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GTOWTH, ENVIRONMENT AND ISLAM

Zubair Hasan

Abstract

The environmental devastation that today confronts not only human-beings but all life forms on the planet earth has brought up the concept of sustainability contextual to growth-oriented development. Western though in origin and understanding, the implications of sustainable development extend to Islam in which, as in the other Abrahamic faiths, one can find an essence of this idea. Several economists have in recent years have examined the debate on the meaning of sustainable development in Islam and attempts to explain the Islamic position on environmental issues the world now faces. This Chapter examines the debate on several interpretations of sustainability and attempts to expound upon a concrete, Islamic definition for sustainable development. It argues that development is intricately linked to the environment as any definition of sustainability ends with environmental concerns.

Such linkage assumes importance contextual to Islamic finance as the developmental funding is now being increasingly used to serve environmental ends. Islamic Finance is so far based essentially upon a negative-screen methodology, relying upon averting investments and actions contrary to Islamic law rather than positive investment in socially responsible concerns. While organizations such as the Islamic Development Bank do engage in development projects, positivism, and particularly the environment, is absent in most of the criteria of Islamic financial institutions. The development of a definition for Islamic sustainable development this chapter presents implies another opportunity for convergence between Islamic Finance and other ethical investments. With the growing popularity of socially responsible investment principles in the world of conventional finance, perhaps an Islamic counterpart would provide an opportunity for collaboration, particularly given the great liquidity of the Gulf region, for it could provide the framework for a positive-screen methodology. Finally, we take a brief look at the sort of environmental problems and the solutions suggested to resolve them, especially the viability of the Coase theorem.

Key words: Growth; Environment; Sustainability; Finance; War; Coase theorem; Islamic approach.

1. INTRODUCTION

Economic development and the factors that promoted it have been the prime concern of economics from its very inception. Development acquired the status of a formal discipline essentially after the Second World War for a variety of reasons.¹ But the innate human urge to produce increasing volumes of goods and services to meet the demand of expanding population to maintain and raise the living standards already attained worldwide, forces a conflict between material prosperity on the one hand and environmental degradation on the other. The conflict has resulted in intensifying the debate as to how the benefits of the growth in output on the one hand and its negative impact of the environment on the other, could be reconciled? We find that the objectives of *Al Shari'ah* and the verses of the Qur'an indicate a way out of this impasse.

The unending human predicament is that neither the population increase nor the urge to improve living standards can be halted, let alone reversed, to be commensurate with what the good earth can support, maintaining the proportions and balance in natural provisions and forces Allah (swt) created for supporting life on the planet. Under the circumstance, growth of output remains the top priority with every country

¹ The main reasons were the stupendous reconstruction requirements of the war-devastated economies, and the poverty eradication demands of the people in a large number of countries that had won their political freedom from the colonial rule after the War. Thus, the talk of planning for economic development became the order of the day mostly after the year 1945. Regrettably, wars have since become more frequent and destructive demanding colossal rebuilds.

across the globe. More, because the curse of poverty and increasing distributional inequalities continue to remain with us. The patterns and processes of production are sought to be modified, even restrained, to resolve these and related issues. However, growth per se cannot be frozen, it is agreed. The agreement has brought to the fore the question what then it is that we need to *sustain* to cover the darker sides of growth?

1.2 Versions of sustainability

There still seems to be no agreed definition of sustainability with reference to economic development. For, it is a relatively recent concept attempting to assimilate the dynamism of a process of change that cannot ignore local concerns, needs, and interests. Being new, it evolves as we learn to grasp its wider implications for different aspects of our lives. The key question here is: what it is that we want to sustain? One comes across three broad answers to the question in the literature. Sustainability implies:

1. Maintaining the long-run rate of economic growth.
2. Achieving inter-generational equity in the use of natural resources.
3. Restricting, as far as possible, the increase in pollution for sustaining the present quality of environment.

The three views are interrelated but policy prescriptions change, depending on one's subjective predilections. We seek to clarify these interpretations, policy consequences that follow in each case and their mutual linkages not only in a secular dispensation but possibly from an Islamic viewpoint as well.

