intermediate-level wastes these are mostly being implemented.[11] For high-level wastes some countries await the accumulation of enough of it to warrant building geological repositories; and others, such as the USA, have encountered political delays. Unlike other industrial wastes, the level of hazard of all nuclear waste – its radioactivity - diminishes with time. Each radionuclide contained in the waste has a half-life – the time taken for half of its atoms to decay and thus for it to lose half of its radioactivity. Radionuclides with long half-lives tend to be alpha and beta emitters – making their handling easier – while those with short half-lives tend to emit the more penetrating gamma rays. Eventually all radioactive wastes decay into non-radioactive elements. The more radioactive an isotope is, the faster it decays. The main objective in managing and disposing of radioactive (or other) waste is to protect people and the environment. This means isolating or diluting the waste so that the rate or concentration of any radionuclides returned to the biosphere is harmless. To achieve this, practically all wastes are contained and managed – some clearly need deep and permanent burial. From nuclear power generation, none is allowed to cause harmful pollution.[12]

ENVIRONMENTAL SAFETY AND NUCLEAR ENERGY: EVENTS OF AN UNCERTAIN PAST

Every form of energy generation method is shrouded with some advantages and some disadvantages. For instance, wind energy which has its disadvantage as being land driven. Area is required to setup a wind energy farm and a certain speed of wind is needed to drive the windmills to generate electricity. In the case of solar energy, the issue of establishing a vast surface area farm to tap solar power is an issue and so is the fact that during the days when there is no sun due to climatic changes, there would be no generation of electricity. It is a combination of these factors, which raises the cost of generation of electricity, from these energy sources making them more expensive than the energy generated through the combustion of fossil fuels. Other sources like hydropower, geothermal, tidal energy etc. too have their share of disadvantages, but they do not cease to be renewable sources of energy which must be developed for mitigating environmental stress. Similarly, with nuclear energy, there are a few serious issues which concerns the critics. First and foremost being the possibility of a nuclear hazard, which has haunted the world after the Chernobyl disaster in the mid-1980s and the second being the health and environmental hazards related to the storage and handling of radioactive waste. To note here, it would be valuable to reiterate the fact that

[10]P.K. Wattal; '*Radioactive Waste Management*'; 38 Sadhana849-857 (2013).
[11]Available at http://www.world-nuclear.org/info/Nuclear-Fuel-Cycle/Nuclear-Wastes/Radioactive-Waste-Management/ (last visited June 30, 2018).
[12]*Ibid.*

in the past almost 50 years of the development of nuclear energy on a wide scale, there have only been three instances of a *nuclear hazard* from a civil facility. It is only these three accidents that have been remembered as the ones which happened at a large scale affecting large number of people. According to Greenpeace, there have been over 300 minor mishaps which did not cause or stir up controversy. Just three main accidents have been taken and understood as environmental hazards and have gone down in the dark pages of history. The first one being the Three Mile Island Disaster in 1979 in United States of America, The Chernobyl Disaster in 1984 in Ukraine and the most recent one in Japan, the Fukushima Disaster. Out of these three accidents, only the Chernobyl accident resulted in deaths and was regarded as the world's biggest nuclear accident, otherwise in the Three Mile Island[13] and Fukushima accident,[14] there have been no reported deaths due to radioactivity.

The institutional framework in India which covers for addressing environmental concerns for nuclear power plants is the Environment Protection Act of 1986 and the rules as formulated under this Act. There are also numerous rules and regulations which are formed under the Atomic Energy Act of 1962 which cater to the aspect of radioactivity, uranium mining and milling and the safeguards which must be practiced. Under the Environment Impact Assessment Notification (amended in 2016), all proposed nuclear plants must submit the reports in the stipulated format and upon the meticulous inspection of the plan's details, and the consultation with the public, shall the plant be allowed to be setup. It was during the time of the setting up of the Kundakulum Nuclear Power Plant when a widespread public protest was staged against setting up of this plant. The locals aided by a few NGOs and public forums with political ideologies took to the streets against the plant. A lawsuit was filed and the Supreme Court, while finally deciding the fate, reinvented the existing trend of environmental jurisprudence in India. It stated that the development which shall only bring prosperity to the citizens and the projects which are in good faith for the greater good must not be met with such hostility. If we dwell in the past too much, we lose on opportunities for paving the way forward for the better future. Therefore, under strict supervision and under conditions imposed for ensuring the safety of the plant, the Nuclear Power Station was allowed to be setup.[15]

The Government of India is very proactive about the safety concerns around the nuclear power plants. It can be established so, because the Department of Atomic Energy and the Atomic Energy Regulatory Board have taken the utmost precautions on both levels of nuclear power generation; the backend as well as the front-end. There have been reported issues about the mismanagement of the Uranium mining and milling which was done decades ago and the proper environmental safeguards which were not followed, that resulted in the yellow slurry

[13] The American Nuclear Society reported: available at, http://www.ans.org/pi/resources/sptopics/tmi/whathappened.php(last visited June 30, 2018)

[14] Three Tepco employees at the Daiichi and Daini plants were killed directly by the earthquake and tsunami, but there have been no fatalities from the nuclear accident. Reported on World Nuclear Association Report, available at http://www.world-nuclear.org/information-library/safety-and-security/safety-of-plants/fukushima-accident.aspx(last visited June 30, 2018)

[15] G. Sunderrajan v. Union of India CIVIL APPEAL NO. 4440 OF 2013.

and dust to affect the workers and miners who work there. In order to control and contain the pollution in the mines, especially Jaduguda Mines, the plant has undergone several modifications adopting technologies to maximize the re-use of water, high recovery of the product and minimum discharge of effluents. It has several automated process control mechanism and online monitoring systems.[16] Various reports from Down to Earth and Centre for Environment and Science have brought to attention of the public that the uranium mining regulator, UCIL (Uranium Corporation of India Limited) has been performing rather sub-standardly. The Ministry of Environment Forest and Climate Change has not been able to regulate this either, as the entire portfolio of Atomic Energy and radioactive substances is strictly under the control of the Prime Minister's Office and there is strict and overarching laws and regulations which do not allow any other department or ministry to transgress into this subject. However, in 2018 the Forest department did issue a penalty on the UCIL worth Rs. 87 crores for the breach of mining licence procedures. The mine was shut down for a long time as the penalty was very high and the State's forest department was not giving them clearance. It was only after the Prime Minister reduced the penalty amount, that the mine started operations again.

