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PUBLIC PARTICIPATION WITH RULE OF LAW AND GOOD ENVIRONMENTAL GOVERNANCE

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Abstract

Public participation, the public's right of people to attend and intervene wisely for creative and volunteering in planning and decision making, as well as monitoring the implementation of the decision. With this phenomenon, everyone to share in the decision-making process to determine the correct real needs and interests of the participants, it promotes effective decision making by decision-makers. Public participation is one of the basic principles of democracy. There participatory interaction with democracy. Today, the concept of a good governance as an appropriate approach for making law of policy considered. On the other hand, this concept is closely related to the human rights and Public law. The purpose of the study is to assess the correlation between the concept of good governance, Rule of law, public participation and the human rights and its effect on the Institutionalization of the public participation. Regarding the nature of the issue, the method of information gathering in the study has been reference to the available texts and also gathering the research recipes and their evaluation. Finally, although it seems there are commons and correlative relations between these concepts, public participation advances and institutionalizes the human rights.

Keywords: Public participation, democracy, the rule of law, Good governance.

1- Introduction

The level of participation in public affairs, as one of the important factors of development, The cause of strengthening national unity and solidarity as we have seen in the Iranian legal system, acceptance of the people in the government of society, In many of the principles of the Constitution of the Islamic Republic of Iran, is predicted public participation (eg principles of paragraph 8 of Article 3, Article 6, Article 7, Article 8, Article 26, Article 27, Article 56, Article 58, Article 59, Article 62, Article 100 to 103, Article 104, Article 114, etc.) Of course, some articles of the Constitution of the Islamic Republic of Iran, have limited the full realization of universal participation, therefore, one can say that there is harmony and unity among the articles of the Constitution of the Islamic Republic of Iran. It is widely recognized that good governance is essential to public participate. Well-functioning legal institutions and governments bound by the rule of law are, in turn, vital to good governance. Weak legal and judicial systems where Laws are not enforced and non-compliance and corruption are the norm undermine respect for the rule of law, engender environmental degradation, and undermine progress towards public participation. Practitioners in the participation field have increasingly turned their attention to reforms to improve legal and judicial Institutions and promote the rule of law and good governance. For example, various United Nations agencies such as the United Nations Environment Programme (UNEP) and the United Nations Development Programme (UNDP), as well as the World Bank and other regional development banks, are directing increasing resources to reform legal and judicial institutions. To date, however, most of these efforts have concentrated on developing new laws and creating new institutions, rather than building capacity for ensuring compliance with existing rules. Yet without compliance, laws and regulations are meaningless or worse, they undermine respect for the rule of law – and cannot promote public participation. As a result, many developing countries and countries with economies in transition still suffer from Weak legal and judicial systems, lack investment, and have poor development prospects, sustainable or otherwise. Thus, Donor-driven reform efforts need to ensure that their rule of law efforts include sufficient training and capacity building to establish the institutional foundation for compliance and enforcement, through both instrumental and normative efforts. The first section of this paper reviews the relationship between the rule of law, good governance, and public participation, as those terms are used by the relevant development organizations. It then briefly describes the efforts made by various organizations to promote the rule of law and good governance. Finally, the paper addresses the need to strengthen compliance

and enforcement for public participation.

2- Rule of Law, Good Governance, and Public Participation

There is a political consensus that the rule of law and good governance are a necessary foundation for efforts to achieve

Public participation. But these broad concepts carry many meanings and there are many strategies for promoting them. This section provides some brief definitions to illustrate how the concepts are used in the international financial institutions and other donor and capacity-building agencies. It then explores the relationship among the rule of law, good governance, and public participation.

2.1 Definitions of “Rule of Law”

Rule of law: Many institutions identify a fair, impartial, and accessible justice system and a representative government

As key elements of the rule of law¹. In this paper, the term “rule of law” is used to mean independent, efficient, and accessible judicial and legal systems, with a government that applies fair and equitable laws equally, consistently, coherently, and prospectively to its entire people.

2.2 Definitions of “Good Governance”

Good governance: Good governance is generally characterized by accessibility, accountability, predictability and transparency². This paper treats “good governance” as having openness, participation, accountability, and transparency as Key elements.

2.3 Definitions of “Public Participation”

Public participation is based on the belief that those who are affected by a decision have a right to be involved in the decision-making process. Public participation is the process by which an organization consults with interested or affected individuals, organizations, and government

¹ - The World Bank, Initiatives in Legal and Judicial Reform 3, available at [http:// ww4.worldbank.org/legal/leglr/](http://ww4.worldbank.org/legal/leglr/) (2004); Christina Biebesheimer & J. Mark Payne, IDB Experience in Justice Reform: Lessons Learned and elements for Policy Formulation 4, available at [http://www. iadb.org/sds/doc/sgc-IDBExperiences-E.pdf](http://www.iadb.org/sds/doc/sgc-IDBExperiences-E.pdf) (2001) (Inter-American Development Bank); Organization for Economic Co-operation and Development (OECD), Final Report of the Ad Hoc Working Group on Participatory Development and Good Governance, Part 1, 10, available at [http:// www.oecd.org/dataoecd/44/ 12/1894642.pdf](http://www.oecd.org/dataoecd/44/12/1894642.pdf) (1997) (hereinafter Final Report of the Ad Hoc Working Group).

² - Asian Development Bank, Elements of Governance, available at http://www.adb.org/Governance/gov_elements.asp; Commission of the European Communities, European Governance: A White Paper, COM (2001) 428 final, available at [http://europa.eu.int/eurex/en/com/cnc/ 2001/com2001_0428en01.pdf](http://europa.eu.int/eurex/en/com/cnc/2001/com2001_0428en01.pdf).

entities before making a decision. Public participation is two-way communication and collaborative problem solving with the goal of achieving better and more acceptable decisions³.

2.4 Democracy and Public Participation

Democracy is a way of governing a country. The most common definition of democracy is rule by the people. This means, the people consent to the government running the country. Citizens are given an opportunity to choose, through their right to vote and appoint public representatives to represent them in government. They do this in regular, free and fair elections. However, the democratic practice of citizens doesn't end here. Democracy also means that the people who have been elected are accountable in various ways to the people who voted for them. They have to act and deliver on the promises they made during elections to ensure the participation of local communities in future plans and priorities. All public sector representatives and officials have to be opening (transparent) and show good use of that they were entrusted with (accountable) in their actions and decisions.

When we vote we give the government a mandate to pass and enforce laws on our behalf. In making laws the government has to follow what is written in the constitution and it uses the courts as well as the police and military to enforce the laws.

If the government becomes unpopular or doesn't do what it promised to do then people can vote for another party in the next election and vote the present government out of power. This is essentially how democracy works and why it can be an effective system of government.

The Constitution sets out the principles for how the public service should operate:

- a) A high standard of professional ethics must be promoted and maintained.
- b) Efficient, economic and effective use of resources must be promoted.
- c) Public administration must be development-oriented.
- d) Services must be provided impartially, fairly, equitably and without bias.
- e) People's needs must be responded to, and the public must be encouraged to participate in policy-making.
- f) Public administration must be accountable.
- g) Transparency must be fostered by providing the public with timely, accessible and accurate information.
- h) Good human-resource management and career-development practices, to

³ - International Association for Public Participation. (2007). IAP2 Core Values. [On-line], Available: <http://www.iap2.org> and Creighton & Creighton, Inc. (2008). What is Public Participation? [On-line], Available: <http://www.creightonandcreighton.com>.

maximize human potential, must be cultivated.

Public administration must be broadly representative of the South African people, with employment and personnel management practices based on ability, objectivity, fairness, and the need to redress the imbalances of the past to achieve broad representation⁴.

3- Relationship among the rule of law, good governance, and public participation

While many factors play an important role in development, good governance is now recognized as playing an essential role in the advancement of public participation. Good governance promotes accountability, transparency, efficiency, and rule of law in public institutions at all levels. In addition, it allows for sound and efficient management of human, natural, economic, and financial resources for equitable and public participation. Moreover, under good governance, there are clear decision-making procedures at the level of public authorities, civil society participation in decision-making processes, and the ability to enforce rights and obligations through legal mechanisms. These aspects of good governance do not in themselves ensure that society is not run well nor do they guarantee public participation. However, their absence severely limits that possibility and can, at worst, impede it. Without proper functioning institutions of governance based on the rule of law that promote social stability and legal certainty, there cannot be investment and assumption of risk that form the basis of market economy development, let alone public participation. Indeed, the strength of the rule of law is the best predictor of a country's economic success. Furthermore, deficiency in the rule of law encourages high rates of corruption, with further devastating consequences on the confidence of economic actors. This lack of investment, in turn, slows economic growth and consequently deprives the governments of resources to invest in education, social safety nets, and sound environmental management, all of which are critical for public participation. Introduction of good governance and rule of law, however, cannot be done overnight. The process is often a gradual one, involving changes to long-standing practices, entrenched interests, cultural habits, and social and even religious norms. A significant step was taken in this endeavor in 1998 when countries adopted the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters ("The Aarhus Convention").⁵ The Convention recognizes that public participation can only be achieved through the involvement of all stakeholders and seeks to promote greater transparency and accountability among

⁴ - <http://www.paralegaladvice.org.za/docs/chap03/02.html>

⁵ - United Nations Millennium Declaration, Res. 55/2, Sept. 8, 2000, available at <http://www.un.org/millennium/declaration/ares552e.pdf>.

government bodies by guarantying three pillars for the public:

- 1) The rights of citizen access to information;
- 2) Citizen participation in decision-making and
- 3) Citizen access to justice in environmental matters. In other words, the Convention guarantees freedom of access to information on the environment, gives citizens a right to participate in environmental decision-making, and provides for recourse to judicial and administrative remedies when these rights are denied by state authorities. Moreover, in 2000, 191 United Nations member States pledged to fulfill a set of key goals (the Millennium Development Goals) for poverty reduction and public participation by the year 2015. In the Millennium Declaration, the member States agreed to “spare no effort to promote democracy and strengthen the rule of law, as well as respect for all internationally recognized human rights and fundamental freedoms, including the right to development⁶.”

In addition to these international agreements by heads of the States, donor agencies are making significant efforts to promote the rule of law and good governance throughout the world. The following section briefly describes these efforts. Improved governance requires an integrated, long-term strategy built upon cooperation between government and citizens. It involves both participation and institutions. The Rule of Law, Accountability, and Transparency are technical and legal issues at some levels, but also interactive to produce government that is legitimate, effective, and widely supported by citizens, as well as a civil society that is strong, open, and capable of playing a positive role in politics and government. This paper considers goals for better governance, key challenges confronting efforts at reform, examples of successful good-governance efforts, and action steps for improving both participation and institutions.

“Transparency” and “public participation” represent two features of the rulemaking process that can enhance rulemaking quality and legitimacy. Transparency refers to public access to information held by government rule makers as well as information about their decision making. Public participation encompasses varied opportunities for citizens, nongovernmental organizations, businesses, and others outside the federal government to contribute to and comment on proposed rules. Both transparency and public participation can promote democratic legitimacy by strengthening the connections between government agencies and the public they serve. Both can also help improve the quality of agency rulemaking. Transparency helps ensure meaningful and informed public participation, and meaningful and informed public

⁶ - See UNEP, Judges Programme, available at http://www.unep.org/DPDL/Law/Programme_work/Judges_programme/Index.asp.

participation informs agency rule makers.

4- Efforts to Promote the Rule of Law and Good Governance

Recognizing the importance of rule of law and good governance, many donor agencies are actively supporting legal and judicial reforms, including judicial training, development of new laws and legal institutions and capacity-building. For example, UNEP has convened several symposia for judges to facilitate judiciary communication, sharing of legal information, and harmonization of different approaches to the implementation of global and regional instruments⁷. One such symposium was the Global Judges Symposium on public participation and the Role of Law that UNEP organized with the International Network for Environmental Compliance and Enforcement (INECE) as a key partner in 2002. At the Symposium, the participants adopted the Johannesburg Principles on the Role of Law and public participation, in which they affirmed, among other things, “that an independent Judiciary and judicial process is vital for the implementation, development and enforcement of environmental law” and that “there is an urgent need to strengthen the capacity of judges, prosecutors, legislators and persons who play a critical role at national level in the process of implementation, development and enforcement of environmental law⁸.” UNDP also has helped promote good governance by focusing on the following six areas⁹:

- 1) Parliamentary development;
- 2) Assistance with electoral systems and processes;
- 3) Improvement of access to justice and human rights;
- 4) Promotion of access to information;
- 5) Support for decentralization and local governance; and
- 6) Reform of public administration and civil service.

Financial institutions and other organizations have also made significant efforts to advance good governance and the rule of law. The World Bank, for example, has several legal and judicial development projects supporting law reform, court modernization, training of judges and court

⁷- See UNEP, Judges Programme, available at http://www.unep.org/DPDL/Law/Programme_work/Judges_programme/index.asp.

⁸- The Johannesburg Principles on the Role of Law and Sustainable Development, adopted at the Global Judges Symposium held in Johannesburg, South Africa, on 18-20 August 2002, available at <http://www.rolac.unep.mx/deramb/publicaciones/GlobalJu.pdf>.