Having discussed the versions of sustainability as used in the literature, the following Section 2 of the Chapter takes a brief look at the growth-equity conflict and its ramifications for sustainable development. In Section 3, we deal with the problems modern warfare unleashes contextual to environment. Section 4 expounds the Islamic position on the environmental issue. In Section 5 we discuss how the instrument of finance, conventional and Islamic can converge to make a positive contribution to environmental amelioration. Section 6 lists the sort of environmental problems the world faces and some of the policy prescriptions put forth to resolve them including the efficacy of the Coase theorem. Section 7 contains a few final observations. We conclude that the Islamic approach is more agreeable to environmental protection and that issues surrounding sustainable development have moral, ethical, social, and political complexities and that economics or economists alone cannot resolve the problem.

2 GROWTH VERSUS WELFARE

Focusing on growth derives its inspiration from the classical steady state long run development model. The model depicts the pessimism unleashed by Malthus and Ricardo that visualized scarcity of resources slowing growth under a faster expansion of population until output expansion would no longer be possible – growth having reached a stationary state. Figure 1 sketches the operation process of the model and the consequence of classical approach. History belied the fears. Growth rarely abated. Indeed, the total output of the world during the latter half of the twentieth century far exceeded what humanity could produce during the entire period of its existence before

warnings that the world is likely to be overwhelmed by the development problems of the sort it is now facing if men do not resist selfishness, greed and rapacious exploitation of natural resources. On a more important side, the way of life Islam prescribes offers ample possibilities of extracting a whole blue print of instructions which, if put into operation, would not only help resolve current problems but may usher in positive improvement in the situation. Maqasid-al-Shari'ah – the objectives of the Islamic law – we shall see, provide the broad framework for such a blue print.

Repetto (1986), for example, defined sustainable development as the one that aims at managing all natural, human and financial resources of a country for sustaining its wealth and welfare over the long-run. Following a similar line, Pearce et al (1990) assume development as a vector – a list of elements- that society seeks to maximize. In an Islamic dispensation the fulfillment of basic needs of all nationals is a social imperative; the elements of the vector will doubtless include, in growth factors like the improvement in food and nutrition, accommodation facilities, medical care, educational attainment, and increase in basic freedoms. Thus seen, sustainable development is a situation where the specified vector must increase over time without hitting the limits. In this formulation GNP growth remains in the forefront as other elements of the vector essentially depends on this variable. This approach has several difficulties. Thus, the World Bank says without mincing words.

The sustainable management of the environment and natural resources is vital for economic growth and *human wellbeing*. When managed well, renewable natural resources, watersheds, productive landscapes and seascapes can provide the foundation for sustained inclusive growth, food security and poverty reduction. Natural resources provide livelihoods for hundreds of millions of people and generate sizeable tax revenue. The world's ecosystems regulate the air, water and soil on which we all depend, form a unique and cost-effective buffer against extreme weather events and climate change.

This view of development implies an infinite time horizon. But decisions-making operates on specified time scales. Planning for achieving pre-fixed targets may thus be difficult. In a dynamic socio-economic scenario over the long run; the elements of the vector may undergo sharp changes in their content, range and quality, destroying inter-temporal comparability. Again, the concept is silent on the direction of change in the vector. The rate of change is assumed to remain positive for each time segment which may not always remain valid. Only the overall trend may be conceived as remaining positive. Most writer prefer to work with this, rather weak, view, of sustainability. In their scheme of things, the present value of development benefits is positive and can be maximized. The assumption is not compatible with the long-run maximization process.

2.2 Ensuring intergenerational equity.

The World Commission on Environment and Development presented the definition of sustainable development in 1987, focusing on an inter-generational equity concept. It believed that such development is the one that meets the needs of the present population without compromising the ability of the future generations to meet their own needs. It implies not merely the conservation of resources but much more. A sound economy is just as essential for satisfying our non-material

(spiritual) needs as it is essential for satisfying our material needs. It must aim at preserving the

natural foundations of life and calls for a fair distribution of goods and opportunities. Performance efficiency and an effective organization for the use of natural resources are needed. It also gives thought to a certain degree of social solidarity. In addition, the Commission relates sustainable development to three domains: economy, environment, and society in equal measure as depicted in