The legal framework around Nuclear Plants and Uranium Mining and Milling has been shrouded in secrecy and the system has not followed any transparency since the beginning. The reason stated during the earlier times was that the Indian Nuclear Programme had a very thin line in between the civil nuclear programme and the defence nuclear programme. Soon after the Nuclear Bomb was tested in India during the 1970s, there was a complete ban imposed on the Indian industry and it lost the cooperation it was getting from the other countries. Therefore, in order to protect the State secrets and the defence programme of separating Plutonium and turning it into weapon grade nuclear material, the entire Nuclear Programme was kept hidden and protected from the public domain. The Central Government remained and continues to remain the single and sole owner, regulator and buyer of nuclear energy. However, soon after the sanctions were lifted in 2005 and the Indo-US Civil Nuclear Agreement was signed, the Indian Government had to expand its feet and prowess into the aspect of nuclear power generation and thus gradually the information about the safety features, technical knowledge and impact assessment reports of the Nuclear Power Plants became available in the public domain. The Atomic Energy Act, 1962 is the main piece of legislation from which all other aspects of atomic energy are regulated by means of regulations and rules such as Atomic Energy (Working of Mines, Minerals and Handling of Prescribed Substances) Rules, 1984; Atomic Energy (Safe Disposal of Radioactive Wastes) Rules, 1987; Atomic Energy (Radiation Protection) Rules, 2004; Atomic Energy Radiation Processing of food and allied products rules 2012; The Atomic Energy (Arbitration Procedure) Rules, 1983. The most recent legislation which was brought into place was the Civil Liability for Nuclear Damage Act, 2010 and Rules, 2011. It is significant to note that since 1962, the technology which is being used for the generation of nuclear energy till now, and the proposed technology and state of the art generation four reactors which have been proposed to be installed in the coming future, may not conform largely to the regulations imposed by these laws and bye-laws. Similar

[16] Available athttp://www.ucil.gov.in/jadugudamill.html (last visited June 30, 2018)

is the case with the blanket environmental safety regulations which are currently in place for all the reactors, irrespective of their make and their technological aspect. This kind of power generation uses a very complicated form of engineering and not all reactors have the same environmental effect. To illustrate, let's consider the example of a Molten Salt Reactor and a Pressurised Heavy Water Reactor. In the former, the core of the reactor is already in molten state. In the situation of a leak, the environmental concern must be to contain the leak and not mandate gaseous containment. On the contrary, in a PHWR make of a reactor, the environmental concern shall be two fold, firstly, the core must not be heated as much as to cause a meltdown and secondly, the coolant used is 'Heavy Water' which in itself causes environmental pollution if it accidentally in comes into contact with the outside environment. This forms a case of an anti-thesis as on one hand, the government has extensively planned and gained approvals for many more nuclear reactors, but the laws and regulations which are in place, are not being reformed or revolutionized to make the process simpler with lesser loopholes.

***Concerns Post Fukushima*:**

Experts such as Wolfran Tonhauser, Head of the IAEA Nuclear Law and Treaty Section on a personal account, mentioned that Chernobyl Accident and the Fukushima Accident gave important lessons to countries, and the lawmakers did learn from their mistakes. It was only after Chernobyl that the global leaders realised that there was no law, neither domestic nor international to regulate situation and liability in case of a nuclear incident or accident. It was also found that the technology used by the Soviet's for this nuclear plant, was obsolete and could not be continued, causing the Russian Government to completely revolutionize their nuclear technology and industry. The most important principle of nuclear law, that of giving immediate information to neighbouring States in case of a nuclear incident or accident, was laid down and majority countries ratified this treaty. The laws determining liability in the event of a nuclear accident or incident in the form of a Convention document was formed and Convention on Early Notification of a Nuclear Accident (the Early Notification Convention) and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (the Assistance Convention) were quickly put in place for signature of the countries. The time period which passed in between two accidents, was that of more than two decades. The incident in Fukushima, was a structural disaster. No less than a miracle that there was no immediate radiation leak, which could have caused catastrophic casualties and the sea as well as the land and air could have been polluted and destroyed almost instantly. However, the mistakes that did come into global attention were that the Atomic Energy Regulatory Body in Japan, was highly tangled and subservient to the government or the National Diet. When the disaster tsunami struck, the nuclear physicists and the people with technological experience immediately warned that the area should be evacuated, however, by the time the official order from the government came, it was too late and it caused issues with the evacuation process, causing public to panic and result in a few deaths. Factually, one news which did not catch anyone's attention was that at the epicentre of the Earthquake and tsunami was another Nuclear Power Facility called the Onagawa Nuclear Power Plant, which did not suffer any

mishap and the reactor responded to the natural disaster and caused itself to shut down without any technical glitch.

From the most recent disasters, it sure is evident, that the Global Nuclear Industry has come a long way in its technological evolution and today, the progress in this area is commendable. There are numerous statistics which prove that a greater number of people have died in Thermal Plant operations, than people who have died in nuclear power accidents[17]. The figure presented in the report from Harvard is that close to 13,200 people die every year in the USA alone due to fine particles coming from thermal power plants. According to a Report in *The Guardian* reported in

"the chemicals which are made airborne from burning coal and found a number of health damages were caused as a result. It estimates that coal burning in China was responsible for reducing the lives of 260,000 people in 2011. It also found that in the same year it led to 320,000 children and 61,000 adults suffering from asthma, 36,000 babies being born with low weight and was responsible for 340,000 hospital visits and 141 million days of sick leave."[18]

Any man-made activity, which is against the natural course of Earth, has a number of risks associated with it. Atomic power since its discovery has been used only for destructive purposes and the Chernobyl Accident in the 1980s only reduced the confidence of using radioactive substances for any purpose whatsoever. However, the times are such that climate change presents grave dangers, and everything must be done to avert a crisis which is irreversible. Therefore, Nuclear Energy, in a controlled environment with strict and updated laws and regulations is the most feasible and viable solution to battle climate change.