⁹- UNDP, Promoting Democracy through Reform, available at <http://www.undp.org/governance/index.htm>. For other examples of UNDP’s efforts, see Ramaswamy Sudarshan, Rule of Law and Access to Justice: Perspectives from UNDP Experience, 7-9, available at <http://www.undp.org/oslocentre/access.htm>.

personnel, and legal education.⁸ In addition, institutions such as the Organization for Economic Co-operation and Development (OECD) have worked to improve and reinforce the legal, judicial, and law enforcement systems¹⁰. For instance, on February 6-7, 2005, OECD and UNDP, along with the Arab League, the World Bank, the European Union, and a number of organizations working in the region, including those from the private sector and civil society, launched a major program to promote good governance for development in the Arab region¹¹. Called the “Good Governance for Development in the Arab Countries”, the program is designed to address the following six themes:

- 1) Civil service and integrity;
- 2) The role of the judiciary and enforcement of judgments;
- 3) e-government, administrative simplification, and regulatory reform;
- 4) The role of civil society and media in reform of the public sector;
- 5) The governance of public finance; and
- 6) The public services delivery and private-public partnership.¹²

5- Importance of Compliance and Enforcement for public participation

Despite a growing body of environmental law both at the national and international levels, environmental quality has been declining in many countries. Furthermore, even after more than ten years and hundreds of millions of dollars in aid, many judicial and legal systems in the world are still functioning poorly. One reason for these trends is the inadequate investment in enforcement and compliance efforts. The need to strengthen enforcement and compliance has been widely recognized.

For example, the participants of the Rio Earth Summit in 1992 recognized this necessity in Chapter 8.21 of AGENDA 21, which established an international mandate to build compliance and enforcement capacity as an essential element of environmental management.¹² Agenda 21 also, empowered UNEP and other organizations to more actively support compliance and enforcement activities, including capacity building.

¹⁰ - The World Bank Group, Annual Report 2002, Themes: Promoting the Rule of Law, available at <http://www.worldbank.org/annualreport/2002/chap0406.htm>.

¹¹ - Final Report of the Ad Hoc Working Group, supra note 1, at 6.

¹² - Organisation for Economic Co-operation and Development, OECD to Join Arab States in Launching “Good Governance for Development” Programme, Feb. 2, 2005, available at http://www.oecd.org/document/36/0,2340,en_2649_201185_34368484_1_1_1_1,00.html.

Moreover, UNEP Executive Director Toepfer has recently highlighted the importance of enforcement and compliance:

We all have a duty to do whatever we can to restore respect for the rule of law, which is the foundation for a fair and sustainable society...public participation cannot be achieved unless laws governing society, the economy, and our relationship with the Earth – both international and domestic – are put into practice and connect with our deepest values. Law must be enforced and complied with by all of society, and all of society must share this obligation¹³. Various institutions' efforts, including those mentioned above, are helping advance rule of law and good governance.

However, it is insufficient to point out a legal obligation and to invest in institutional reforms if the culture of law abidingness has not replaced the culture of corruption. In other words, if the countries receiving the aid do not work to make the internal changes and do not actually implement the legal and judicial reforms, their legal and judicial systems will continue to struggle to improve, their economic development will continue to falter, and there will be no progress towards public participation. Therefore, the donor agencies need to focus more on those reforms aimed at the deeper goal of increasing governments' compliance with the laws. This requires tools that empower citizens to participate in governance, including access to justice, with opportunities to pressure the judicial and legal systems. It is increasingly recognized that the fundamental changes that are needed for rule of law and public participation require the support and commitment of the key people within the system, and this core group needs to be given enabling assistance to help build the essential internal political will these reforms require. Donor assistance is critical, but so is the will to reform, which must be fostered from within. The international community is already beginning to move in this direction. For example, as noted, the Aarhus Convention guarantees the rights of access to information, public participation in decision-making, and access to justice in environmental matters. These rights empower citizens to ensure that environmental laws are properly enforced and complied with. On the capacity building front, institutions such as UNEP, the Global Environmental Facility, and the United Nations Economic Council for Europe (UNECE) have produced guidelines to facilitate implementation and compliance with certain multilateral environmental agreements (MEAs)¹⁴.

¹³ - Declaration of the Initiative on Good Governance for Development in the Arab Countries, Feb. 6-7, 2005, available at <http://www.oecd.org/dataoecd/51/12/34425871.pdf>.

¹⁴ - Agenda 21, 8.21, available at <http://www.un.org/esa/sustdev/documents/agenda21/english/agenda21chapter8.htm>.

The UNEP Guidelines, for instance, highlight several compliance assistance strategies, including sharing experiences, evaluating the effectiveness of technology transfer, and drafting model legislation. Drafting model legislation. In addition, public agencies and researchers have begun collecting empirical data to analyze the effectiveness of different policies and strategies in inducing compliance with various environmental regulations. For instance Oran Young, Helmut Breitmeier, Michael Zürn, and others have created the International Regimes Database to empirically analyze.¹⁵ However, the empirical literature on environmental enforcement is still fairly sparse, due to the difficulty of obtaining reliable empirical information about the compliance of particular regulated entities.

There is a great need for more well-functioning, reliable, and comprehensive data gathering systems. NGOs and various international networks, including INECE, can play an important role in gathering and validating information for such systems. With better coordination and increased support, all of these efforts those addressing the rule of law and good governance issues, environmental compliance assistance, and empirical data collection and analysis – will help expedite progress towards public participation.

6- Right to public participation

Public participation is a political principle or practice, and may also be recognized as a right (right to public participation). The terms public participation, often called P2 by practitioners, is sometimes used interchangeably with the concept or practice of stakeholder engagement and/or popular participation. Generally public participation seeks and facilitates the involvement of those potentially affected by or interested in a decision. This can be in relation to individuals, governments, institutions, companies or any other entities that affect public interests. The principle of public participation holds that those who are affected by a decision have a right to be involved in the decision-making process. Public participation implies that the public's contribution will influence the decision.¹⁶ ¹⁷Public participation may be regarded as a way of empowerment and as vital part of democratic governance. In the context of knowledge management the establishment of ongoing participatory processes is seen by some in the facilitator of collective intelligence and inclusiveness, shaped by the desire for the participation

¹⁵ - MAKING LAW WORK: ENVIRONMENTAL COMPLIANCE AND SUSTAINABLE DEVELOPMENT, Preface (Zaelke, Durwood, Kaniaru, Donald & Kružíková, Eva eds., 2005).

¹⁶ - AP2 Core Values for the Practice of Public Participation". Iap2.org. Retrieved 2012-08-06.

¹⁷ - Principles of Public Participation". Co-intelligence.org. 2008-05-23. Retrieved 2012-08-06.

of the whole community or society.¹⁸ Public participation is part of “people centered” or “human centric” principles, which have emerged in Western culture over the last thirty years, and has had some bearings of education, business, public policy and international relief and development programs. Public participation is advanced by the humanist movements. Public participation may be advanced as part of a “people first” paradigm shift. In this respect public participation may challenge the concept that “big is better” and the logic of centralized hierarchies, advancing alternative concepts of “more heads are better than one” and arguing that public participation can sustain productive and durable change¹⁹.

The role of public participation in economic and human development was enshrined in the 1990 African Charter for Popular Participation in Development and Transformation.

In 1990 practitioners desired the established of the International Association for Public Practitioners in order to respond to the increasing interest in the practice, and in turn established the International Association for Public Participation (IAP2). The practice is well established global and the International Association of Public Participation now has affiliate organizations across the globe²⁰. In some jurisdictions the right to public participation is enshrined by law. The right to public participation may also be conceived of as human right, or as manifestation of the right to freedom of association and freedom of assembly. As such the Netherlands, Germany, Denmark and Sweden, have public participation and freedom of information provisions in their legal systems since before the Middle Ages²¹. Democracy and public participation are closely connected democratic societies have incorporated public participation rights into their laws for centuries. For example, in the US the right to petition has been part of the first Amendment of the US constitution since 1791. More recently, since the 1970s in New Zealand numerous laws (e.g.: health, local government, environmental management) require government officials to “consult” those affected by a matter and take their views into consideration when making decisions.

Effective public participation depends on the public having accessing to accurate and comprehensive information. Hence laws regarding public participation often deal with the issue of the right to know, access of information and freedom of information.

¹⁸ - African Charter for Popular Participation in Development and Transformation Archived May 2, 2008, at the Wayback Machine.

¹⁹ - International Association for Public Participation". www.iap2.org. Retrieved 2015-06-04.

²⁰ - "International Association for Public Participation - Affiliates". www.iap2.org. Retrieved 2015-06-04.

²¹ - "Public participation legislation - Coastal Wiki". Encora.eu. Retrieved 2012-08-06.

The right to participation may also be advanced in the context of equality and group rights, meant to ensure equal and full participation of a designated group in society. For example, in the context of disabled people.

7- Principles of Public Participation²²

When a government reaches out to private or public organizations or directly to the public to seek their participation in the decision-making process, the government is said to be engaging in public participation. Public participation is sometimes also referred to as public consultation or public engagement. Typically, participants in the process are lobbyists, interest groups and citizens who are most likely to be affected by the matter under consideration. Public participation denotes a range of public involvement, from simply sharing information about a pending decision (informing) through to creating a partnership arrangement, one based on mutual trust, information-sharing and a willingness to agree on a course of action together. Exhibit 1 (on the following page) shows the whole range of participation opportunities and the objectives at each level²³.

The Government appreciates the thought-provoking and interesting report provided by the Office of the Auditor General. Public engagement is a timely topic and one that this Government strongly believes is critical to effectively make decisions. We agree with the characterization of public engagement as being on a continuum, starting from informing the public through to collaboratively identifying solutions to significant public policy issues. Whether it is informing the public of government decisions through publicly available reports, such as B.C.'s Water Plan or the Climate Action Plan, or collaboratively determining the direction of health care through the Conversation on Health, we have and continue to engage the public across a broad range of decisions and policy issues along the continuum. The

²² - Public participation in democratic society is both vital and problematic. Some public meetings are so dysfunctional that observers end up wishing someone in charge would bring an end to the chaos and misery. Sometimes extensive public input is sought in numerous forums, only to have all that input ignored. Two groups -- The International Association for Public Participation and The Community Development Society -- have proposed excellent guidelines for public participation. Both, however, fail to deal with the collective intelligence (and co-stupidity) dimensions of public participation. So I've added a set of principles based on current understandings of co-intelligence. The three lists together provide very powerful criteria for evaluating or improving the status of public participation in any community or project. All three lists are current as of May 23, 2008. http://www.co-intelligence.org/CIPol_publicparticipation.html.

²³ - Auditor General of British Columbia | 2008/2009 Report 11: Public Participation: Principles and Best Practices for British Columbia, <https://www.bcauditor.com/sites/default/files/publications/2008/report11/report/public-participation-principles-and-best-practices-british-columbia.pdf>.

common principles of public participation outlined in the report are ones that the Government endorses when engaging the public prior to a decision being made. Additionally, the seven steps provide a useful framework for designing a public engagement process. Government will take this guidance into consideration when determining where and how the public will be engaged. Government agrees that a consistent approach to engagement across all agencies is advisable, but believes that this approach is appropriate only in certain circumstances. For example, where government engages as a result of a regulatory or legal requirement, consistency should be the rule. However, as government engages on a wide variety of issues and across the public engagement continuum, flexibility is key to ensure that the engagement design and methods can fit the appropriate circumstances. It is also key for government to be able to determine where public engagement would be most beneficial and cost-effective. In conclusion, Government believes that the Auditor General's report provides useful guidance on how to engage the public. This guidance will be distributed to all ministries as information to consider when designing public engagement process. We thank the Office of the Auditor General for its work.

1. **INCLUDE ALL RELEVANT PERSPECTIVES:** The diversity of perspectives engaged in a wise democratic process will approximate the diversity of the community of people affected by the outcome. In addition, community wisdom and buy-in come from the fair and creative inclusion of all relevant perspectives -- all related viewpoints, cultures, information, experiences, needs, interests, values, contributions and dreams. Furthermore, those who are centrally involved peripherally involved or not involved in a situation each have -- by virtue of their unique perspectives -- uniquely valuable contributions to make toward the wise resolution of that situation. Creative inclusion of perspectives generates more wisdom than mechanical inclusion of people.

2. **EMPOWER THE PEOPLE'S ENGAGEMENT.** To the extent people feel involved in the creation or ratification of democratic decisions -- either directly or by recognized representatives -- they will support the implementation of those decisions. This is especially true to the extent they feel their agency and power in the process -- i.e., that they clearly see the impact of their diverse contributions in the final outcome. Thus, it serves democracy and collective intelligence when expertise and leadership are on tap to -- and not on top of -- the decision-making processes of "We, the People" and anyone democratically mandated by the people to care for the common welfare.

3. **INVOKE MULTIPLE FORMS OF KNOWING.** Community wisdom arises from the interplay of stories (with their full emotional content), facts, principles, reason, intuition,

imagination, inspiration, and compassion or empathy. To the extent any one of these dominates or is missing, the outcome will be less wise.

4. ENSURE HIGH QUALITY DIALOGUE. The supreme test of dialogue is its ability to use commonality and diversity (including conflict) creatively. There are three tests for the quality of dialogue towards desirable outcomes: Is it deepening understanding? Is it building relationships? Is it expanding possibilities? Most public forums need good facilitation to ensure high quality dialogue.