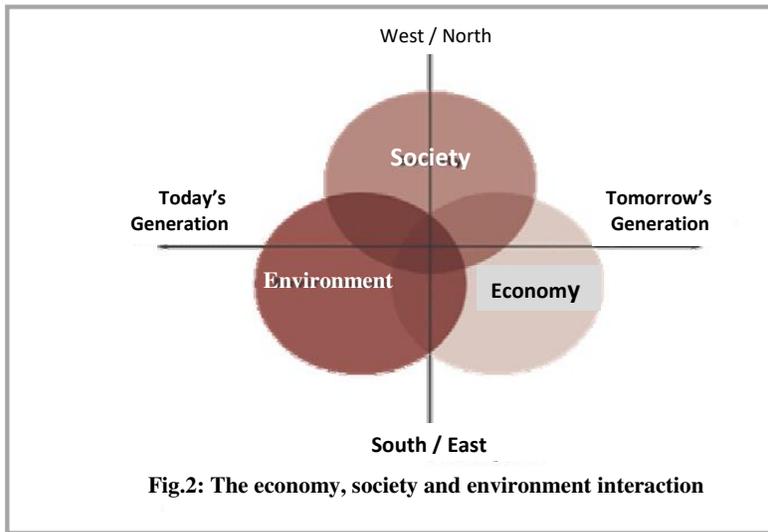


Figure 2 reproduced with some modification from its Report.

This rendition of sustainable development echoes the Islamic position on the issue. It puts the spiritual or non-material needs of people on the same footing as of material needs for measuring economic performance. Islam talks of the spiritual or non-material needs of people on the same footing as of material needs for measuring economic performance.

We shall have occasion to present in some detail the Islamic stance relative to environment in Section 4. We shall see that the Islamic ingredients of sustainability are more than what the Commission bargained for in its Report mentioned above. Its deliberations do not go far enough and are not free of weaknesses. In the first place, there is little agreement on the objective criteria to test if development is indeed progressing on a sustainable pace, let alone for knowing the needs of future generations on a comparable basis. The time dimension of the concept remains unspecified. It seems more rhetoric than offering a workable plan of action.

2.3 Restricting pollution

Finally, there is the perception of sustainable development as an effort to forge a compromise between the growing demands for economic growth on the one hand and for environmental protection on the other. This approach is narrower but more realistic than those discussed earlier. It is, in fact, the foothold of all shades of environmentalism that has become so vocal in recent years. The credit for its formulation goes to the Earth Summit at Rio de Janeiro in 1992. It was spelled out in its Agenda 21 blue print for sustainable development for the 21st century. The definition seeks to limit the rate of growth to a level that would allow it to continue without aggravating the resource position, if environment is maintained as it is. It focuses on recycling of resources, their renewal where possible, and their conservation if non-renewable. This view too has difficulties but these are, in fact, such as are applicable to any notion of sustainable development.

The three versions of sustainable development discussed above are closely linked. For example, a sustainable rate of growth implies that the pace of development should be slower than it presently is. This obviously would help conserve resources, lower pollution and improve distribution. Emphasis on temporal equity would demand a more even spread of resources, prosperity, and environmental damage over time. The notion implies putting the brakes on consumerism and expanding credit card culture i.e. borrowing from the future to spend now.³ Again, focus on environmental sustenance would eventually help in conservation of resources and may improve also the intergenerational distribution of incomes. In summary, it comes about that whichever of sustainability version explained above one might choose, it would eventually end up with environmental

3. WAR AND ENVIRONMENT

There have been many and varied causes of environmental degradation but writings on the subject, textbooks especially, seldom include wars, including civilian conflicts like those in Syria, Iraq or Libya among the leading causes.