THE GRAPH OF NUCLEAR ENERGY ACROSS THE WORLD: SOLUTION TO CLIMATE CHANGE

World Nuclear News coherently compiles reports, interviews, news threads, policy updates and important rules and regulations on an Inter-Governmental level about Nuclear Energy and its composite growth amidst climate change and rapidly rising carbon emissions. It has proved to be a neutral turf since the Fukushima Incident took place as the entire world's nuclear industry was struck with uncertainties. This platform not only provided valuable information about this sector, but also compiled the insights of the Nuclear Law and Technology experts on the future of atomic power. The Japanese plants which were in cold shut-down since, are now being slowly revived and started back, as the country discovered that since the nuclear plants went offline, their imports on coal and oil and gas went incessantly up, causing the prices of fossil fuels shooting up in the global market. The amount of carbon emission recorded was unusually high and despite their efforts, they went from being an energy surplus country, to an energy deficient country. After many years, now, the plants in Japan are slowly re-opening after getting audited and reviewed on their safety standards and security.

[17] James Hammitt of the Harvard Center for Risk Analysis in Boston.
[18] Available at https://www.theguardian.com/environment/2013/dec/12/china-coal-emissions-smog-deaths(last visited June 30, 2018)

The European countries such as France, Germany, Italy, Belgium etc. passed a resolution to cut down on their nuclear-powered energy and replace it with 'Renewable Energy'. Trillions of dollars and various innovative plans later in Europe, it has been seen that despite the efforts with Renewable Energy and Clean Sources, global carbon emissions are only on a rise. Some countries have adopted a rather different approach of reducing their share of nuclear energy, while increasing their share of renewables. However, when the facts, statistics and reports are witnessed, the carbon share stays the same. Germany proudly announced its withdrawal from nuclear power and that renewables were to replace it. But instead of reducing carbon emissions and ensuring the stability of the energy mix, Germany has achieved exactly the opposite. Coal use in Germany has been gradually decreasing over last few years. Renewables now account for about 30% of Germany's power mix, but if we take a look at the emissions statistics, not much had changed for the past five years.[19] The European countries, with their increased infrastructure building for renewable energy and shutting down their nuclear power plants, are contributing more to their energy deficit and carbon footprint than any benefit that they may be deriving. It has evidently increased the share of coal in their energy mix as the baseload energy provider and they are now becoming countries which are contributing significantly to carbon emissions. France, which decided to reduce its share of nuclear energy and focus more on renewables, still provides more than half of its energy requirement from nuclear plants. According to a 2018 report, President Macaron gave the statement that by 2035, France shall close its fourteen reactors and not revive the nuclear industry. This was done to honour the promise made by previous President Hollande. However, according to a new Bill passed in France, there shall be a delay in this planned reduction of nuclear power to less than fifty percent till 2035. The new draft energy and climate bill is aimed at enshrining into the law the objective of making France carbon-neutral by 2050. Presenting the bill, Rugy said: "While the energy transition law provided for quartering greenhouse gas emissions by 2050 [compared with 1990 levels], the government goes further with the zero net emission target by 2050, the world's highest standard for greenhouse gas emissions in the fight against global warming." He added, "This makes France the first country in Europe to set the goal of carbon neutrality into law, and it will now be the compass of all our climate policies." [20]

Smaller countries in Europe, Middle East and Africa are now seeing an increased amount of investment from the developed countries such as USA, France, Russia and even China, in building their capacity for nuclear energy. Finland, Norway, Netherlands, Argentina, Turkey, Sudan etc. are the upcoming countries which are successfully installing nuclear capacity in their attempt to reach energy security. Michael Shellenberger - the President of Research and Policy organisation Environmental Progress, while addressing delegates at XI International Forum Atomexpo 2019 held in Sochi, Russia commented that the nuclear industry must act to end the decades long demonization of the most environmentally friendly form of energy and the world's only viable hope against climate change. In order to conserve the Earth, from a

[19] Borislav Boev, *Why We Need Nuclear Power*, D.A Tsenov Academy of Economics (Bulgaria); (2019).
[20]Available at http://www.world-nuclear-news.org/Articles/French-bill-delays-nuclear-reduction-by-ten-years (last visited June 30, 2018)

future hypothetical accident, which may or may not happen, countries and societies cannot agree to accept the harm that is being done in a continued fashion by climate change. The Earth and the biodiversity is changing at a dangerous speed, causing cyclones, droughts, floods, melting of ice caps and extinction of species as we speak, while all that we are concerned about is what *could* happen and how bad and catastrophic an accident *could be if it ever happens.* Also, if the Anti-Nuclear lobby is of the opinion that nuclear is not the option but solar energy and other forms of renewable energy is the option, then the Lifecycle Assessment of all these options must be done and the carbon footprint must be calculated, only to find out that there is no such form of energy source which can completely solve the question of energy security. Solar Panels are the most energy consuming products, with each panel needing to burn three tons of coal fired energy, to produce one solar panel. The compound of silica which is used in the panel is an extremely hazardous by-product which can pollute the environment in equally undesirable fashion. Setting up a 100 MW solar power plant shall require a vast amount of land area as compared to a 100MW nuclear power plant. Similar is the case with hydroelectricity. The construction of a mega-project shall require tons of cement and other carbon intensive inputs, along with the clearing of hundreds of hectares of forests and channelling rivers and degrading their oxygen content and disrupting the living biota in the rivers, which no other source of energy shall do. The question shall arise time and again, whether or not Renewable Energy is sustainable in nature. Battling climate change is becoming increasingly important and the strategy which should be adopted must be progressive and quick responding. Nuclear Energy answers positive to most of the questions and in order to attain the targets of Zero-Carbon economies, in the manner in which Germany and United Kingdom proclaim and announce[21] there must be a paradigm shift from thermal energy to nuclear energy. Only renewable sources shall help achieve carbon neutrality, but only after the evil of climate change would have altered the biodiversity on Earth forever.