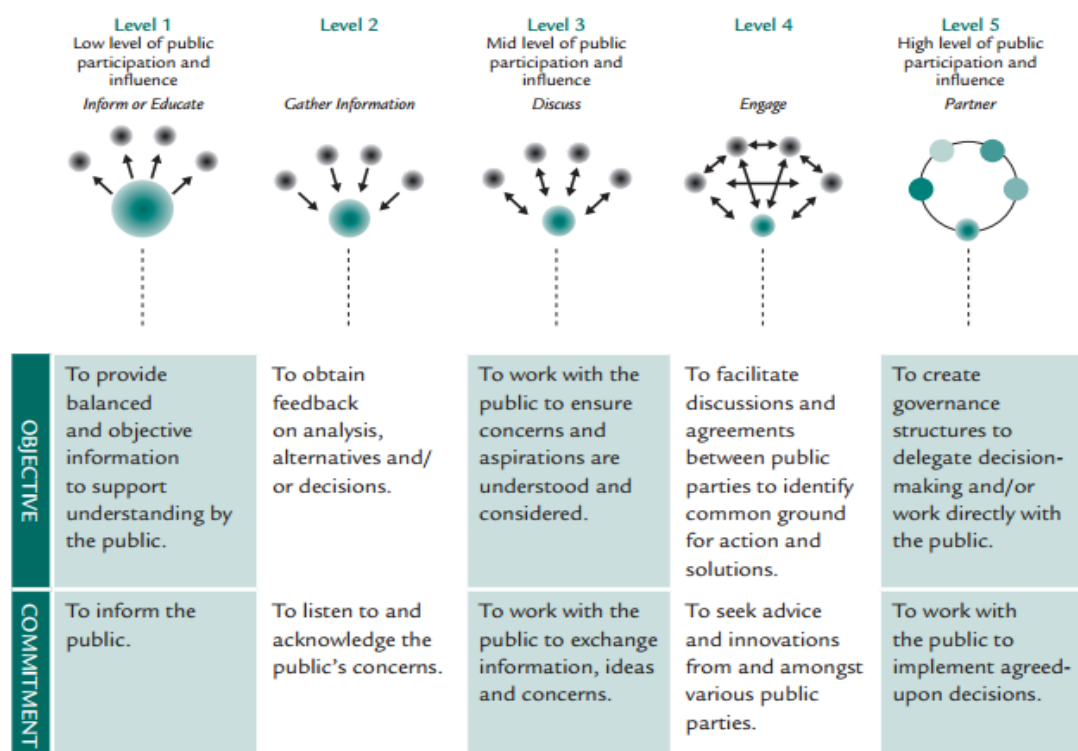
5. ESTABLISH ONGOING PARTICIPATORY PROCESSES. Since intelligence is the capacity to learn, and learning is an ongoing process, collective intelligence can manifest most powerfully in democratic processes that are ongoing, iterative, and officially recognized by the whole community or society. One-time events (such as public hearings and conferences that are not part of a larger ongoing democratic process) are limited in their capacity to generate collective intelligence for a whole community or society. The institutionalization of official periodic citizen deliberations according to these principles maximizes collective intelligence. For examples, see “Citizen and, especially, Wisdom Councils.

6. USE POSITIONS AND PROPOSALS AS GRIST. Early focus on positions and proposals can prevent the emergence of the best possible outcomes. In general, collective intelligence is supported by beginning with an exploratory approach which notes existing positions, proposals and solutions as grist for exploring the situations they were created to handle. Exploring the assumptions, interests, needs, values, visions, experiences, etc., which gave birth to these particular proposals, tends to deepen understanding and relationship so that new and better solutions can emerge. See "Beyond Positions: a Politics of Civic Co-creativity."

7. HELP PEOPLE FEEL FULLY HEARD. To the extent people feel fully heard, they will be able to hear others and, ultimately, join in collaborative deliberation and co-creative problem-solving. Among the approaches to helping people feel fully heard are Active Listening, Nonviolent Communication, and Dynamic Facilitation.

Exhibit 1

The Public Participation Continuum



Source: Adapted from Health Canada and International Association of Public Participation

8 - Conclusions

Effective public participation is becoming an important consideration for government as the public and stakeholder groups increasingly expect to be involved in government decision-making. As well, governments increasingly recognize the value of public participation and its use as a tool for strengthening trust and confidence in the decision-making process. In Iran, government has committed to accomplishing its goals and priority actions in partnership with citizens and stakeholder groups. We therefore undertook this work to: „ better understand public expectations regarding involvement in government decision-making; develop an appropriate framework of public participation for Iran based on current best practice; „ determine whether the provincial government is clear about why and where it should use public participation; and „ establish a reasonable standard to be used in assessing government’s public participation practices. As discussed above, there are a number of reasons why government engages citizens and stakeholder groups before making a decision. In some cases, consultation is mandated by the courts or established through legislation. In other cases, it is adopted as a “discretionary opportunity” to engage and involve a broader audience in shaping the decisions of government. Our review focused on understanding best practices in the latter cases. Our first step was to identify these practices across Iran, and use them to develop a framework for public participation consistent with these findings and other best practices. We then examined existing practices in Iran and have highlighted our observations at the end of the study.

There is a consensus that the rule of law and good governance are the foundation for achieving public participation goals. Various institutions have taken initiatives in promoting the rule of law and good governance throughout the world and have made considerable progress over the years. However, despite these efforts and the growing number of environmental laws and regulations, environmental quality and public health continue to deteriorate due in significant part to lack of implementation, enforcement, and compliance with existing laws. A strengthened focus on compliance and enforcement efforts could overcome these problems and would be a critical investment for advancing public participation.

The influence and expansion of human rights cover more territories. Today, the concepts and respect at all levels would be unacceptable, without regarding other humans' rights. Accordingly, one of the fundamental preconditions of every concept in the correlations of the international

community is the recognition and emphasis on the concepts of the human rights. The developmental trend is not also out of this framework. The concept of good governance, with its especial features, emphasizes on the human rights more than anything else. This fact would be revealed through the comparison of the concept of good governance with the concepts of the human rights. In the other word, the human rights have been changed to the substantive concept of good governance. But on the other hand, the correlations between these two are far beyond the one-sided ones and they are cohesively interdependent. In reality, good governance is formed when the principles of the Constitutional Law are institutionalized. As the concept of good governance develops, the other side of this two-sided correlation is revealed. The concept of good governance makes the officials committed to institutionalize the noble concepts of human rights and take steps to develop them. These measures are conducted through the negative actions to enjoy the law or the positive ones to guarantee the Constitutional Law. The commitment of the officials and the inextricable dependence of the fundamental factors of the concept of good governance on the human rights clearly indicate the wonderful effect of this concept on the institutionalization of the human rights and its fundamental values in the international community.

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NEED TO CURB ILLEGAL MINING & DEVELOPMENT OF LEGAL PROVISIONS IN INDIA

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“Earth provides enough to satisfy every man's needs, but not every man's greed.”

— Mahatma Gandhi

Illegal Mining has become a huge problem in today's world. In the last five years, the mining sector has been in limelight due to various reasons such as illegal exploitation of resources to banning of iron ore mining in Karnataka and Goa hence providing a bad name to this sector. Illegal mining has no doubt caused a great harm to our environment and has been a continuous source of depletion of earth's natural resources. So what exactly is illegal mining? Illegal Mining can basically be defined as mining activity which is carried on without the state permission, particularly in absence of land rights, mining license or any document that could authenticate the current operation. The illegal mining can be both done under as well as above the surface. Such mining is termed as illegal because the minerals or the ores which is extracted from the ground is the one that belongs to the state.

ENVIRONMENTAL AFFECT DUE TO ILLEGAL MINING

Environment Pollution is the biggest glitch which is followed by such illegal mining activities. This is because most of the minerals are found in rivers or beneath the earth surface and hence for their extraction, mining companies often resort to blasting of rivers and the surrounding areas which enable them to access the required minerals. Therefore causing grave danger to the wildlife and individuals in the close proximity. Mining of minerals often leads to land degradation. Land Degradation creates environment issues which can have long term ecological effects, some of which can even demolish the whole environment. Destruction of flora and fauna is also an outcome of illegal mining. Due to heavy concentration of mining activities in different areas, agricultural lands have not only been degraded but have also lost their production capacity i.e. less production of agricultural product due to insufficiency of minerals in the soil as well as insufficiency of land. Continuous large-scale mining activities will diminish the vegetation to a level which is dangerous to biological diversity. According to Essumang, agricultural produce such as

fresh vegetables and food items are affected by the activities of illegal mining. Mining also contributes up to a certain level in deforestation. About 2-3% of deforestation in Brazilian Amazon is an outcome of illegal mining activities. These trees are cut down so that the machinery and the tools which are to be used to extract the minerals can be brought hence providing a better access to the natural resources present below the earth surface. In addition to this when the extraction process is completed, soil erosion takes place which not only depletes the surface vegetation but there is also deterioration in the viability of the land for agricultural activities and loss of habitat for birds and other animals. Communities close to these mining areas suffer from malaria, vector diseases and other environmental related diseases due to stagnant waters left by these illegal miners. Mining is an inherently invasive process that can cause damage to a landscape in an area much larger than the mining site itself.

Another impact on environment of these illegal mining activities is pollution of water bodies. One of the major concern on which the government has to look upon is the level of mercury exposure and intoxication incurred in the extraction and processing stage of illegal mining. According to the leaders of the energy sectors, it is estimated that 30 to 40 [metric] tons of mercury are dumped into the environment annually and burned off after amalgamation- generally without even using rudimentary technology to protect workers' health or capture waste or fumes. Mercury is assumed to be one of the most dangerous chemical substance which is present in the periodic table. When mercury dissolves into river or other water bodies it infects the fish species which are further consumed by human beings as well as other predators leading to various dire health hazardous. Minimata disease which had affected around 2,265 people of which 1,745 died, spread over the shores of Japan is a very fine example of the above. The concentration from the mining operations have been a chief source of both surface and groundwater pollution. Water reservoirs which are present in the region surrounding the area of mining is not only used by the miners but also serves as a source of drinking water and irrigation in many communities. Accumulation of harmful chemicals in the water reservoirs due to illegal mining affects the water quality and even increases the cost of water treatment for water companies that treat water for consumption by the public. The pollution sometimes becomes so bad that it increases the amount of chemical that is used in the water in order to make it fit for drinking that it supersedes the present chemicals hence invariably affecting the quality of water supplied to the public. Water pollution caused by mining activities also include acid mine drainage, metal contamination and increased level of sediments in the streams. These contaminations have the tendency to modify water pH and therefore often prove very harmful to the aquatic vegetation and habitat. Marine animals suffer many diseases due to this.

Mining activities not only cause land and water pollution but even contribute to air and noise pollution. The grievances of the affected communities on air quality have been the airborne particulate matter, emission of black smoke, noise and vibration. Various particulates released during mining include respirable dust, nitrogen dioxide, sulphur dioxide and carbon monoxide which lead to various respiratory diseases and disorders and can exacerbate the condition of people with asthma and arthritis. Mining of minerals such as coal releases methane, a potent greenhouse gas which leads to depletion of ozone layer. There were cases where the values recorded for smoke exceeded the acceptable and tolerable levels of the EC, WHO and EPA. The uppermost value recorded was 207 gm-3 as against the tolerable levels of 100 gm-3 for the EC, 85 gm-3 for the WHO and 40 gm-3 for EPA-Ghana. Coal mining is often considered to be a very dangerous activity. Underground mining hazards include suffocation, gas poisoning, roof collapse and even gas explosions. The source of noise and vibration in the surrounding area compromise mobile equipment, air blasts, vibrations from blasting and other machinery. Such noises and vibration causes stress, discomfort and damage to the auditory system. Associated with the numerous environmental effects resulting from illegal mining are the consequent health effect or disorders. It is evident from various researches that diseases such as malaria, skin diseases, diarrhoea, fever, cold and catarrh caused in areas surrounding are an outcome of mining activities.

LEGISLATIVE PROVISIONS IN INDIA TO CURB ILLEGAL MINING

There are laws all around the world in order to prevent illegal mining activities. These laws have been created to prevent the misuse of natural resources and to avoid its depletion. Illegal iron ore mining in Karnataka and Madhya Pradesh, Bauxite, Chromite and coal mining in Orissa and the most famous gold mining in Ghana are some of the most known mining scams around the world. Mineral rights are vested in the hands of the government i.e. the state government. Therefore, it makes it the owner of such minerals wealth wherever found. Hence it has the right to assign such rights of extraction to anybody under the provisions of Mines and Minerals (Regulation and Development) Act, 1957. Anybody extracting minerals without obtaining such permissions are liable to be punished under the provisions of laws. The action which the government can take are listed below:

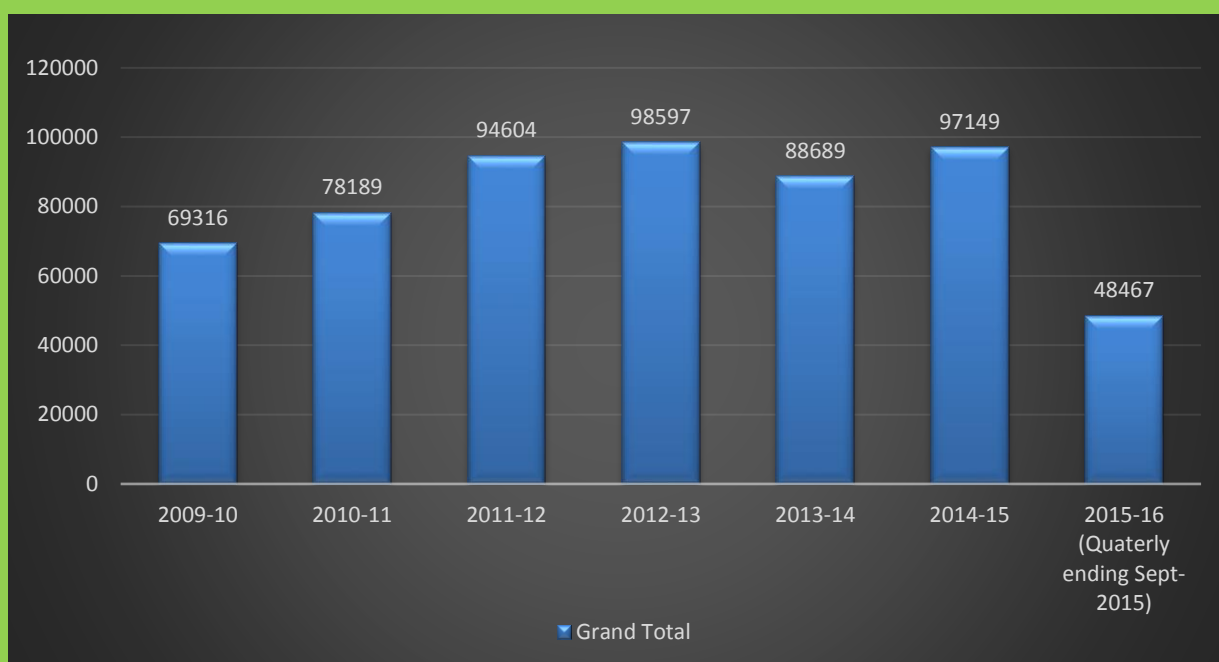
1. Action to impose fine up to three times the market value of material extracted illegally as per Section 48 (7) of the Maharashtra Land Revenue Code, 1966 can be taken by the Collector, S.D.O., Tahsildar and District Mining Officer along with recovery of royalty of mineral.