The impact of modern *warfare*, including scorch earth methods, has indeed been devastating on landscapes, ecosystems and the people. The progression in weaponry from chemical to nuclear arsenals has increasingly put stress on the environment. The literature is full of the environmental damage inflicted by some recent wars like those in Vietnam, Korea, Rwanda, Balkans, the gulf and Afghanistan.⁴

These wars in varied environments and different parts of the world, especially in the Gulf, reveal that the ecological consequences of conflicts often remain written in the landscape for many years. Efforts at regeneration or development do apparently scrape the landscape clean concealing the scarring effects of war; yet looking carefully, and in the right places, can allow the postwar history to be read in the landscape. Problems often tend to move below the surface but one may need only to scratch it for finding the remains of the continuing environmental damage. For example, even after years of During the 991 American led Kuwait invasion, the oil spill into the Persian Gulf is regarded as the worst ever sea pollution. Moreover, the oil is found percolating through the porous soil and threatens the country's meager freshwater resources.

True, wars are not the only events that leave their footprints on the ecosystems. This seems as much true of natural calamities - floods, hurricanes, earthquakes, volcanic eruptions, and tsunamis, for example. Thus, it is argued that conflicts fall into the context of natural history.

³ See Spink: Abstract, p.1. Repetto (1986) also endorses this view.

⁴ Widespread concern about the environmental effects of warfare began with the American attack on Vietnam; the U.S. military sprayed 79 million liters of herbicides and defoliants over about one-seventh of the land area of southern Vietnam. A variety of chemicals including the most infamous Agent Orange aimed at destroying the country's inland hardwood forests and the mangroves that fringed the Mekong Delta so as to deprive communist Viet Cong guerrillas of the cover that enabled them to move freely and launch ambushes against American forces. U.S. actions in Vietnam gave rise to the concept of "ecocide"-the deliberate destruction of the environment as a military strategy. a disaster for these tropical forests,

“Still, warfare is not the same as other disturbances that buffet natural ecosystems, and there are reasons to be concerned about the long-term ecological effects of war, particularly of the modern variety. For one thing, there is the sheer firepower of current weapons technology, especially its shock-and-awe deployment by modern superpowers: "Our capacity to destroy now is so much greater than it's ever been before," notes World Conservation Union chief scientist Jeffrey McNeely. The involvement of guerrilla groups in many recent wars draws that firepower toward the natural ecosystems-often already circumscribed and endangered ones-where those groups take cover. And the targeting of civilians can touch off mass migrations of refugees, which on an overcrowded planet can have a devastating environmental effect.” (Sara 2008)

4. ISLAMIC POSITION

Islamic economists often claim that the holy scripture had centuries back had voiced these concerns. This looks a bit farfetched. The environmental issues, as we have them today, confronted mankind centuries later than the advent of Islam. However, notable it is that the scripture did contain candid prohibitions of acts relevant to the environmental issues of today. Islam is a universal religion imbued with rationality. Thus, people, irrespective of their faith, may unconsciously think, at times, along Islamic lines. One finds, for instance, the approach of the Commission (1987) largely in consonance with the objectives (*maqasid*) of the Shari 'ah.

The main objectives of the Islamic law put seek are to promote the well-being of all mankind. This urges for the protection of their faith, self-respect, intellect, their progeny and their wealth.⁵ Such protection needs wisdom, mercy, and justice. Muslims, as others, must be strong both materially, and morally to achieve these objectives. Rapid economic growth with priority for the fulfillment of basic needs and avoidance of wasteful expenditure are imperative to help move in that direction. Safeguarding of intellect implies that the community is able to resist pollutive cultural influences from alien sources and must stick to what remains still relevant in their heritage. It has to pay special attention to educational attainments, research and critical valuations. The insistence of Shari 'ah on preservation of the progeny is intended for ensuring inter-generational equity in the distribution of wealth and prosperity, conservation of resources, and sustenance of the environment, all links of one chain.

Moderation and balance in worldly pursuits that the verses of the Qur'an repeatedly emphasize are intended to support this basic Islamic concept of sustainable development. We shall have occasion to present such verses later in the discussion. The achievement of the *maqasid* (goals) calls for dynamic interaction between socio-economic processes and environmental priorities. If Muslim countries could produce even a replica of such interaction and its benefits, it may be possible to send a positive message to humanity that such a framework is imperative to produce an equitable economy, a better society and a world that is worth living for present and future generation.