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21Net Zero: The UK's contribution to stopping global warming - the Climate Change Committee (CCC): available at http://www.world-nuclear-news.org/Articles/UK-should-aim-for-net-zero-GHGs-by-2050,-report-sa(last visited June 30, 2018)

RIGHT TO ENERGY *VIS-À-VIS* CLIMATE CHANGE

Raghav Parthasarathy &
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INTRODUCTION

Energy consumption is fundamental for the survival of all living organisms. The impact of energy consumption on economy and environment are intertwined. Energy in the form of fossil fuels like coal, lignite, crude oil etc., are classified as non-renewable resources, whereas, wind energy, tidal energy, geothermal energy, solar energy etc., are classified as renewable resources. Both renewable and non-renewable resources have been in use in various sectors. Economic growth is wholly dependent on energy consumption as it is closely related to the industrial production and domestic needs. India is heavily reliant on primary sources of energy like petroleum and its derived products for its energy needs, which are being imported from other countries leading to draining of its financial resources. India is one of the top importers of oil products amounting to 9.18% of global imports.[1]

The concept of the three E's i.e., Energy, Economy and Environment[2] requires to be relooked as they are mostly related to the energy consumption, environment protection and sustainability leading to growth in the economy. Even though these are interlinked in numerous intricate ways, the other aspect of this is '*Equity*'. The principle of equity requires to be highlighted as the energy supply requires the consumption of essential resources of the planet. By considering the environment as a legal person[3], which deserves to be protected, the concept of equity has emerged from the environmental standpoint. It is fundamental to understand that when energy requirement is pitted against the environment, it is always the environment that takes a backseat. Whereas, depriving access to energy impedes economic development and prosperity. The balance between the two must be brought in.

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[1] *Oil Price and International Trade in Petroleum Trade in Petroleum Crude & Products; An Indian Perspective*, Working Paper No.70 – EXPORT-IMPORT BANK OF INDIA JANUARY 2018, available at https://www.eximbankindia.in/Assets/Dynamic/PDF/Publication-Resources/ResearchPapers/90file.pdf (last visited June 24, 2018).

[2] United States Environment Protection Agency, "About the E3: Economy – Energy– Environment. Formed in the year 2009 to help revitalize the economy while helping achieve sustainability, E3 is a federal technical-assistance framework comprising six federal government agencies, including EPA.
https://www.epa.gov/e3/about-e3-economy-energy-environment (last visited May 8, 2018)

[3] Dinah Shelton, Nature as a legal person, *VertigO - la revue électronique en sciences de l'environnement* [Online], Hors-série 22 | septembre 2015, Online since 10 September 2015, available at http://journals.openedition.org/vertigo/16188; DOI: 10.4000/vertigo.16188 (last visited May 8, 2018)

Energy security is the sub-set of national security, economic security and environmental security. Reliance on fossil fuels can only be reduced but cannot be absolutely eliminated.[4] The primary objective is to provide constant energy supply to all at affordable prices thereby providing access to energy for all, and secondary objective is to ensure that the same energy is extracted from the renewable sources, in order to safeguard the environment by supplying clean energy to every household. Nevertheless, it is also essential to understand that conservation of environment and right of access to energy should go hand in hand. Further, emphasis on the right of access to energy is crucial to expound the bigger and broader narrative of energy security. Government holds monopoly over supply of essential energy services like LPG, petroleum products[5] and power, to ensure continuous supply to fulfill the demands. Consequently, the role of government in supplying these essential goods and services, in other words, to provide access to energy becomes a universal service obligation.

Incessant supply of energy derived from the non-renewable sources will lead to exhaustion of those resources and add up to the environmental pollution due to excessive carbon emission. Opting for renewable sources of energy, for the industrial and domestic purposes, is a step towards cutting down the usage of non-renewable sources of energy, in order to alleviate the consequences of climate change. Efforts have been made at the international level to combat climate change and to protect the environment. Several treaties and declarations have been signed and ratified by the member nations, one such being the 2015 Paris Agreement on Climate Change[6]. The focus is also on steps taken by the Government of India to implement the declaration signed as one of the member nations. It is crucial to attain energy independence by eliminating dependency on other countries and to reduce the hazards inflicted on the environment. That apart, securing energy need of the country be it for the domestic or for industrial purpose, shall be the principal objective. The author tries to highlight various nuances of the right to energy from the perspective of providing access to the deprived class and its impact on the climate change. Further focus will also be laid on the Paris Treaty Obligation and its bearing on the climate.

ACCESS TO ENERGY – FROM THE PERSPECTVE OF RIGHT

Due to increase in industrial activities and rapid growth of urban areas, need for energy and energy products are swelling at a very fast pace and the governments at the national level are aware of the demands. Fast growth, due to industries and cities becoming economic hubs, has led to a large-scale migration, which is not only impacting the urban growth but also poses a

[4]The proposition that the G7 leaders have agreed to phase out the use of fossil fuels by the end of this century leads to an inference that the same cannot be eliminated absolutely.
See generally, Global Consumption of fossil fuels continues to increase available at http://instituteforenergyresearch.org/analysis/global-consumption-of-fossil-fuels-continues-to-increase/ (last visited June 10, 2018).
[5]S. 2(a)(viii) of the Essential Commodities Act, 1955.
[6]The universal agreement's main aim is to keep the global temperature rise this century well below 2 degrees Celsius and to drive efforts to limit the temperature increase even further to 1.5 degree Celsius below the Pre-industrial levels, *See generally*, Historic Paris Agreement on Climate Change: 195 Nations Set Path to Keep Temperature Rise Well Below 2 Degrees Celsius, https://unfccc.int/news/finale-cop21 (last visited June 10, 2018).

challenge to the Government to provide basic amenities and provide access to energy. That apart, higher oil prices are hurting consumers and putting pressure on the Governments to reintroduce subsidies[7]. The non-fulfilment of which has led to issue of energy poverty. The problem has to be tackled by providing basic minimum access to energy to lead a dignified and healthy life. In fact, the developing countries are facing tremendous challenges in terms of fulfilment of the energy requirement to a large chunk of its growing population. Yet, the question that arises for consideration is whether the government has a duty to provide energy, more so clean energy only for the sake of survival of its population? Or should it consider supply of power to increase productivity and increase the standard of living?