2. The mineral extracted illegally can be seized/confiscated by the Collector, S.D.O., Tahsildar, under Section 48 (8) of M.L.R. Code 1966.
3. Under Section 22 of Mines and Mineral (Regulation and Development) Act, 1957 complaint can be lodged before appropriate Court of the District Magistrate by Director of Geology and Mining, Joint Director, Regional Deputy Director and District Mining Officers for illegal mining.
4. Under Section 21 of Mines and Mineral (Regulation and Development) Act, 1957 following action can be taken by the competent authorities mentioned below:
 - a. Under Section 21 (3) order of eviction from the area can be served on the person doing illegal mining.
 - b. Under Section 21 (4), the machinery tool equipment, vehicle or any other thing brought on the land for carrying out illegal mining can be seized by the District Magistrate, Officers of Director Geology and Mining and District Mining Officers.
 - c. Under Section 21 (5), the mineral illegally extracted can be recovered from such person where such mineral has already been disposed of the price thereof and rent, royalty or taxes can also be recovered from such person by the State Government or District Mining Officer for the period such area has been occupied by him.
 - d. A person doing illegal mining can be punished with imprisonment for a term which may extend to two years or with fine which may extend to ten thousand rupees or with both.

Under Section 23C of the Mines and Mineral (Development and Regulation) Act, 1957 (MMDR Act, 1957) the government is empowered to make rules for prevention of illegal mining, transportation and storage of minerals.

However, based on the quarterly returns on illegal mining submitted by various State Governments to Indian Bureau of Mines (IBM) (a subordinate office under the Ministry of Mines), the total cases of illegal mining in the country reported from year 2009-10 to 2015-16 (Quarter ending September, 2015) is provided below:

Year-wise details of illegal mining	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16 (Quarter ending sept-2015)
Grand Total	69316	78189	94604	98597	88689	97149	48467



In exercise of the power conferred by section 23C of Mines and Minerals (Development & Regulation) Act, 1957, Govt. of Uttar Pradesh has published the Uttar Pradesh Mineral (Prevention of Illegal Mining), Transportation and Storage Rules, 2002. In addition, Uttar Pradesh Govt. vide Order No-5360/77-5-2005-371/05 dated 10.11.2005 has even constituted a task force under the chairmanship of District Magistrate to check and curb illegal mining and illegal transportation in all the districts of Uttar Pradesh. The number of cases of illegal mining and fine recovered by Govt. of Uttar Pradesh in the last ten years are provided below:

Years	No. of cases	Revenue recovered (Rs. In Lakhs)
2006-2007	5120	433.27
2007-2008	4656	469.96
2008-2009	3874	500.18

2009-2010	5472	847.67
2010-2011	6234	1376.71
2011-2012	6713	1668.35
2012-2013	9708	3193.98
2013-2014	8612	2978.35
2014-2015	9920	2527.35
2015-2016(Till January'16)	10016	2953.67

Conclusion

The authors are of the view that protection of environment should be the major concern which the world should be taking up before it's too late. Be it anything that causes harm to the environment should be addressed properly and strongly. Illegal Mining is a problem which has been there since many years. Proper laws and regulations should be made as well as implemented in order to curb it. Nations have to unite and committees have to be formed to stop the depletion of previous natural resources.

In India, The Mines and Minerals (Development and Regulation) (**MMDR**) Act, 1957 was amended through the MMDR Amendment Act, 2015 which came into effect from 12th January, 2015. The Amendment Act has, inter alia, stringent punitive provisions for combating illegal mining. Illegal mining has been made punishable with imprisonment for a term which may extend to five years and with fine which may extend to five lakh rupees per hectare of the area. Provisions have been made for setting up of Special Courts for the purpose of providing speedy trial of offences relating to illegal mining.

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**EVENLY DISASTROUS, ODDLY IN EXISTENCE-
THE IMPLEMENTATION OF THE “ODD EVEN SCHEME” IN NEW
DELHI AND ITS CRITIQUE**

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The Government of NCT Delhi drew ample attention in the beginning of this year with its announcement of the odd-even rule in the capital. The newest scheme on the block was able to flawlessly amalgamate policy, pollution and politics with immeasurable ease.

The rule is a method of rationing, defining which car one can drive on a particular date. On even dates, only cars with license plates ending with an even number shall be allowed on city roads, and on odd dates, cars with license plates ending with an odd number shall be allowed.

What seemed like a discovery to many, is in fact, an already tried and tested formula which goes way back to the 45 B.C. when it was first applied in Rome by Julius Ceaser.¹ The experimental policy was also adopted in Mexico as early as 1989²; cars would be banned for one day in the week depending on the number on their license plates. The scheme worked well initially but couldn't be rescued from its loopholes. People started buying two cars with both, even and odd numbers, which meant higher emission levels, which ultimately led to an increase in pollution by an alarming 13%.³

¹ Black, William R. (2010); *Sustainable Transportation: Problems and Solutions*; The Guilford Press. p. 14. ISBN 978-1-60623-485-3.

² Karl Mathiesen (2014-03-20). "*Why licence plate bans don't cut smog*". The Guardian. Retrieved 2016-01-02; Lucas W. Davis (2008). "The Effect of Driving Restrictions on Air Quality in Mexico City" (PDF). *Journal of Political Economy*, 2008, vol. 116, no. 1. Retrieved 2016-01-02.

³ Retrieved from an article published in Hindustan Times, Dec 29, 2015.

The first phase of the odd even rule commenced on 1st January 2016 and continued for fifteen days as an endeavor to reduce the pollution levels.⁴ The capital city has also completed the second phase of the rule, which ran from 15th April 2016 to 30th April 2016.⁵ Ironically, even after two phases of the said rule, its success stands debatable.⁶

After the conclusion of the first phase, an analysis of PM_{2.5} (Particulate Matter) data, which was generated by India Spend's breathe air-quality monitoring devices, revealed that air-pollution levels in Delhi rose 15% during the 15-day period.⁷ PM_{2.5} is fine particulate matter with a diameter of 2.5 micrometres or less and is known to invade the lungs and pose the greatest risk to human beings.⁸

It is interesting to note that while all the private pollution monitoring agencies revealed that the rule did not kindle any significant impact on the pollution levels, yet, the Delhi government continued to claim unabatedly the success of the scheme.⁹

During the first phase, a PIL was filed opposing the car-rationing plan, which the court refused to admit. *“The government is taking some steps to control pollution. People are dying due to pollution and you are challenging it for publicity,”* remarked Chief Justice T S Thakur, in response to the appeal. The High Court of Delhi said that, *“the power of judicial review cannot be extended to determine correctness of such policy decision”*.¹⁰

⁴ Available at, <http://it.delhigovt.nic.in/writereaddata/egaz20157544.pdf>, last accessed on 06.05.2016.

⁵ Available at <http://it.delhigovt.nic.in/writereaddata/egaz20167550.pdf>, last accessed on 06.05.2016.

⁶ *IIT-Roorkee study says odd-even didn't dent Delhi's air pollution*, Available at <http://timesofindia.indiatimes.com/city/dehradun/IIT-Roorkee-study-says-odd-even-didnt-dent-Delhis-air-pollution/articleshow/51071484.cms>, last accessed on 06.05.2016.

⁷ Available at, <http://www.indiaspend.com/cover-story/15-days-after-odd-even-delhis-pm-2-5-levels-rise-15-67571>, last accessed on Jan 16, 2016.

⁸ Air Pollution, What's the Solution, Available at, <http://ciese.org/curriculum/airproj/pmprimer/>, last accessed on 06.05.2016.

⁹ *Delhi odd-even plan a success, continue it voluntarily: Kejriwal*, available at <http://www.hindustantimes.com/delhi/delhi-odd-even-plan-a-success-continue-it-voluntarily-says-cm-kejriwal/story-reFDMkVoCk1fiSjNR8yN.html>, last accessed on 06.05.2016.

¹⁰ Retrieved from an article published in The Times of India, Jan 14, 2016.

According to System of Air Quality and Weather Forecasting and Research (SAFAR) data, between April 15-30, PM_{2.5} levels peaked at 190 µg/m³ on April 30, almost double the level on the same date last year. Between April 26-28 this year, PM_{2.5} levels spiked from 129 to 179 µg/m³. Last year, between April 25-29, the levels dropped from 140 µg/m³ to about 70 µg/m³.¹¹

These comparative statistics help simplify the debate over the success or failure of the odd-even rule. The scheme now seems like a sinking ship with no lifeboats at its disposal. Based on an analysis of PM_{2.5} data, generated by India spend's breathe air-quality monitoring devices air pollution levels in Delhi rose 23% during the second phase of the odd-even rule.¹²

Thus at the end of phase two, the data indicates that it likely cannot work in the long term without additional actions, such as improving bus services, curbing factory and truck emissions and suppressing construction dust, which accounts for about half of Delhi's air pollution. Moreover, two-wheelers (which have been exempted from the odd-even rule) emit more pollutants than cars.¹³

Owing to its questionable practicality the odd-even rule is heavily criticized. Furthermore, the change in the Kejriwal-led government's approach towards the rule has also been condemned. Where during the first phase, they called it a scheme meant for pollution control, in the second phase they diverted towards calling it an attempt at traffic control. Does this mean that the pollution issue of the capital city is once again left unattended? That its attempted solution has now been given a different direction? The exemption given to women drivers and state officials (president, prime minister, chief minister, speakers of lok sabha, governor) has also been a cause of agitation. It is strenuous to ignore that even if the odd-even scheme brings down the pollution levels now, it can have some dangerous consequences in the long-term.

¹¹ Retrieved from an article published in The Indian express, May 2, 2016.

¹² Available at, http://www.business-standard.com/article/current-affairs/delhi-s-air-pollution-rises-23-during-second-odd-even-phase-116043000879_1.html, April 30, 2016.

¹³ Odd-even formula: Why exempt women, two-wheelers, asks Delhi High Court, available at, <http://indianexpress.com/article/cities/delhi/why-exempt-women-2-wheelers-from-odd-even-rule-hc-to-aap-govt/>, last accessed on 06.05.2016.

In order to implement a scheme as unorthodox as the odd-even rule the government requires adequate infrastructure in the form of public transport to replace the private vehicles and ease out the lives of the citizens of Delhi. Without the same, the metros will begin to see a flood and the present means of transportation like the auto-rikshaws will soon hold a place so exclusive in the system that their charges will soar high. If we are to turn our heads to traffic the way the government has, even then the long-term menacing effects remain the same.

The corollary of this will be the loophole detection that many delhiites have already mastered. People will begin to buy an extra car meant to serve their end during the odd-even month, which will conclusively defeat the original purpose of the rule i.e. pollution control. Also, during the two phases there have been innumerable cases of commuters using fake CNG stickers as CNG vehicles are exempted from the rule. This will leave Delhi in a position similar to that of Mexico.

The unfortunate reality is that environmental crisis in Delhi remains unaddressed. A study carried out in 2008 by the Central Pollution Control Board (CPCB) identified road dust as the biggest contributor (52.5%) to particulate matter in Delhi's air, followed by industries (22.1%). The study attributed only 6.6% of particulate emissions to vehicles.¹⁴ The government must formulate plans that target larger polluters, incorporate vacuum cleaning of roads as well as new laws regarding standards in construction sites.

The degradation of Delhi's air-quality requires more than just repeated attempts at a failed policy. It's time for the government to make sustainable changes with impactful results rather than just playing on the political field with an old idea hoping to catch headlines.

¹⁴ Retrieved from an article published in, The Indian Express, Jan 6, 2016.

Space Debris Mitigation, Nuclear Resources & Challenges of Environmental Law of Outer Space

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There exist five treaties which form the body of Space Legislation. However, these seem incomplete, as the drafters were unaware of the rapid progress that would take place, and no amendments have been made since. Although there exists a non-appropriation principle detailed within the Outer Space Treaty, there is presently no consensus about the legal status of objects which pollute the space environment. Article IX of the Outer Space Treaty calls for avoidance of any harmful interference with the environment in Outer Space and the Moon Agreement prevents any alteration of the environment and atmosphere of the moon and other celestial bodies, providing a limit to the pursuits of scientific experimentation. However, these, are possibly the only widely recognized principles within the international community.

One of the several faults with the Outer Space Treaty is the lack of implementation. The words used are ambiguous, and there is no agreed definition for the words “appropriation” or “harmful interference”, and there has been no reliance upon the Articles it contains, although several opportunities have been available. The lack of international support for the Moon Treaty means that it qualifies only as a soft law. There is no evidence of any state practice, and most prominent space-faring nations, including the United States of America, Russia & China have not signed the same. It is further pitiable, that although a significant amount of time has passed since the treaties were adopted, there have been no amendments to fill these lacunae.

As the quest for knowledge has continued, space activities have become alluring to several nations, providing an advantage across sectors, and impacting the economy greatly. This technological advancement has led to a rapid increase in the number of space objects that have been launched. Once these space objects reach the end of their mission, some of them are de-orbited. However, a larger proportion has remained in the Outer Space atmosphere – owing to technical failures, or a lack of appropriate mission planning. It is accepted that space objects which reach the end of their mission

are derelict, and are considered to be space debris. Although there is a loss of functionality, the space debris still qualifies to be a space object, within the jurisdiction of the launching State for the purposes of the Liability Convention. The NASA Orbital Debris estimated that over 500,000 pieces of debris currently orbited outer space.