The Islamic ingredients of sustainability are more than what the Commission Report has listed as explained earlier.. In the first place, there is little agreement on the objective criteria to test if development is indeed progressing on a sustainable pace, let alone for knowing the needs of future

⁵ Al-Ghazali as quoted in Chapra (2000, 118)

generations on a comparable basis. The time dimension of the concept remains unspecified. It seems more rhetoric than offering a workable plan of action.

4.1 Policy concerns

Our discussion of some of the variants of sustainability shows that the concept of development seems to have kicked up more haze than light. Development by nature is a value loaded term and implies the achievement of stated economic and social objectives at a perceived pace. Sustainability on the other hand connotes the ability of development to continue over time indefinitely. Thus seen, sustainable development is a constrained process of dynamic change for social betterment. The common element underpinning the indicated approaches to such development is conservation of resources and maintenance, if not reduction, of pollution levels. The debate on sustainable development thus centers on the concern about the deteriorating environmental quality. The deterioration continues unabated also in the Muslim world even as Islam preaches moderation in consumption, exhorts to avoid wasteful use of natural resources, reminds people of delicate proportions in the universe and enjoins on mankind to maintain the natural balance. It warned that greed will tempt mankind to disturb the proportions and tilt the balance. The following verses of the Qur'an bear ample testimony on the point. The following verses support the *maqasid* and their implications for sustainable development as discussed earlier.⁶

6: 3 – It is He Who created the heavens and the earth In true (proportions). (See also n. 896 p. 313)

30:41– *Mischief has appeared on land and sea because of (the need) that hands of men have earned. (See also n. 3557 p.1019)*

39: 5 – *He created the heaven and the earth in true (proportions). (See also n.4247 p.1181)*

54:49 –*Verily, all things have We created in proportion and measure. (See also n.5163 p.1394)*

67:3 – *He Who created the seven heavens one above another; No want of proportion will thou see in the Creation of Allah) Most Gracious. So turn thy vision again. Seest thou any flaw? (P. 1498).*

67:4 – *Again turn thy vision a second time (thy) vision will come back to thee dull and discomfited, in a state worn out.*

Here, a clarification may not be out of place. It is sometimes argued that the Islamic concern for the environment follows automatically from the general principle: 'Receive no injury inflict no injury'. Some others supporting the contention claim that there are hundreds of verses in the Qur'an relevant to avoid causing injury to the natural and environmental resources (Hassan and Cajee 2002). This seems stretchy, if not irrelevant. The tradition was intended presumably more to regulate relations between man and men rather than between them and the environment.

⁶ The translation of the verses given here in support of the stated Islamic position is reproduced from the *Holy Qur'an Text, Translation and Commentary* by Abdullah Yusuf Ali (New Revised Edition 1409A.H./ 1989A.C.), Amanah Corp. USA.

The environmentalists continue to express dismay on the decadent health of the planet. They lament about the diminishing biodiversity, global warming, depleting fish stock, shrinking supplies of unsullied fresh drinking water, the plundering of virgin tropical forests, and air pollution reducing agricultural yields and affecting human health. It is estimated that there are as many as 30 million different species of living organisms in the world today. They constitute a vast and important source of genetic information that could be useful for the development of medicines, natural pesticides, resistant varieties of plants and animals. Human activities have taken a heavy toll on biodiversity pushing up the rate of species extinction. Estuarine water pollution reduces fish regeneration. The conservation of habitats and specie preservation pose another resource problem. Examples can be multiplied ad infinitum.

The issue of property rights in environmental goods remains unsettled even at the theoretical plane: do individuals have or should have these rights or the societal entity? If the two have to share these rights, when shall they do so and how? Again, in many cases it is not possible to pinpoint the sources of a particular pollution affecting air, water, or land. Even if the sources were satisfactorily identified, the contribution of each source to total pollution is difficult to determine. Furthermore, there is the problem of estimating the cost of the damage caused, identify the sufferers, and ascertain the damage each suffered for grant of compensation. And, what shall be the criteria or form the compensation would take is the question that has yet to be answered. Decisions on issues of the sort do usually involve a measure of arbitrariness, and thus tend to raise grave concerns about justice and injustice.