The principle laid down in the Preamble of Universal Declaration Human Rights[8] states - "*Whereas recognition of the inherent dignity and of the equal and inalienable rights of all members of the human family is the foundation of freedom, justice and peace in the world"*. Whilst the focus would be to supply the energy for the population, the urgency in addressing the issue of the impact of such supply also has to be considered. There is a scope for development of the economy, but at the same time, fulfilment of basic human needs by ensuring that the rights of other living organisms and their habitats are not affected also has to be ensured. In a country like India with a huge population and vast bio resources, the lack of access to energy will not only deprive people of the basic human right to lead a civilized life but will also prohibit access to opportunities available to the people to prosper economically. Access to energy in the form of power or fuel has been considered as one of the basic requirements for any human being. The aspect of energy fulfilment is a critical issue for our country and the power sector needs to respond to rapid growth in demand and sustainability challenges.[9]

It is essential to understand the term "right" in the context of access to energy, which is fundamental for human survival. The Hon'ble Supreme Court way back in the year 1995 in the case of *Chameli Singh*[10] has recognized the right to live, which does not merely mean survival, but life with human dignity which requires shelter along with electricity connection, which is an essential service and the citizens cannot be deprived of the same by the State. The Court also observed that the right to live guaranteed to a person under the Constitution includes "the right to an adequate standard of living for himself and his family including food, clothing, housing and to the continuous improvement of living conditions."[11]

The Chhattisgarh High Court has held in the case of *N.R. Sharma*[12] that access to electricity constitutes a right more so, a human right which can be classified under the right to life as

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[7]The Global Energy Outlook and the Increasing Role of India, Dr. Fatih Birol, Executive Director, International Energy Agency, Darbari Seth memorial Lecture, 29, August 2018. Available at 'https://www.teriin.org/sites/default/files/files/DSML2018-presentation.pdf (last visited October,4, 2018).

[8]*See* Preamble of the Universal Declaration of Human Rights, available at http://www.un.org/en/universal-declaration-human-rights/ (last visited October 4, 2018).

[9]*Supra* note 7.

[10]Chameli Singh and Others v. State of U.P (1996) 2 SCC 549.

[11]Article 11(1) of International Covenant on Economic, Social and Cultural Rights 1966.

[12]N.R. Sharma v. Chhattisgarh State Power Distribution Company Limited and Others in W.P. No. 3340-41 and 3343/2017, date 02.01.2018.

enshrined under Article 21 of the Constitution of India. When a statutory duty is imposed on the State to provide the person seeking supply of electricity, a duty is cast upon the State not to refuse unless the conditions laid down are not fulfilled.[13] It has been held in the case of *T.M. Prakash and Others v. The District Collector and the Superintending Engineer, Tamil Nadu Electricity Board* [14] that;

"It is the fundamental duty of the respondents to show compassion to those who are living in huts and tenements for long number of years, taking into consideration their socio-economic disabilities, without electricity supply for many years. Preamble to the Constitution of India guarantees right of every person to justice, social, economic and political. When socio and economic justice is the mandate of the Constitution of India, it is a travesty of justice to deny electricity to the petitioners. Income is one of the sources for achieving an egalitarian society and it is the fundamental right to decent living.

The Court in the above case has recognized the right of an individual to have access to energy and it is the duty of the State to provide it, when it is sought for. Moreover, the lack of electric supply is one of the determinative factors, affecting education, health and a cause for economic disparity leading to inequality and poverty in the society. The Court reiterated the principle of Universal Service obligation which refers to "*a minimum set of services, which are of specified quality to which all end-users have access, at an affordable price in the light of specific national conditions, without distorting competition.*"[15]

The issue of energy poverty is volleying around the areas with large number of households who have access to fuels like fire wood, twigs, coal, dung cakes and dried leaves, which are easily available than those fuels which are comparatively expensive and not accessible to the people in the rural areas.[16] The smoke generated due to the burning of such fuels cause pollution and adversely affects the health. However, there have been improvements due to the initiatives undertaken by the Government to provide free cooking gas and subsidies[17] to the economically weaker sections of the society. The past decade has witnessed the growth of safer modes of energy utilization which is a slight improvement from the earlier times. However, the steps adopted are not sufficient, the technological advancement must be capitalized in order to reduce the carbon emissions.

India relies heavily on the primary energy sources like coal and natural gas to fulfil its energy requirements[18]. The Central Governments initiative of "Make in India"[19] to transform the

[13]Ss. 43 and 44 of the Electricity Act, 2003.
[14]T.M. Prakash and Others v. The District Collector and the Superintending Engineer, Tamil Nadu Electricity Board 2013 (6) CTC 849.
[15]European Directive on Telecommunications, Directive 2002/22/EC of the European Parliament and of the Council of 7 March 2002.
[16]"India: Issues and Priorities for Agriculture, May 17, 2012". The World Bank, available at http://www.worldbank.org/en/news/feature/2012/05/17/india-agriculture-issues-priorities (last visited October 4, 2018).
[17]Pradhan Mantri Ujjawala Yojana, available at http://www.pmujjwalayojana.com/about.html (last visited October 4, 2018).
[18]Indian Energy Sector: An overview, available at http://www.indiaenergyportal.org/overview_detail.php (last visited June 11, 2018)

country into a manufacturing hub and to provide "Power for All"[20], requires continuous energy supply without any interruptions. The focus of the government will be mostly with regard to providing energy commodities to the household at affordable prices. Whereas, issues regarding availability of affordable and clean energy is a conundrum which is dawdling and requires huge investments both from the private and the public sectors. However, investment requires adaptation of newer and better technology by replacing the old and outdated ones.[21]

Conversely, the issue of environmental degradation was in focus for several decades, however, only in the early 2000's it was realized that the issue of energy requirement also needs to be addressed. Energy poverty not only meant lack of access to clean energy but was also interconnected with other issues like economic poverty and social backwardness.[22] The overall development of any human being is dependent on several factors, one of them being the access to energy. The focus should really be on the incremental changes in order to bring millions out of the poverty thereby ensuring that they are granted access to energy.