Most of this debris is located in the Lower Earth Orbit region. The sheer amount of debris means that the collision risk in this region is high. A single collision, based on the velocity of the objects, leads to an increase in the debris created, as evidenced by the collision between Iridium-33 and Kosmos-2251 in 2009. The effect on the environment does not end there. This single collision within the Lower Earth Orbit region can set off cascading collisions, known as the Kessler syndrome.

In 2007, the IADC issued guidelines for Space Debris Mitigation, which were further adopted by the United Nations General Assembly. Owing to the fact that state practice is limited to those space-faring nations, and there is often consensus on the same, Prof. Bin Cheng has opined that such norms may constitute instant customary international law, creating an obligation upon States. In the *North Sea Continental Shelf* case, the International Court of Justice held that the passage of a considerable period of time (duration of practice) was unnecessary for it to become customary international law, adding value to the proposition of instant customary law.

The argument for the Guidelines as customary international law rests on the fulfillment of the requirements observed in the aforementioned case. Since the Space Debris Mitigation Guidelines were issued, 8 Intelsat, 6 Japanese, 10 U.S., 3 Russian and 22 satellites from other nations have been de-orbited in full compliance with the SDM Guidelines, which is indicative of a nearly uniform state practice. The United Nations General Assembly Resolution 61/111, adopted in 2007, contains several clauses showing the desire of all Member States to cooperate with each other to reduce space debris. Space-faring nations have further incorporated these issued Guidelines within their national technical standards and legislation, which showcases *opinio juris*.

Notwithstanding this customary obligation, it is possible for an argument to be made for derogation from these Space Debris Mitigation Guidelines to be in violation of Article IX of the Outer Space Treaty. The bare text of Article IX expressly lays out a duty for States to act with due regard for corresponding interests of other States. It further states that exploration must be conducted to avoid harmful contamination of the Outer Space environment, in addition to preventing any adverse changes in the Earth's environment.

An ambiguously worded Article IV of the Outer Space Treaty provides for an implicit exception to nuclear resources in Outer Space, which allows States to operate and orbit space objects with nuclear reactors, such as SNAP-10A. SNAP-10A, launched by the United States is still in orbit, and is scheduled to hit the ground in 3,000 years, by which time any radioactive material will be harmless.

However, the space environment and the Earth environment will be grossly affected if SNAP-10A, or any of the other 29 dead nuclear reactors in Outer Space (all launched by USSR), collide with another object in space. Such a collision would release this radioactive material, in addition to releasing innumerable pieces of debris. Article III of the Liability Convention would make the launching State/s liable on the basis of fault, but without any violations of internationally set standards, such fault is unlikely to be proven. This would result in a situation where a tenet of International Environmental Law, that the polluter pays, is not adhered to, but significant environmental damage takes place.

Such challenges and possibilities in today's world call for amendments to Article IX, or another treaty establishing legally binding norms for such transboundary harm occurring in Outer Space, such as recognition of the Principles in the United Nations General Assembly Resolution 61/36 titled Principles on the allocation of loss in the case of transboundary harm arising out of hazardous activities.

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ENVIRONMENTAL PROTECTION FROM THE PERSPECTIVE OF THE INDIAN CONSTITUTION

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INTRODUCTION

History is a witness to the fact that the man has been endlessly been dependent on the nature for his survival and well-being. With the industrial, scientific and technological revolutions the needs of man increased considerably. As time passed, new problems started to come up creating an imbalance in the nature. There is a growing evidence in many parts of the earth of *"dangerous levels of pollution in water, air, earth and living beings; major and undesirable disturbances to the ecological balances of the biosphere, destruction and depletion of irreplaceable resources; and gross deficiencies harmful to the physical, mental and social health of man..."*¹ It was this background that helped in the signing of the Stockholm Declaration of 1972 which for the first time drew the attention of the whole world towards the protection of the environment.


In the recently held Paris Conference 2015, parties to the U.N. Framework Convention on Climate Change (UNFCCC) reached a landmark agreement on December 12 in Paris, paving a new way in the two-decade-old global climate effort. The agreement and a companion decision by parties were the key outcomes of the conference, known as the 21st session of the UNFCCC Conference of the Parties, or COP 21. Together, the Paris Agreement and the accompanying COP decision¹¹ were as follows:


- Reaffirm the goal of limiting global temperature increase well below 2 degrees Celsius, while urging efforts to limit the increase to 1.5 degrees;
- Establish binding commitments by all parties to make “**nationally determined contributions**” (NDCs), and to pursue domestic measures aimed at achieving them;
- Commit all countries to report regularly on their emissions and “progress made in implementing and achieving” their NDCs, and to undergo international review;
- Commit all countries to submit new NDCs every five years, with the clear expectation that they will “represent a progression” beyond previous ones;
- Reaffirm the binding obligations of developed countries under the UNFCCC to support the efforts of developing countries, while for the first time encouraging voluntary contributions by developing countries too;

- Extend the current goal of mobilizing \$100 billion a year in support by 2020 through 2025, with a new, higher goal to be set for the period after 2025;
- Extend a mechanism to address “loss and damage” resulting from climate change, which explicitly will not “involve or provide a basis for any liability or compensation;”
- Require parties engaging in international emissions trading to avoid “double counting;” and • Call for a new mechanism, similar to the Clean Development Mechanism under the Kyoto Protocol, enabling emission reductions in one country to be counted toward another country’s NDC.

ENVIRONMENTAL PROTECTION - CONSTITUTIONAL ASPECTS

Although the real panic in India came to be felt only after the Bhopal gas tragedy in 1984, yet it began concentrating on the problem of pollution soon after the Stockholm conference. In United Nations Conference on Human Environment at Stockholm, the then Prime Minister of India Mrs. Gandhi emphasised on safeguarding the natural resources, flora and fauna and the ecosystem for the benefits of present and future generations through careful planning or management, and also laid the vision for the nation’s commitment to the protection of environment. To comply with the principles of the Stockholm Declarations adopted by the International Conference on Human Environment, the Government of India, by the 42nd Amendment Act, 1976 made express provisions for the protection and promotion of the environment, by the introduction of Article 48-A and 51- A(g) which form the part of Directive Principles of State Policy and the Fundamental Duties respectively.

 **Article 48-A:** By Constitution (42nd Amendment) Act, Sec.10 (w.e.f. 3.1.1977) Protection and improvement of environment and safeguarding of forests and wild life: *"The State shall endeavour to protect and improve the environment and to safeguard the forest and wildlife of the country".*

 **Article 51-A (g):** By Constitution (42nd Amendment) Act, Sec.11 (w.e.f. 3.1.1977) *"It shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures".*

In protecting the natural environment Article 48-A is of immense importance today. Because of the judicial activism in India the legal value of Directive Principles jurisprudence has increased tremendously. Article 47 of the constitution directs the State to improve the standard of living and public health. To fulfil this goal, it is necessary that the State should provide pollution free

and clean environment. The Government brought about many changes in the Constitution in order to give impetus to environment protection.

1. Seventh schedule of the constitution:

In the Concurrent List, the 42nd Amendment was inserted which provided for.

- (a) Entry 17-A, providing for forests.
- (b) Entry 17-B, for the protection of wild animals and birds.
- (c) Entry 20-A, providing for population control and family planning.

2. Eleventh schedule of the constitution.

This new schedule was added by the Constitution 73rd Amendment Act, 1992. The schedule has 8 entries which provide for environmental protection and conservation.

3. Twelfth schedule of the constitution.

The entry number 8 was added to this schedule by the 74th Amendment Act, 1992 providing for the Urban Local bodies, with the function of environment and promotion of ecological aspects to them.

Other constitutional provisions:

- ***List I (union list) entries:***

- 52. Industries,
- 53. Regulation and development of oil fields and mineral oil/ resources,
- 54. Regulation of mines and mineral development,
- 56. Regulation and development of inter-state rivers and river valleys,
- 57. Fishing and fisheries beyond territorial waters.

- ***List II (state list) entries:***

- 6. Public health and sanitation;
- 14. Agriculture protection against pest and prevention of plant diseases;
- 18. Land Colonization etc;
- 21. Fisheries;
- 23. Regulation of Mines and Mineral development subject to the provisions;
- 24. Industries subject to the provisions.

- ***List III (common or concurrent list) entries:***

- 17-A Forests;
- 17-B Protection and wild animals and birds;
- 20. Economic and social planning;
- 20-A Population control and family planning.

The Eleventh Schedule, directs the Panchayats to work for soil conservation, water management, forestry, drinking water, etc. with a view to environmental management. The 12th Schedule directs the urban local bodies such as municipalities to perform the functions regarding protection of environment and promotion of ecological aspects. The Government of India in 1980 set up the Ministry of environment and Forests. The government adopted the new National Forest Policy in 1988. India also passed a comprehensive legislation in the form of Wildlife Protection Act of 1972. India has also formulated National Action plan for the Protection of wild life.

Fundamental rights

The judiciary's dynamic interpretation of fundamental rights have regulated into the rights to healthy environment from the following Articles.ⁱⁱⁱ

(a) Article 14: *"State shall not deny to any person equality before the law or the equal protection of the laws within the territory of India"*.

(b) Article 19 (6) : State is empowered to make any law imposing in the interests of the general public, reasonable restrictions on the exercise of freedom to practice any profession, or to carry on any occupation, trade or business guaranteed by (1) (g).

(c) Article 21: *"No person shall be deprived of his life or personal liberty except according to procedure established by law"*.

Provisions Related To Environment In The Indian Penal Code

The Penal Code too at that time contained provisions making pollution a crime.

• **Section 277**

Fouling water of public spring or reservoir -Whoever voluntarily corrupts or fouls the water of any public spring or reservoir, so as to render it less fit for the purpose for which it is ordinarily used, shall be punished with imprisonment of either description for a term which may extend to three months, or with fine which may extend to five hundred rupees, or with both.

• **Section 278**

Making atmosphere noxious to health -Whoever voluntarily vitiates the atmosphere in any place so as to make it noxious to the health of persons in general dwelling or carrying on business in the neighbourhood or passing along a public way, shall be punished with fine which may extend to five hundred rupees.

ENVIRONMENTAL PROTECTION - THE JUDICIAL APPROACH

Public Interest Litigation and Environmental Protection

Since the last decade, PIL has played a unique role by bringing justice to people belonging to different walks of life, especially the downtrodden of the

society. The PIL is now recognised as an effective instrument of social change. Public interest litigation has contributed a lot in protecting the environment. *Introducing the PIL concept into pollution cases, in Ratlam Municipal Council v. Vardhichand, J. Krishna Iyer observed that, "... social justice is due to people and therefore the people must be able to trigger off the jurisdiction vested for their benefit to any public functioning." Thus he recognised PIL as a constitutional obligation of the courts.*^{IV} As a result, a number of cases related to environmental issues have been brought before the courts through PILs.

Cases related to environmental issues

The role of Indian judiciary in interpreting the constitutional provisions with the changing socio-economic perspectives is worth appreciating. The judgement in *Maneka Gandhi v. Union of India*¹ made Article 21 of the Constitution of India a residuary freedom clause. Through this case, the court brought under the umbrella of article 21, the **right to clean environment**. The polluted environment unhealthy to live. It is this aspect which attracted the attention of the apex court in the *Consumer Education*² case. The court, in support of a list of earlier cases decided by it took a view that right to good health was an integral facet of meaningful right to life and extended the right to robust health and vigour of the workers without the workers would lead a life of misery. Thus, the *Consumer Education* case saves the pollution victims of pollution from the long and complex statutory remedies. Now they can directly approach the Supreme Court through article 32 to enforce his above mentioned fundamental right. This case is an example of judicious justice against pollution. During this time, the High Courts also did not lag behind in making contribution in this regard. The Allahabad High Court in the *D.D. Vyas v. Ghaziabad Dev. Authority*³ case ruled out in favour of the residents of that area to have a better air to breathe in the environment of that area. The quality of life which is envisaged under article 21 was clarified by the Karnataka High Court in the case of *V. Lakshmi pathy v. State of Karnataka* to mean that qualitative life which had the 'quality of environment'. In the case of *Govind Vs. Shanti Sarup*⁴ where Section 133 of the code of Criminal procedure was used by the Court to preserve the

¹ AIR 1978 SC 597

² *Consumer Edu. & Res. Forum v. Union of India*, AIR 2001 SC 1948

³ AIR 1993 All. 57

⁴ AIR 1957 SC 1943

environment in the interest of "health, Safety and convenience of public a large". It is simply clear that, the judgment is based on the right to live with decency and dignity as provided in the right to life. In the case of *M.C. Mehta v. Union of India*⁵, the Court held that enterprises engaged in any hazardous or inherently dangerous industry which could pose a threat to public health have an absolute duty to the community to ensure that no harm resulted to anyone. Recently, in a PIL filed against the Odd-Even Rule in Delhi brought by the Delhi Government, the High Court held refused to interfere with the Government's decision. An appeal was also filed in the Supreme Court but the Court backed the decision of the Delhi Government and even termed the PIL as a publicity stunt. "The government is taking some steps to control pollution. *"People are dying due to pollution and you are challenging it for publicity,"* remarked Chief Justice T S Thakur, responding to the appeal filed by a lawyer.^V

CONCLUSION

The way we human beings are exploiting the nature, the day is not far when we will become a threat to our own existence. Luckily, people are becoming more and more aware and concerned about this problem started taking steps which is indeed commendable. And, here is where the judicial systems have a greater role to play. The role of Indian judiciary in interpreting the constitutional provisions with the changing socio-economic perspectives has been worth appreciating, but more is needed. Maintenance of health, preservation of the sanitation and environment have been held to fall within the purview of Article 21 as it adversely affects the life of the citizens and it amounts to slow poisoning and reducing the life of the citizens because of the hazards created if not checked. This way, we see that the courts are playing an active role as the enforcing organs of the constitutional objectives to prevent all actions of the state and the citizen from upsetting the ecological balance, and thus acting as a safeguard not only for the Constitution but also for our Mother Earth.