Added to these problems are the difficulties of putting policies into operation. Here, adequacy of laws and efficiency in executing them are the questions. Islamic economists some time raise what they consider a more fundamental issue: why the world is characterized with glaring inequalities in the distribution of wealth and incomes within and among nations which all agree is the prime source of galloping pollution? Today, in the year 2016, for example, the projected GDP of the 'global man' is over US \$10000 per annum having doubled of what it was in 2000 (13). Is it not good enough for a comfortable living for people of the 'globe village' if only the distribution were more equitable?⁷ But the story has been much different: Widening income and opportunity disparities have put immense pressure on world resources, give rise to wars, armed conflicts, corruption and mounting environmental degradation.

4. FINANCE AND ENVIRONMENT

People are not yet familiar with environmental finance even as they are with environmental issues, their adverse impact on humans living within and across nations, and some public measures to arrest the resulting damage such as vehicular emission control, disposal of industrial waste, promotion of clean energy sources and the like. Using financial incentives and curbs to address

⁷ The per capita GDP projection for the year 2016 is based on the data reported in the World Development Reports – World GDP \$75.21 trillion and population 7.4 billion. Interestingly, Global economy as of date is 1.58 times greater in PPP terms compare to nominal terms. Out of 190 economies, 174 have higher value in PPP basis and 15 have higher in nominal. For United States both values are identical. The PPP cheers up the poor showing their distance from the rich smaller.

environmental problems has been a more recent phenomenon. Environmental finance has emerged as an instrument to induce business activities to arrest damage and ameliorate the ecological systems. Environmental finance may thus be defined as concerned mainly with finance and investment regarding the ecological environment.⁸ It falls in the domain of corporate social responsibility (Blum, 1994).

Environmental finance employs funding conservation initiatives to improving the impact of businesses on the environment without sacrificing profitability; it may improve quality of life for a community. Increasing flow of funds across borders has opened more and varied investment avenues across businesses. Environmental finance is thus leading the shift from isolated environmental regulations to their internationalization for the market-driven economies. The Paris agreement makes a major contribution in that direction. (Susan Jaworski 2017).

Environmental Finance envisages corporate strategies that financial service professionals as well as their clients must understand in order to proactively improve environmental performance of modern businesses. New markets are being created to help companies manage environmental risks, including weather derivatives, catastrophe bonds, and emission trading permits. It collects real-world case studies for analyses and feasible policy prescriptions (Lambatt & White, 2002).

In evaluating the projects, effort is first made to avoid adverse environmental impacts. If satisfactory results cannot be obtained, alternatives are examined. Even then if avoidance is not possible, ways to minimize the damage are considered. An example is the shortening of the distance between western and southern Europe for smooth and faster movement of men and materials, the opening of the rail tunnel through the Swiss Alps, made possible. This will certainly help energy conservation. Tunneling indeed is becoming popular to serve that end. They also reduce inventory and capitalizing just-in-time delivery, reducing emissions in product fabrication processes. The \$46 billion China-Pak Economic Corridor when operational will cut on energy consumption in a big way.

Public sector agencies across the world have an environmental finance or funding center. The Environmental Protection Agency (EPA) in the US, and similar institutions in Indonesia, Mongolia, India and many European countries promote environmental finance. Many colleges and universities in the developed world have a designated environmental finance center. Some colleges and universities offer environmental finance degrees that focus on economic and policy analysis, financial analytics, science and technology, markets and regulation. Developing countries, Muslim especially, are lagging far behind in environmental teaching and research.⁹

Environmental economics and environmental finance are sister disciplines though with different shades; they supplement each other on interface. We discuss in the following section some theoretical bases and policy prescriptions relevant to both.

⁸ Strictly speaking, environmental economics is distinguished from ecology and on two grounds. First, ecology is systemic; it focuses on preserving *natural capital* which cannot in any way be substituted by man-made resources. Second, and it follows from the first, sustainability is puritan or strong as opposed to diluted or weak

⁹ INCEIF the Global University of Islamic finance remain one glaring example of such omission but they are planning to fill the gap in due course.