IMPACT ON CLIMATE CHANGE

The utilization of fossil fuels has become inevitable at all levels be it for industrial, domestic or for transport and automobile. While the purpose of use may be different but all such uses of fossil fuels cause emissions[23] contributing to severe damage to environment and ecology. Ceaseless burning of these non-renewable resources accompanied with deforestation has had impact on climatic conditions. The other aspect which needs to be considered is the impact of right of access to energy on climate. Energy has been harnessed from the environment for over several centuries. Energy requirements increased as there was growth in the trading activities. Accordingly, the energy products had to be commercialized leading to large scale consumption of fossil fuels like coal, lignite, petroleum and other products leading to huge amounts of carbon emissions which besides affecting the environment, also cost the exchequer of the State an enormous sum. Rampant consumption of these fossil fuels has led to global warming and increase in the temperatures worldwide. Technological advancement in search of better fuel and better extraction techniques requires sophisticated paraphernalia. Sustainability, as the principle, has been conceived while the technological advancements and adoption are in progress. Increasing demand and rampant fossil fuel extraction, has led to loss of habitat and loss of animal lives causing greater impact on the environment.

The repercussions of consuming these energy products on environment is evident, as it has led to melting of glaciers, increase in sea level and consequent bearings on health. Requirement of energy is indispensable for any economic or other activity, for which access has to be given to

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[19]About Make in India Program, available at http://www.makeinindia.com/about (last visited June 11, 2018)
[20]Power for All, available at https://powermin.nic.in/en/content/power-all (last visited June 11, 2018)
[21] The Future of the Global Power Sector – Preparing for emerging opportunities and threats, available at http://www2.deloitte.com/content/dam/Deloitte/dk/Documents/energy-resources/The-future-of-the-global-power-sector.pdf (last visited June 9, 2018).
[22] Stephen R. Tully, *The Contribution of Human Rights to Universal Energy Access*, 4 NORTH-WESTERN JOURNAL OF INTERNATIONAL HUMAN RIGHTS, (2006).
[23]Climate Change, Global Issues available at http://www.nber.org/programs/eee/eee.html (last visited June 9, 2018).

everyone. Economic prosperity always prevails over the environmental concern, as without exploitation of natural resources, economic prosperity cannot really be achieved. The emission cuts will certainly help the cause, but the real question is how to go about addressing the issue. Solutions like switching to renewable sources of energy like generation of power from solar, wind and tidal could be explored. As the economies grow, the market demands easy access to the resources. Yet, to achieve true independence in energy sector by securing energy for the nation will take a considerable amount of time.

Infrastructure development is another essential parameter for any developing country to sustain. The available energy resources for now, might seem abundant, but in the long run, these will diminish as most of the energy sources are primarily carbon based. Most of the fossil fuels available presently or extracted are carbon based, which, when, burnt emit huge amounts of carbon. Result of this being drastic increase in air pollution and going by the recent reports, several cities in India are hugely affected by air pollution.[24] Consequence of this would be severe deterioration of environment, health and ecology. The prime reason as to why fossil fuels are still in use is because, carbon-based fuels are cheaper than the other available alternatives and it becomes easier for the companies to choose those products over the renewable sources of energy[25]. Several eminent persons have voiced their concerns regarding the temperature changes and the United Nations Secretary General – Ban Ki Moon[26], quoted as hereunder:

"We must limit global temperature rise to 2 degrees. We are far from there, and even that is enough to cause dire consequences. If we continue along the current path, we are close to a 6-degree increase".

The global temperatures are on the rise and it has been estimated that the temperatures across the world would only increase leading to melting of glaciers and consequent rise in the sea level. The immediate impact of this would not only be on our surrounding environment but also on our needs and requirements. As the increase in temperature will likely lead to increase in our energy demand as well as change the way the energy is being produced.[27] The emission of large amounts of greenhouse gases and uncontrolled human activities including the burning of carbon rich fossil fuels releasing large volumes of pollutants harms the fragile environment. Since the major part of energy generation is based on the non-renewable sources, the two thirds of global greenhouse gas emissions are linked to the burning of fossil fuels. The mitigation and adaption to climate change are key challenges that the countries are largely facing due to excessive industrial growth supporting the economies. In order to succeed in addressing the issue of global warming or decreasing the adverse impact on environment, the

[24]WHO Urban ambient air pollution database, Public Health, Environmental, and social detriments of health, available at http://www.who.int/phe/health_topics/outdoorair/databases/cities/en/ (last visited June 9, 2018).
[25]Energy, Economy and Environment, S. Rajkumar, IIT – Kharagpur, available at http://greencleanguide.com/essay-on-energy-economy-and-environment/ (last visited June 28, 2018)
[26]Don Fullerton, Environmental and Energy Economics, National Bureau of Economic Research, available at http://www.un.org/en/globalissues/climatechange/ (last visited June 28, 2018)
[27]Climate impacts on Energy, Temperature, energy demand, and energy supply. United States available at Environmental Protection Agency https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-energy_.html (last visited on June 28, 2018).

countries need to specifically address the issue of preventing irreversible damage to the environment.

Attempts at the international level are ongoing since the year 1994 to obligate the developed countries and the developing countries to bind each other in terms of emissions by way of international instruments like the United Nations Framework Convention on Climate Change (UNFCCC)[28]. The aim of the Convention is to prevent the dangerous human interference with the climate system in order to ensure and extend protection. The paper has also attempted to focus on the policy initiatives at the international level and its subsequent implementation at the national level for mitigating the effect of climate change.