⁵ AIR 1987 SC 965

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^I Quoted in *Ibid.*, at 83, referring to United Nations Conference on Human Environment: Final Document 1972

^{II} <http://www.c2es.org/international/negotiations/cop21-paris/summary> (*accessed on 03.04.2016*)

^{III} Mathew P.D., "Fundamental Rights in Action-New Delhi: Indian Social Institute, 1996

^{IV} Thakur Kailash, "*Environmental Protection Law and Policy in India*", Deep & Deep Publications Pvt. Ltd.

^V <http://indianexpress.com/article/cities/delhi/sc-calls-plea-against-odd-even-scheme-a-publicity-stunt-refuses-urgent-hearing> (*accessed on 01.05.2016*)

THE ROLE OF INDIAN JUDICIARY IN PROMOTING SUSTAINBLE DEVELOPMENT

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INTRODUCTION:

We live today in the world of contradictions. On one hand we have extremely developed states and on the other hand we have states where people cannot get access even to minimum necessities of life. However the process of development undertaken by most of the states involves hyper-consumption of energy and natural resources leading to environmental degradation.ⁱ This is a transition period for many developing economies like India, so there is a strong need to strike a balance between industrial development and physical environment so as to reduce the intensity of pollution.ⁱⁱ Unfortunately in developing countries many industries dependent upon environmental resources have come up and it has threatened the natural resource base. What is needed is to pursue industrial development with a sense of responsibility. It is possible through sustainable development.

CONCEPT OF SUSTAINABLE DEVELOPMENT:

The importance of environmental protection in the process of industrial development was realized globally for the first time at United Nations Conference on Human Environment held at Stockholm in 1972. Another mile stone in this respect was Rio Conference held in 1992 in Brazil which gave concrete shape to the concept of sustainable development which visualizes balance between ecological and developmental concerns.

Brundtland Commission Report defined sustainable development as development that meets the needs of present without compromising the ability of future generations to meet their own needs.ⁱⁱⁱ

The following features of sustainable development are often applied by the judiciary in environment and development discourse.

a) **Inter-Generational Equity:** The principle talks about the right of every generation to get benefit from the natural resources.

b) **The Precautionary Principle:** When an activity raises threats of harm to the environment or human health, *precautionary* measures should be taken even if some cause and effect relationships are not fully established scientifically.

c) **Polluter Pays Principle:** the costs of pollution are borne by those who cause it.

PIVOTAL ROLE OF INDIAN JUDICIARY IN PRESERVING SUSTAINBLE DEVELOPMENT:

Supreme Court and High Courts of India have playing an important role in preserving the Doctrine of Sustainable Development. Legislature has enacted various laws to prevent environment degradation in india. In this situation, superior court has played a pivotal role in interpreting those laws to suit the Doctrine of Sustainable Development^{iv}

Indian Judiciary has played an important role in maintaining sustainable development and encouraging public and private industrialization without giving least opportunities to incur irreparable damage accrued to natural environment essential to maintain healthy flora and fauna of the planet and in India particular. It is to be noted that, every cases on environmental issue have come before the court through Public Interest Litigation (PIL) either by the Article 32 or by Article 226 of the Constitution of India.^v

Right to healthy environment has been incorporate directly and indirectly into the judgments of the superior courts in India and this link between environmental quality and right to life has been first established in the case of **Charan Lal Sahu Etc. vs. Union of India and Others**^{vi}

In **Subhash Kumar vs. State of Bihar**,^{vii} Supreme Court interpreted the fundamental right granted under Article 21 of the constitution of India and held that, right to life include right to whole some environment, which is also means right of enjoyment of pollution free water and air for full enjoyment of life.

In **M.C. Mehta vs. Union of India & others**,^{viii} which is also known as the Oleum Gas Leak case, the Supreme Court introduced the new concept of managerial liability- 'absolute and non-delegable' liability for disasters arising out from the storage or use of hazardous materials from their factories, the enterprise must ensure that no harm has been caused because of the fact that negligent occurred or not.

In **Vellore Citizen Welfare Forum vs. Union of India**,^{ix} the Supreme observed that, the companies' are vital for countries development, but having regard to pollution the doctrine of 'sustainable development' must be adopted by them as the balancing concept and the 'precautionary principle' and the 'polluter pays principle' has also be accepted as the part of the law.

In **M. C. Mehta vs. Kamal Nath**,^x the Supreme Court made it clear that, 'any disturbance of the basic environment elements, namely air, water, and soil, which are necessary for life, would be hazardous to life.' Thus the court in exercise of jurisdiction under Article 32 can not only award damages but also levy fine for the environmental pollution.

In **Abhilash Textiles vs. Rajkot Municipal Corpn.**,^{xi} the Gujarat High Court made it clear that 'the petitioners cannot be allowed to reap profit at the cost of the the public health.'

In another case of **Wing Commander Utpal Barbara vs. State of Assam** the court declared that the total ban on the use of the plastic bags by the Magistrate under Section 144 of the Criminal Procedure Code is the violative of freedom of trade and business under Article 19 (1) (g) of the Constitution of India. The remedy instead of ban could have been to take appropriate steps regulating its use and disposal and to resort to appropriate legislation for it.

In this way, Indian Judiciary introduces a balance between the development and the environment, which is the basic need of any human being.

How Judicial Interpretation is helpful towards Sustainable development?

The contribution of the Supreme Court of India in protecting the environment and ecology, forest wild life, etc has been phenomenal. The judiciary has contributed to environment protection in India in two ways. These are:

1. It has provide procedural innovations to provide much wider access to justice, and
2. It has, by a positive and expansive interpretation of the 'right to life' enriched in Article 21 of the Constitution, included within its ambit a 'right to a healthy environment.'

It can be noted that, a major initiative towards environmental protection and sustainable development in India has originated from the Indian judiciary and the commitment of the judiciary towards social good in general and environmental protection in particular, led to the emergence of the innovative use of 'public interest litigation' under Article 32 and 226 of the Constitution of India, as a tool for social and environmental justice.^{xii}

Starting from the Stockholm Conference, Indian judiciary has adopted an increasingly environment friendly stance and has implemented an interpretative nexus between a clean environment and the 'right to life,' and the superior courts has done a excellent job to prevent environment pollution for the sake of societal growth and further development and also by reason of definite legislations in regards thereto.^{xiii}

Conclusion

The environment and the development are two sides of the same coin and anyone of this cannot be scarified for the other. On the contrary, both are equally essential for our batter future. In this situation responsibilities lies on the judiciary to deal with this cases with caution of high degree, only than we will achieve our goal to secure pollution free developed country for our next generation.

For protecting the environmental degradation Public Interest Litigation(PIL) under article 32 & 226 of the Constitution of India played an important role, because most of the environmental cases which are tried by Supreme Court are the result of this PIL.

Some times it found that, this industries or business/trade are carried on in a manner which endangers vegetation cover, animals, aquatic life and human health, but now a day we found that, ant trade or business which is offensive to flora and fauna or human beings cannot be permitted to be carried on the name of the fundamental right. In this regard we can just hope that, the judiciary

plays an important role to protect the environment as well as help for the industrial development in India by adopting the policy of Sustainable Development.

ⁱ Agarwal Arvind, 'Globalisation, Development and Environment degradation: A Human Rights Perspective' in Suresh C. Shastri edi. Human Rights, Development and Environmental Law –An Anthology, Bharat Law Publications (2007), pp. 86-100 at p. 87

ⁱⁱ Singh Shailendra, Puja Jain and Abhay Kumar, 'Impact of Industrialization and Environmental Pollution', The Indian Forester Vol.135 Issue 9 September, 2009 available at www.indianforester.co.in/index.php/indianforester/article/view/481

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^v Dr. Sudarshan, V., 2006, Sustainable Development and Indian Judiciary. Lucknow Journal of Social Sciences. [online] Volume : 3, Issue : 1

^{vi} SCR Supl. (2) 597

^{vii} AIR 1991 SC 420

^{viii} 1987 SCR (I) 819.

^{ix} AIR 1996 SC 2715

^x (1997) 1 SCC 388

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FUTURE OF NUCLEAR ENERGY

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INTRODUCTION

The paper looks at the relative significance of the key determinant components prone to influence what's to come of atomic power in a cost benefit analysis. The paper analyses as to how the nuclear energy will affect the climate and also the use of fossil fuels in order to generate energy. Coal is a major and developing supporter to the outflow of carbon dioxide that as a result leads to global warming. As compared to other energy sources, nuclear power requires consistent government involvement because of security as well as other important reasons. The test is to guarantee satisfactory supply of energy while constraining the negative complications of energy creation. Burning of natural resources such as coal, fuel and gas results in generation of 75% of carbon dioxide, which is the major contributor to climate change.¹ Nuclear power is one of the sources that has been tested and is effectively free of greenhouse gas releases. As a result of this, there is a lot of interest in this form of energy. But due to the risks that are attached to this form of energy, the future of such energy is not yet stable. One of the main aims of the paper is to analyse the current situation of nuclear energy and what the future holds for the energy.

¹ Intergovernmental Panel on Climate Change (IPCC), "Carbon Dioxide Capture and Storage," 2005, Special Report, http://www.mnp.nl/ipcc/pages_media/SRCCSfinal/IPCCSpecialReportonCarbondioxideCaptureandStorage.htm, p. 55.

EMERGENCE OF NUCLEAR ENERGY

USSR's Obninsk Nuclear Power Plant became the world's first nuclear power plant to generate electricity and it produced around 5 megawatts of electric power. This was on 27th June, 1954.²

By 1970, around 90 atomic plants with a limit of 16,500 Megawatt-electric (Mwe) were operational in 15 nations; by 1980, the figure had bounced to 252 plants with a limit of 1,35,000 Mwe spread over 22 nations.³ But the nuclear power industry didn't attract much of investment; as a result, from 1980 onwards there was a decline in demand for nuclear energy.⁴ The latter half of twentieth century saw establishment of nuclear power plants in Asia. In 1990's only 19 more nuclear power plants were added to the overall tally. Nuclear energy came to be seen as expensive and ineffective; therefore, there was this sudden decline in its demand.⁵

Since around 2001 the term nuclear renaissance has been utilized to allude to a conceivable atomic force industry recovery, determined by climbing fossil fuel costs and new worries about meeting greenhouse gas emission limit.⁶ The likes of China, India and United States have shown interest in nuclear capacity and have already launched projects for setting up nuclear power plants. The World Nuclear Association declared in 2012, that the nuclear energy generation in that year was the lowest since 1999. There has been this imbalance with regard to nuclear energy.⁷

² "From Obninsk Beyond: Nuclear Power Conference Looks to Future". International Atomic Energy Agency, <http://www.iaea.org/newscenter/news/2004/obninsk.html>

³ Hans Blix, "Nuclear Power in the 21st Century," Nu-Power, Nuclear Power Corporation of India Limited, Vol. 11, No. 1-3 (1997), http://www.npcil.nic.in/nupower_vol11_1-3/hansblix.htm

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⁶ "The Nuclear Renaissance". World Nuclear Association, <http://www.world-nuclear.org/info/Current-and-Future-Generation/The-Nuclear-Renaissance/>

⁷ World Nuclear Association, "Nuclear power down in 2012", World Nuclear News, (20 June 2013), http://www.world-nuclear-news.org/NN_Nuclear_power_down_in_2012_2006131.html

As of now, there are 439 nuclear power plants with a joined Gigawatt-electric (Gwe) limit of 372 spread over 31 countries.⁸ Moreover, 36 plants are under development and an alternate 93 are planned. Nuclear energy contributes 16 percent to worldwide power generation.⁹ The so called renaissance is a result of interest shown by countries like United State and India. The Middle Eastern countries are expected to play an important role in the future. In order to analyse the nuclear energy, we will look at nuclear energy's economic viability, its impact on climate and proliferation of nuclear weapons.

Economically, nuclear power plants are very expensive and their maintenance cost is even higher. Nuclear energy has to compete with not only fossil fuels such as coal, oil but they also have to compete with renewable sources such as Wind and Solar Energy. Presently, wind and sun powered energy represents only two percent of the world's energy; most recent evaluations suggest a pitiful development rate of 2.1 percent for every year until 2030.¹⁰ In India, the 10 major nuclear power plants have had cost overruns of 300 percent. At the beginning the estimated costs were \$5.2 billion, but the revised costs came out to be \$17.7 billion.¹¹ While venturing into a business, an entrepreneur critically examines the chances of him getting profit. Investment in nuclear energy is a very risky investment, because generation of nuclear energy can at times cause disasters and would in turn leave investors in frenzy. As a result, nuclear power plants are not only expensive, but they are dangerous to human life. In the market, they are not economically competitive with fossil fuels such as oil, gas and coal.

Climate change lobbyists support nuclear energy because of the fact that it is a cleaner source of energy as compared to fossil fuels. Fossil fuels are targeted because of the high level of carbon emissions. Release of carbon dioxide is one of the main causes for climate change and also global warming. It is of utmost important that there be reductions in carbon emissions.¹² To stabilize the amount of carbon dioxide in atmosphere, emission of carbon dioxide worldwide must be

⁸ "World Nuclear Power Reactors 2007-08 and Uranium Requirements," World Nuclear Association, June 9, 2008, <http://www.world-nuclear.org/info/reactors.htm>

⁹ Mycle Schneider, "The World Nuclear Industry Status Report 2007," Greens-EFA Group in the European Parliament, January 2008, <http://www.greens-efa.org/cms/topics/dokbin/206/206749.pdf>

¹⁰ Energy Information Administration, "Annual Energy Outlook2008," Department of Energy, Report No. DOE/EIA-0383, June 2008, <http://www.eia.gov/oiaf/archive/aco08/>

¹¹ M.V. Ramana, "Nuclear Power in India: Failed Past, Dubious Future," Non-proliferation Policy Education Center, May 10, 2006, <http://www.npec-web.org/Essays/Ramana-NuclearPowerInIndia.pdf>

¹² Intergovernmental Panel on Climate Change (IPCC), "Climate Change 2001: The Scientific Basis" (Cambridge: Cambridge University Press, 2001), Working Group I Report, p.13.

reduced to 50 percent by 2050.¹³ The chain of nuclear production contributes between 10 to 25 grams of carbon dioxide per kWh that is around 20 to 50 times less than the fossil fuels.¹⁴ Nuclear energy is a clean source of energy. Low carbon emissions will not make the nuclear energy, economically viable. Perhaps one of the better ways to reduce emissions of carbon dioxide would be instituting the carbon tax. Countries like Sweden and England have already introduced this form of tax.¹⁵ But putting tax on fossil fuels like coal and gas is a political question.

Nuclear energy has certain safety requirements that are unique, and any breach would result in severe consequences. Damage to the core reactor could lead to catastrophe. The major nuclear disasters that have rocked the world, Chernobyl in 1986 and the Three Mile Island incident in 1979 were all due to damage in the core reactor. The safety concerns and disasters add to the public concern. And this merry-go-round tale will continue. Till the time public is not convinced regarding the safety of nuclear plants, it will be very difficult for investors to invest heavily in nuclear energy. The destiny of the whole nuclear energy industry would depend on only one disaster. Developing countries generally have a perspective of having a laid back approach regarding safety. The second potentially dangerous things that comes from nuclear energy plant is the radioactive waste. The spent fuel waste remains radioactive for thousands of years.¹⁶

Nuclear weapon proliferation is at the centre of controversy when it comes to international affairs. Uranium can be upgraded to form Highly Enriched Uranium (HEU) that will make it the weapons grade. It is one of the most important security challenges that the world community is facing currently. Pakistan has shown that even though by having weak technology, it is not impossible for countries to get hold of enriched Uranium. Nuclear fuel available from processing plants provides an easier route towards nuclear weapon proliferation. Even some officials in the United Nations have agreed that they can't stop some nations to produce nuclear weapons out

¹³ Ted Nordhaus and Michael Shellenberger, "Scrap Kyoto," *Democracy*, Issue 9 (Summer 2008), p. 12.

¹⁴ Nuclear Energy Agency, "Nuclear Power and Climate Change," 1997, <http://www.nea.fr/html/ndd/climate/climate.pdf>, p.11.

¹⁵ "Where Carbon is Taxed," Carbon Tax Center, June 19, 2008, <http://www.carbontax.org/progress/where-carbon-is-taxed/>

¹⁶ Gail H. Marcus, "Innovative Nuclear Energy Systems and the Future of Nuclear Power," *Progress in Nuclear Energy*, (2007), p. 93

of their nuclear reactors.¹⁷ At a stage it becomes impossible to keep a check on nations that are producing nuclear weapons. A program 'Megatons to Megawatts' was launched. In the program around \$8 billion of weapons rating Uranium has been converted to reactor rating Uranium, which means they have eliminated around 10,000 nuclear weapons.¹⁸

Even though carbon emissions are minimal, once a nuclear reactor is destroyed or is damaged, the consequences are severe.

THE FUKUSHIMA DAIICHI NUCLEAR DISASTER

The Fukushima Daichii Nuclear disaster took place on 11th March, 2011, as a result of which three of six reactors in the plant melted down. The failure took place due to the tsunami that hit the plant due to a 9.0 magnitude Tohoku earthquake.¹⁹ The incident caused the most extensive release of radioactive substance after the incident of Chernobyl and for that matter the Three Mile Island case. The incident took place due to the earthquake and also the tsunami that was triggered by the earthquake. Due to the tsunami, backup power systems were critically damaged and they were responsible for cooling down the reactors. As the reactors were not able to cool down, the process of fuel melting took place. In December, 2011 it was announced by the government that the reactors in the Fukushima Power Plant have reached 'cold shutdown' which means that there is a diminished threat of further release of radioactive substance.²⁰ One of the ministers from Japan also declared that \$15 billion has been allocated in order to decontaminate the area around the Fukushima plant.²¹ Japan has admitted that the entire cost for the complete shutting down of the plant would exceed \$75 billion.²² In 2008, an expert from International

¹⁷ Benjamin K. Sovacool (2011). *Contesting the Future of Nuclear Power: A Critical Global Assessment of Atomic Energy*, World Scientific, p. 190

¹⁸ "Megatons to Megawatts Eliminates Equivalent of 10,000 Nuclear Warheads". Usec.com

¹⁹ Phillip Lipsy, Kenji Kushida, and Trevor Incerti. 2013. "The Fukushima Disaster and Japan's Nuclear Plant Vulnerability in Comparative Perspective." *Environmental Science and Technology* 47 (May),

²⁰ Yuji Okada, Jacob Adelman, and Stuart Biggs, "Fukushima Dismantling to Start After Cold Shutdown," *Bloomberg*, December 16, 2011, <http://www.bloomberg.com/news/2011-12-15/tepcosaid-to-expect-approval-to-start-decommissioning-fukushima-station.html>

²¹ Toko Sekiguchi, "Japan Allocates Money for Decontamination," *Wall Street Journal*, December 19, 2011.

²² Shota Ushio, "Japan's Nuclear Power to Remain Competitive Through 2030: Panel," *Nucleonics Week*, December 22, 2011.

Atomic Energy Agency (IAEA) warned Japan about problems that an earthquake could cause during meeting of G8 on Nuclear Safety.²³ As of the latest studies, the approximate cost of the disaster would be \$105 billion which is more than the estimated in 2011.²⁴ In a recent interview Naoto Kan, Japan's Prime Minister at the time the incident took place revealed that there was a possibility of evacuating people living in Tokyo.²⁵ Tokyo Electric Power Company (TEPCO), the company in charge of nuclear power plant admitted that it failed to take required safety steps.²⁶ TEPCO could have prevented the incident if backup generators would have been placed. As a result of melting down of three reactors, a lot of radioactive waste has been released by the plant over the years. In order to isolate the toxic water that has been produced by the plant, Japan is planning to build an ice wall.²⁷ The ice wall will be 1.5 km. long and around 1500 pipes will be inserted in order to freeze the soil surrounding the soil and further prevent any sort of decontamination.²⁸

The efforts that have been made by the government as well as other local authorities to get to the root of the problem have been disappointing. There was misunderstanding as to how public and private entities are required to predict and mitigate such a disaster. Japan has a long history of earthquakes. The islands of Japan have been formed due to seismic activities. It should have been reasonable for government to predict that tsunami would be triggered due to an earthquake. Yet, the nuclear plant was made close to the sea. The result of the radiation has been

²³ "IAEA warned Japan over nuclear quake risk: WikiLeaks". physorg.com. Daily Telegraph. 17 March 2011.

²⁴ Rt.com, (2014). Fukushima disaster bill more than \$105bn, double earlier estimate – study. [online] Available at: <http://rt.com/news/183052-japan-fukushima-costs-study/> [Accessed 27 Aug. 2014].

²⁵ Moore, T. (2014). *Japan's former PM tells of Tokyo evacuation risk after Fukushima*. [online] Brisbane Times. Available at: <http://www.brisbanetimes.com.au/queensland/japans-former-pm-tells-of-tokyo-evacuation-risk-after-fukushima-20140827-1097na.html> [Accessed 27 Aug. 2014].

²⁶ FACKLER, M. (2014). *Tepeco Admits Inadequate Precautions at Nuclear Plant*. [online] Nytimes.com. Available at: http://www.nytimes.com/2012/10/13/world/asia/tepeco-admits-failure-in-acknowledging-risks-at-nuclear-plant.html?_r=1& [Accessed 29 Aug. 2014].

²⁷ BBC News, (2014). *Japan Fukushima ice wall work starts*. [online] Available at: <http://www.bbc.com/news/world-asia-27669393> [Accessed 30 Aug. 2014].

²⁸ *Id.*

so severe that thyroid gland cancer has been detected in youngsters in Fukushima. The victims of the radiation exposure suffering with thyroid gland cancer now total 104.²⁹

DECOMMISSION OF NUCLEAR REACTORS BY GERMANY

As a result of the disaster and the financial burden, nuclear energy turns out to be a very big gamble. After Fukushima disaster, German Chancellor Angela Merkel declared that Germany will shut all its nuclear reactors by 2022.³⁰ A panel was set up by the Chancellor in order to analyse whether Nuclear Power Plants should be shut down. In wake of Fukushima disasters, Germany will shut all its reactors by 2022 even the newest ones. Prior to shutting down of 8 reactors, Germany got 23% of its energy from the nuclear reactors.³¹ The Fukushima was the changing point, as the incident has instilled fears in the hearts of policy makers and as well as the public. In Germany, there were protests against the use of nuclear power. They were regarded as one of the biggest protest in the history of Germany against nuclear energy.³² After some nuclear reactors were shut down, it was feared that Germany would face electricity black outs but that didn't happen. Germany increased its dependence on other sources of energy.

Fukushima accident and decommission of nuclear reactors by Germany are events that highlight the lack of trust that is there in nuclear energy. The destruction caused by Fukushima has hindered the growth and also the scope of nuclear energy. Not only Germany, but Switzerland has decided to ban the construction of any other new nuclear plants.³³ Spain has also said that they will be phasing out there current stock of nuclear reactors and will look for a cleaner source

²⁹ AJW by The Asahi Shimbun, (2014). *Thyroid cancer diagnosed in 104 young people in Fukushima - AJW* by The Asahi Shimbun. [online] Available at: <http://ajw.asahi.com/article/0311disaster/fukushima/AJ201408240011> [Accessed 29 Aug. 2014].

³⁰ Uk.reuters.com, (2014). *German government wants nuclear exit by 2022 at latest | Reuters*. [online] Available at: <http://uk.reuters.com/article/2011/05/30/us-germany-nuclear-idUKTRE74Q2P120110530> [Accessed 30 Aug. 2014].

³¹ BBC News, (2011). *German nuclear plants to be shut*. [online] Available at: <http://www.bbc.co.uk/news/world-europe-13592208> [Accessed 30 Aug. 2014].

³² BBC News, (2011). *Anti-nuclear protests in Germany*. [online] Available at: <http://www.bbc.co.uk/news/world-europe-12872695> [Accessed 30 Aug. 2014].

³³ KANTER, J. (2014). *Switzerland Decides on Nuclear Phase-Out*. [online] Nytimes.com. Available at: http://www.nytimes.com/2011/05/26/business/global/26nuclear.html?_r=2& [Accessed 30 Aug. 2014].

of energy.³⁴ Spain has joined Sweden, Germany, Italy and Belgium as the fifth European country to abandon nuclear power. In the European Union Austria, Denmark, Ireland, Greece and Portugal are strongly anti-nuclear.³⁵ As the future for nuclear energy is still unsure, it will be great to see how other countries deal with the prospect of adopting nuclear power. With the serious concerns over global warming and carbon emissions, only time will tell whether countries choose nuclear energy or other forms of energy generation.

CONCLUSION

Nuclear energy is a clean energy and there is nothing opposing it. Nuclear energy is a cleaner source of energy as compared to limited fossil fuels. Global warming and carbon emissions have triggered a need for an alternative source of energy. As a result, emergence of wind, solar and nuclear energy as substitutes has attracted a lot of investors. But the deficiencies and less amount of energy generation makes wind and solar less favourable. The energy that is clean and produces a good amount of energy is Nuclear energy. But the reputation built by nuclear energy over the years gets spoilt when a nuclear accident takes place. The industry and market for nuclear energy is very fragile. It's a very big risk for investors to invest because of security concerns and it is very expensive. Fukushima disaster changed the approach of many countries in the world and they are scared to face the same fate as Japan. Japan has actually paid the cost which no one even imagined during the construction of the nuclear plant. All the major countries are sceptical about this form energy and are beginning to phase-out their own nuclear reactors. But as circumstances have arisen, nuclear energy is less preferred because of safety concerns and also because it has led to proliferation of nuclear weapons. Even the countries which do not have sophisticated technology have managed to develop nuclear weapons. The presence of nuclear power in a country is a threat because non-warranted use will be detrimental to the public. Nuclear energy has positives as well as negatives and it gets really difficult to balance the two in order to achieve and extract the best out of nuclear energy. The future depends on how far are nations willing to go in order to make sure that energy generation is clean and green.

³⁴ Greenpeace International, (2014). *Spain says "Adios" to nuclear power*. [online] Available at: <http://www.greenpeace.org/international/en/news/features/spain-adios-nuclear-31-06-06/> [Accessed 30 Aug. 2014].

³⁵ The Economist, (2011). *When the steam clears*. [online] Available at: <http://www.economist.com/node/18441163> [Accessed 30 Aug. 2014].

THE HFCs ISSUE: A NEED FOR A SOLUTION

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The project undertaken by humans of protecting the earth from harmful UVs, seem to be accomplished here and is no less than a triumph for every specie on the earth. Ozone is not just a layer of combination of three atom of Oxygen but a protective shield against those intruding UVs which are a highly potential cell destructive rays from the sun. Ozone in Stratosphere, however, acts as an effective filtering device and blocks the incoming of these UV-B rays.¹

The struggle to protect this stratospheric ozone layer starts in 1970s with the suggestion that chlorine from chlorofluorocarbons could reach the stratosphere and cause ozone loss.² Subsequent to this is the discovery of high loss of ozone is the polar region, specifically the Antarctic region (popularly known is ozone hole), which became the main concern for the world to come together against the issue. As a result, Montreal Protocol of Vienna Convention, an international treaty was signed, to limit production of chlorine- and bromine- containing ozone-depleting substances (ODSs).³

These chlorofluorocarbons were successfully substituted by hydrofluorocarbons (HFCs), which do not deplete ozone molecules in the stratosphere. But Achim Steiner, UNEP Executive Director and UN Under-Secretary-General, cautions that, “many replacement substances, like hydrofluorocarbons (HFCs), are also potent greenhouse gases”⁴ hence continue reliance on the same cannot be done. This

¹ K.S Kavi Kumar, “MONTREAL PROTOCOL”, Madras School of Economics, Chennai.