POLICY INITIATIVES AT THE INTERNATIONAL AND THE NATIONAL LEVEL

The world is witness to the fact that the ongoing efforts to mitigate the climate change have resulted in the historic Paris Agreement in the year 2015. The Paris Climate Change Agreement was developed within United Nations Framework Convention on Climate Change (UNFCCC) dealing with greenhouse gas emission its mitigation, adaptation and finance. The Paris Agreement came out of the 21st Conference of Parties, the COP21, held in Paris from November 30th to December 12th, 2015. The Paris Agreement was a landmark international deal when 174 countries, including EU and China, signed up to sweeping pledges on the environment at UN meeting in the French capital in late 2015.

Paris Agreement was open for signatures from the April 22nd, 2016 to April 21st, 2017. In accordance with Article 21(1), it came into force on November 4th, 2016, the 30th day after which at least parties accounting for an estimated 55 percent of the total greenhouse gas emissions have deposited their instrument of ratification, acceptance, approval or accession. Parties were given the liberty to withdraw from the Agreement after three years of entering into force, but they were not to make reservations.

Objectives:

Limiting global temperature rise to 'well below 2°C'-

The target is to achieve the terms set down in the Agreement, which limits the global average temperature rise to well below 2°C. The Agreement includes a commitment to keep a check on the rise in global temperatures well below 2°C, compared to pre-industrial times, while striving to limit them even more, to 1.5°C. To achieve this goal, greenhouse gas emission must be reduced, those that come from fossil fuels, till their total eradication. Through the premises of zero fossil fuels, it is intended to replace these with renewable, alternative, or clean energy. Main aim of the Paris Climate Change Agreement is as follows;

Mitigation - It is a term to attenuate or soften a negative thing, such as an illness or a headache. In the case of global warming, mitigation refers to reduction of emission of greenhouse gases

[28]United Nations Framework Convention on Climate Change also called as the Rio Convention. United Nations 1992. The UNFCCC brought into force on 21st March 1994 have almost all the countries as its members i.e., almost 197 countries having ratified the Convention are called the Parties to the Convention.

(GHG) or fossil fuels until their total eradication. They also include the improvement of the sumps to increase the absorption capacity of said gases. Likewise, programs such as carbon taxes and incentives of voluntary GHG reduction and clean energy substitution are considered.

Adaptation - It refers to actions that must be carried out to prevent changes that may produce undesired effects. In the case of global warming, adaptation refers to initiatives and measures that reduce the vulnerability of natural and human system to climate change. Countries and communities must implement preventive measures and practices to avoid probable harm. Short- and long-term measures must be contemplated, through environmental management, planning and disaster management.

Resilience - In the case of global warming and climate change, resilience refers to the capacity of an ecosystem to absorb disturbances, without significantly altering its structural and functional characteristics, which can return to its original state after the disturbances have ceased. The Paris Agreement places a special emphasis on increasing the capacity for adaptation, strengthening resilience and reducing vulnerability to climate change.

Impact of Paris Agreement:

The report on 'Global Trends in Climate Change Legislation and Litigation 2018'[29], points out that there are more than 1,500 national climate change laws and policies worldwide, of which 106 have been created since the Paris Agreement was reached in late 2015. All 197 countries that are signatories to the Agreement have at least one law or policy on climate change. Of the 106 new laws and policies passed since the Paris Agreement 28 explicitly make reference to the Agreement. Further analysis will be required to determine if these new laws and policies are consistent with the Paris Agreement. Alignment between national and international goals will be pivotal to meeting the Paris targets. That apart, there are litigation pending that are filed in the respective Courts which has seen partial success. The climate related human rights cases are emerging, and the trend is only soaring.

The report also concludes that, a new wave of strategic legal test cases linking climate and right is emerging. The findings of the report on litigation are based on the analysis of 276 cases in 25 national courts, not including United States. About three-quarters (77%) of cases are primarily concerned with action to reduce greenhouse gas emission, and 40% cases are brought on behalf of companies. The measures adopted in the Paris Agreement are forcing the countries to reduce the greenhouse emissions. Even though the emissions are far higher than what they were earlier, there has seen drastic reduction compared to the past century. The technological solutions to increase the fuel efficiency and relevant infrastructural support have to be developed in order to combat the consequences of climate change.

[29] *Michal Nachmany and Joana Setzer*, Policy brief – Global trends in climate change legislation and litigation: 2018 Snapshot. Grantham Research Institute on Climate Change and the Environment, May 2018.

National Action Plan on Climate Change (NAPCC) and Paris Agreement

India officially recognized the concern of climate change in the year 2008 and has framed National Action Plan on Climate Change in the same year to deal with the issues related to climate change. The NAPCC comprises of eight missions which include Solar, Water, Green India, Sustainable Habitat, Sustainable Agriculture, etc.[30] The developing countries across the world have ratified the Paris Agreement and India as one among the major polluters has ratified it as well. India is on track to achieve the national targets set to address climate change under the Paris Agreement. The Central Government has commissioned three research institutions to project a long-term low carbon growth trajectory for India. This is the first step that India has taken to achieve its commitments under the Paris Climate Agreement. Developed nations have committed to reduce their emission in absolute terms. But developing nations such as India, keeping the need for poverty eradication, have committed to reducing the emission intensity of their economies over time.

International agreement/treaties/protocols in India have to be translated into domestic laws for them to be applicable as provided under Article 253 of the Constitution of India. The law-making power in this regard vests with the Parliament. India has been quite responsive in recognizing and devising the legal framework for the climate change. This has led to the improvement in its ranking in the Climate Change Performance Index 2019, when it climbed to the 11th rank. The other important factor favoring India is the falling prices of the renewable sources of energy which can push India towards achieving the goal of reducing the greenhouse gases. Indian Courts and tribunals have swung into action time and again in order to protect and conserve the environment. In the case of *Vellore Citizens Welfare Forum v. Union of India*[31] the Supreme Court of India held, *industries are essential for the economic development of the country, but when it comes to the health of public, and having regards to the pollution caused by the industries, the concept of Sustainable development [32] has to be accepted in principle and applied strictly*. The principle of polluter pays, and precautionary principle has been adopted by the Indian courts in several cases.