² M.P. Chipperfield, “Quantifying the ozone and ultraviolet benefits already achieved by the Montreal Protocol”, Nature communications, 26th may, 2015. Also see, <http://www.nature.com/ncomms/2015/150526/ncomms8233/full/ncomms8233.html> (Last accessed, 14th April, 2016).

³ M.P. Chipperfield, “Quantifying the ozone and ultraviolet benefits already achieved by the Montreal Protocol”, Nature communications, 26th may, 2015. Also see, <http://www.nature.com/ncomms/2015/150526/ncomms8233/full/ncomms8233.html> (Last accessed, 14th April, 2016).

⁴ Susanne Dambeck, “The Ozone Hole could become History”, Lindau Nobel Laureate Meetings, 15th May, 2015. Also see, <http://www.lindau-nobel.org/the-ozone-hole-could-become-history/> (Last accessed, 14th April, 2016).

essay is thus an attempt, to highlight immediate requirement of the time to ponder upon this silent threat (i.e. HFCs) and thereby an urge for a quick solution.

HISTORICAL ACCOUNT OF AN ATTEMPT TO REMOVE THE USE OF ODSs

In the year 1985, Vienna convention for the protection of the Ozone Layer and the 1987 Montreal Protocol on Substances depleting the ozone layer, formally recognized the threat, the Ozone depleting substances (ODSs) possess, to the ozone layer and to the climate. Therefore, countries were called to sign these treaties and conventions in order to reduce and phase-out the use of these substances. This was the major task because ODSs were once used in large quantities for refrigeration, air-conditioning, fire extinguishing, and as solvents, propellants, fumigants, and foam blowing agents.⁵ No doubt that the efforts of countries together saved Earth from the dire consequences these ODSs possess and as a result, HFCs, as an alternative, was introduced.

HFCs do not deplete the ozone layer and are suitable for the use as an alternative where CFSs and HCFCs were used. Therefore, the use of HFCs is increasing rapidly as a result of global economy development and population growth.⁶ Many new technologies have started incorporated the use of HFCs and therefore becomes a main substance in day to day activity.

But recent debate has emerged about the possible threat these HFCs poses to environment. Since, Montreal Protocol covers in its ambit only those substances which has potential to deplete the ozone layer, HFCs being a super-greenhouse gas has the higher tendencies to create global warming and hence it also need to be phased out too from the regular use. There are two contentions in this regards. On one hand, developed countries seek to amend the Montreal Protocol to control the use of HFCs, while on the other, developing countries contend that the agreement does not and cannot have the mandate to regulate greenhouse gases.⁷ They allege that the amendment proposal is a ploy of rich nation to sell HFC replacement technologies and mint money.⁸

⁵ "HFCs: A Critical Link in Protecting Climate and the Ozone Layer", A UNEP Synthesis Report, 2011. For more information, see http://www.unep.org/dewa/Portals/67/pdf/HFC_report.pdf (Last accessed, 14th April, 2016).

⁶ "HFCs: A Critical Link in Protecting Climate and the Ozone Layer", A UNEP Synthesis Report, 2011. For more information, see http://www.unep.org/dewa/Portals/67/pdf/HFC_report.pdf (Last accessed, 14th April, 2016).

⁷ "HFCs: Safe for Ozone, yet a Potential Greenhouse Gas", Centre for science and environment, Ch. 2, 2012.

⁸ "HFCs: Safe for Ozone, yet a Potential Greenhouse Gas", Centre for science and environment, Ch. 2, 2012.

In this phase of doubt, it becomes important for us to analyze how these HFCs are a potential threats and why there is an immediate need for the replacement for the same. Following head will try to explain how these HFCs are not the perfect alternative to these ODSs and therefore, an instant need has arisen to switch from these HFCs to some efficient alternative.

HFCs: A SILENT THREAT

Atmospheric observations shows that the abundance of HFCs in the atmosphere is increasing rapidly.⁹ Being a super greenhouse gas, it has a high tendencies creating greenhouse effect, a natural process that warms the Earth's surface. When the Sun's energy reaches the Earth's atmosphere, some of it is reflected back to space and the rest is absorbed and radiated by greenhouse gases. This radiation absorbed by these gases is re-emitted in all directions, some back towards the surface leading to a net warming of the surface¹⁰.

Projection shows that over the next 20 years, HCFs will make up 8.6% of global greenhouse gases emission¹¹, and if used continuously then its production will hit the equivalent of 6.85 billion tons of CO₂ in 2050 and in 2070, at 7.97 billion tons of CO₂ which will be almost 10 times the projected CO₂ emission of US in 2010¹² and since HFCs are more severe than CO₂ gas, it is more dangerous.

A team led by *Drew Shindell* at the Goddard Institute for Space Studies, found that, “the greenhouse effect was responsible not only for heating the lower atmosphere, but also for cooling the upper atmosphere. The cooling poses problems for ozone molecules, which are most unstable at low

⁹ “HFCs and climate change”, A UNEP Synthesis Repot, chapter 3, 2011. For more information, see http://www.unep.org/dewa/Portals/67/pdf/HFC_report.pdf (Last accessed, 14th April, 2016).

¹⁰ “The Greenhouse Effect and Climate Change” University of Belgrade report. Also see, <http://www.ff.bg.ac.rs/Katedre/KFAMJGPL/GreenhouseEffectAndClimateChange.pdf> (Last accessed, 14th April, 2016).

¹¹ “Global International planate report”, Green Peace. For more information, visit <http://www.greenpeace.org/international/Global/international/planet-2/report/2009/5/HFCs-Fgases.pdf> (Last accessed, 14th April, 2016).

¹² For more information, visit <http://www.greenpeace.org/international/Global/international/planet-2/report/2009/5/HFCs-Fgases.pdf> (Last accessed, 14th April, 2016).

temperatures.”¹³ This instability due to change in temperature works as a catalyst for further division of ozone molecules, and thus make the stratosphere lesser denser, resulting in depletion.

Harm done by these HFCs to the climate are measured by the *Global Warming Potential* (GWP). GWP is a calculation of how powerful a greenhouse gas is over a specific timescale compared to carbon dioxide, which has a GWP of one.¹⁴ Therefore, a comparative analysis can be made by the institutes/analyst using this method to find out as to which HFCs and how potential these greenhouse gases are. Also with the help of the same, and based on the same, policies and choices can be made by the government in order to tackle the situation.

ROAD AHEAD

In the wake of potential effects this greenhouse gas can make, many country/institutions/groups have started taking measures to reduce the use of the same. According to recent UNEP (United Nations Environment Program) reports, 80% of current HFC emissions originate from industrialized countries in which, the United States, Europe, Russia, Japan and Australia mark the biggest percentages, however, developing countries in East Asia, South Asia, and South America are catching up quickly.¹⁵ The Consumer Goods forum (CGF), a group of over 400 private sector companies from 70 countries, also has pledged to phase out HFC refrigerants in new point-of-scale and large refrigeration system started in 2015.¹⁶

When we talk about the role of countries, so far, the European Union is the only governmental body that has actively worked to reduce HFC emissions. In particular, starting in 2011 HFCs are banned

¹³ Bruce E. Johansen, *“The relationship of Ozone Depletion and the Greenhouse effect”*, Greenwood press. Also see, <http://www.ratical.org/ratville/ozoneDepletion.html#DTS> (Last accessed, 14th April, 2016).

¹⁴ For more information, visit <http://www.greenpeace.org/international/Global/international/planet-2/report/2009/5/HFCs-Fgases.pdf> (Last accessed, 14th April, 2016).

¹⁵ Global International planate report, Green Peace. For more information, visit <http://www.greenpeace.org/international/Global/international/planet-2/report/2009/5/HFCs-Fgases.pdf> (Last accessed, 14th April, 2016).

¹⁶ *“Benefits of addressing HFCs under the Montreal Protocol”*, United States Environment Protection Agency, July 2014.

from mobile air conditioning in cars in the EU.¹⁷ Subsequently, in the year 2015 US submitted its own amendment where it suggested that developing countries should get at-least 15 more years to eliminate their HFCs as compared to developed nations.¹⁸

INDIA

As living standards are on rise in India, enormous expansion of the demands for products using air conditioners and alike will be inevitable. As markets for room and vehicle air conditioning grow (with increase in living standard), HFCs use in India will expand dramatically...unless an alternative is proposed.¹⁹ Therefore, at the present juncture it is a high time for developing country like India to act in pursuant of reducing the dependency on such harmful substance.

India is always famous for “leapfrogging” to more efficient and economic technologies,²⁰ which can be seen by its efforts towards achieving the current desired goal. Interestingly, India was earlier amongst the countries that are opposed to the expansion of the scope of the Montreal Protocol to include HFCs, but in 2015, India in its draft amendment has proposed different trajectories for phase-out of HFCs by developed and developing countries.²¹In its submission to the Montreal Protocol, India has demanded that the full costs of the technology transition be provided and a long timeframe

¹⁷ Global International planate report, Green Peace. For more information, visit <http://www.greenpeace.org/international/Global/international/planet-2/report/2009/5/HFCs-Fgases.pdf> (Last accessed, 14th April, 2016).

¹⁸ Amitabh Singh, “India embraces HFC phase-out under Montreal Protocol”, The Indian Express, April 18, 2015. Also see, <http://indianexpress.com/article/india/india-others/india-embraces-hfc-phase-out-under-montreal-protocol/> (Last accessed, 14th April, 2016).

¹⁹ “Cooling India with less Warming: The Business Case for phasing Down HFCs in Room and Vehicle Air Conditioners”, Council on Energy, Environment and Water, Issue Paper June 2013. Also see, <http://ceew.in/pdf/CEEW-IGSD-NRDC-TERI-Cooling-India-With-Less-Warming-Jun13.pdf> (Last accessed, 14th April, 2016).

²⁰ “Cooling India with less Warming: The Business Case for phasing Down HFCs in Room and Vehicle Air Conditioners”, Council on Energy, Environment and Water, Issue Paper June 2013. Also see, <http://ceew.in/pdf/CEEW-IGSD-NRDC-TERI-Cooling-India-With-Less-Warming-Jun13.pdf> (Last accessed, 14th April, 2016).

²¹ Amitabh Singh, “India embraces HFC phase-out under Montreal Protocol”, The Indian Express, April 18, 2015. Also see, <http://indianexpress.com/article/india/india-others/india-embraces-hfc-phase-out-under-montreal-protocol/> (Last accessed, 14th April, 2016).

be given for the transition.²² This amendment is in pursuant to the agreement on HFCs which take place between India and US in the year 2013 which became the driving force for the same.

Finally, countries have started acting against such harmful substance but this war is surely long lasting. But at this point, it is also pertinent to determine the next best alternative for HFCs. There are many recommendations made by different agencies, few of them are discussed ahead.

RECOMMENDATIONS

On November 6, 2015, all 197 parties to the Montreal Protocol on Substances that Deplete the Ozone Layer agreed on a "Dubai Pathway" for controlling climate-change-inducing hydrofluorocarbons (HFCs)²³. Parallel to which, European commission is currently conducting a review of the European Union regulations on the use of certain Fluorinated Greenhouse Gases. This report also explores the availability of alternative to HFCs and suggests two long term technical options for eliminating the influence of HFCs on climate change²⁴:

- 1- Using fluorine-free substances with low or zero-GWP ex: Ammonia, Hydrocarbons such as propane and iso-butane, Dimethyl ether, water, CO₂, other substances used in various types of aerosols, foam products, refrigeration, air conditioning and fire protections systems.
- 2- Alternative methods and processes, ex: including fiber insulation materials, dry-powder asthma inhalers and building designs that avoid the need for air-conditioners.

The above report, however, suggest that the use of alternative method and process is the most effective way of reducing the emission of HFCs.

²² Nitin Sethi, "India does U-turn after deal with US on climate threatening refrigerants gases, HFCs", Business standard, April 18, 2015. Also see, http://www.business-standard.com/article/current-affairs/india-does-u-turn-after-deal-with-us-on-climate-threatening-refrigerant-gases-hfcs-115041701121_1.html (Last accessed, 14th April, 2016).

²³ *Recent International Development under the Montreal Protocol*, EPA. Also see, <https://www.epa.gov/ozone-layer-protection/recent-international-developments-under-montreal-protocol> (Last accessed, 5th May, 2016).

²⁴ Michael Kauffeld, "Availability of low GWP alternatives to HFCs: Feasibility of an early phase-out of HFCs by 2020", Environmental Investigation Agency (EIA), 2012. Also see, https://eia-international.org/wp-content/uploads/EIA_FGas_Report_0412_FINAL_MEDRES_v3.pdf (Last accessed, 14th April, 2016).

Another researcher and scientist John G. Owens²⁵, suggest that a new class of hydrofluoroethers (HFEs) should replace HFCs, as compare to HFCs, HFEs has shorter atmospheric lifetime and therefore using this substance would serve the purpose.

As it can be seen that there are many recommendations made by many institutions but yet no recommendation sufficiently able to replace HFCs. Many big industries like Coca Cola and others have started using different methods for cooling purpose and has seen a huge success in energy preservation and emission of GHGs. Though it is contended that switching the technology which uses HFCs to some alternative is the best possible solution available, but at the same time it may prove to be an expensive path for most developing countries. Therefore, author suggest that it is need of the time to reach to a solution as soon as possible, and for that purpose everybody is eyeing on the Montreal Protocol amendment 2016 and hoping to receive a successful solution.

²⁵ John G. Owens, "*Low GWP Alternatives to HFCs and PFCs*", St. Paul, MN USA. Also see, http://solutions.3mbelgie.be/3MContentRetrievalAPI/BlobServlet?lmd=1310648569000&assetId=1273689616858&assetType=MMM_Image&blobAttribute=ImageFilen (Last accessed, 14th April, 2016).