India's promise to reduce its emission of greenhouse gas per unit of GDP by 33 to 35 percent below by 2005 levels by the year 2030 would be achieved by generating energy from renewable fuel sources including the solar, wind or other type of biofuels. The addition of forest cover would have to be rapidly increased, so that an additional carbon sink equivalent to 2.5 to 3 billion tons of carbon dioxide is generated by the year 2030. In the run up to COP 15 in 2009 at Copenhagen, Denmark, India had promised to reduce its emission intensity by 20 to 25 percent from 2005 levels by the year 2020. According to recent report by the Carbon Disclosure Project (CDP) India, is aligning with the climate goals that the government has set

[30] Performance of National Action Plan on Climate Change, Estimates Committee Report Summary available at https://www.prsindia.org/content/performance-national-action-plan-climate-change.(last visited June 24, 2018).
[31]Vellore Citizens Welfare Forum vs. Union of India AIR 1996 SC 2715
[32]Sustainable Energy for all, United Nations Foundation, available athttps://www.seforall.org/news/energy-and-health-making-the-connection (last visited June 24, 2018).

under the Paris Agreement. Brundtland Commission[33] submitted its report and several countries stood witness to it, as the proposal in 1987 was approved, and consisted of commitments of various world leaders who had promised to ensure sustainable development at all levels of the society.

CONCLUSION

The fundamental requirement of any living being is energy. It forms an integral part of human life, without which there can be no survival. Living organisms are slowly adapting to the newer ways of living as the world is witnessing a change. Human beings on the other hand are also adapting to the safer and less harmful ways, leaving behind the dangerous and detrimental practices which was affecting the health and environment. Advancement in science and technology has led to the introduction of new machinery to take over from the old existing ones. Consequently, there has been a drastic shift from old and conventional practices to the new and efficient ones.

A strong inter-linkage can be established between energy and economy as there cannot be economic growth without the consumption of energy. Consumption of energy has soared due to increasing industrial activities funded by the increased foreign investments. Growing economy is linked to the prosperity of the nation and its people. But over reliance on carbon rich resources have put the Government in a dilemma of whether to accomplish the Climate change goals or to fulfil the energy requirements of the country. The focus should mostly be on developing mechanism for energy efficiency as there has been unprecedented growth in the infrastructure needs for extracting, generating and utilizing the renewable energy products.

Among the top energy consumers in the world, India stands as one of the leading countries.[34] As a developing country, India's per capita energy consumption is less when compared to the other major developing economies. The amount of energy consumption of India when compared to the other developed countries like Japan, America or any other European countries is minimal. In the modern-day civilization, energy is the cornerstone of human lives and it becomes the duty of the Government to fulfil the needs of the people by providing access to energy Providing access to energy may not be an easy task at any level. The paper, even though, focuses on energy from the point of view of right, the implications of it on ground are far more complex than it is perceived to be, as it is also a matter of political will for its implementation in the right spirit. Access to energy is not made available to everyone due to several factors which ranges from political, environmental, financial or in some cases also social, as it has always affected the deprived class in one way or the other.

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[33] Report of the World Commission on Environment and Development: Our Common future, Gro Harlem Brundtlad, 20 March 1987. available at https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf (last visited June 24, 2018)

[34] Emerging Consumer Demand – Rise of the small-town Indian, Confederation of Indian Industries, Nielsen, 2012-13. available at: http://www.nielsen.com/content/dam/corporate/india/reports/2012/Emerging%20Consumer%20Demand%20%E2%80%93%20Rise%20of%20the%20Small%20Town%20Indian.pdf (last visited June 24, 2018).

Energy requirement is considered as a necessity at all levels. But the energy as a concept of right has come into the picture in the recent decades. It has to be noted here that granting access to energy is considered as a human right, the deprivation of which is considered as a violation of human right and dignity as provided under several international conventions. An important question that arises for consideration is whether energy is accessible and affordable to everyone?

The question assumes importance for the reason that access to energy is basically dependent on physical location, as the energy services cannot be accessed in the remote areas where providing access to these energy products would be difficult. On the other hand, economic condition of consumers, often pose hindrance for them to gain access. Several steps have been taken at the domestic level in order to ensure that none of them are left out of the system which has been followed from several international conventions. The role of government assumes greater significance for the simple reason that the last person should not be deprived of access to energy and the supply of said energy should culminate from the renewable resource technology. It should not be at the cost of the excessive carbon emissions or generation of non-degradable waste materials, rather it should be in a sustainable manner. A comprehensive policy framework has to be developed for this purpose and to refine the existing ones by adopting the new vision to address the issue of climate change. Simultaneously efforts both at the national and municipal level have to be made to ensure that the right to access energy goes hand in hand with the environment conservation reversing the effects of climate change.

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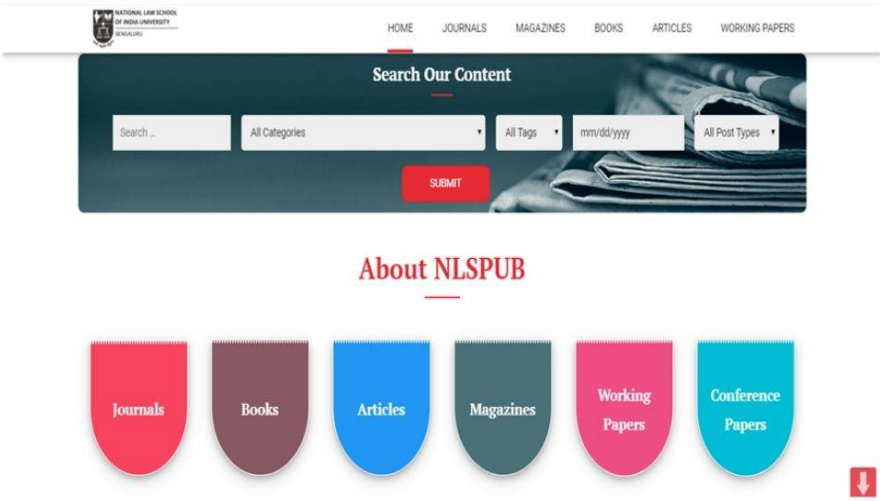

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