5. SOURCE OF PROBLEMS

Natural resources that Allah (swt) has provided on/in the planet earth include all sorts of minerals animals, vegetation and liquids for human to create things for their comfort and enjoyment. Some of these resources like vegetation fish and animals are *renewable* and can be maintained at the existing level of availability if the rates of their renewal and consumption remain the same. But most of these resources, especially world's forest cover, are being used faster than their replacement bordering extinction. Even more serious a problem confronts mankind in the fast depletion of *non-renewable* mineral resources like iron ore, tin, coal, oil and natural gas. The situation calls for a well-conceived conservation policy which falls in the ambit of environmental policy.

However, the core environmental issues arise in the case of resources that are not priced in the market such as air and water; these are used freely in the production processes. But this use is unique. It does not typically form part of the output so as to deplete their volume. Human beings use them to receptacles of their personal discharges and vehicles of wastes flowing out of their consumption and production activities. Examples are domestic garbage, hospital wastes, dust raised during construction, emissions from automobiles, power houses chemical factories, and nuclear plants. They all find their way into the air and/or water – running or still, on surface or underground. Allah (swt) has granted these natural receptors great absorption and self-cleansing power from what we throw in them. However, we were naïve in believing that this power of the natural agents was unlimited. We learnt it rather late that we can use them as waste receptacles only at the cost of reducing their availability for healthy living of all life forms on the planet earth. What reduces this availability is summed up in one word – *pollution*. How to maintain a balance between the two is the core issue of environmental economics.

5.1 Pollution and property rights

The term pollution refers to the contamination of air and water or soil caused by the discharge of substances harmful to living-beings and their possessions. Such substances may consist of

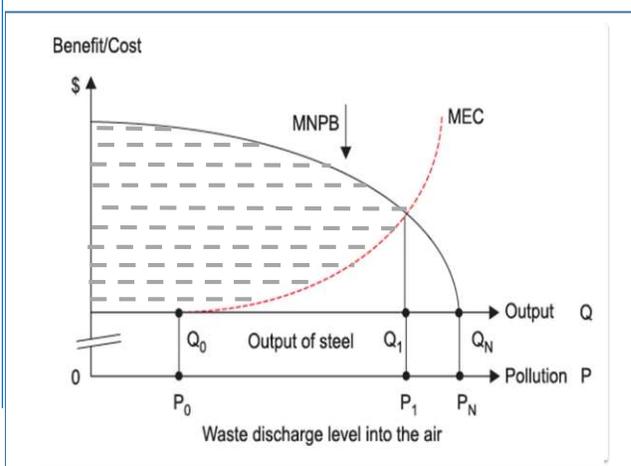


Figure 3: Property in fresh air

free gifts of nature, governmental action can be taken against the polluters only after the absorption capacity of the air has been crossed. Figure 3 illustrates the case. Here, as output increases along

particulates of gases, liquids and solids. Energy – heat, noise or radiation - could also be their sources. Pollution alters the characteristics of the natural agents to inflict or threaten damage to health, safety or welfare of all life forms or properties. The harm can assume varied forms and temporal distances. An important question contextual to pollution is: who has property rights in natural agents – the people at large or public authorities? The answer affects the rights to pollute. If one takes the position that air and water are the

along the X-axis so does pollution. The curve MNPB measures the marginal net private benefit in the form of business profits as output increases. MEC in contrast measures the marginal external cost the corresponding pollution imposes on society to undo the damage inflicted.¹⁰ The private profit which also is the benefit of the society is more than the cost it bears until Q_1 equilibrium output. The property rights issue is that until Q_0 output the production of steel is not causing any pollution; production is within the pollution absorption capacity of the air implying that pollution charges must grant Q_0 cut in output, subjecting only Q_0 Q_1 to penalty, if any. However, this theoretical argument valid though, poses insurmountable difficulties in application. Hence the rule of the thumb is that public authorities have property rights in fresh air and businesses must be charged on the entire Q_N output to mitigate pollution.

6. PROPOSALS FOR TREATMENT

6.1 Pollution types

Pollution problems may be classified as local, regional or international. Domestic waste and sewer disposal and noise control and waterways maintenance are examples of local problems. Regional problems are typical of involving cross border pollution. Bush fires, volcanic eruptions, floods tornadoes, tsunamis, atomic leakages often cause serious environmental problems across countries. These at times need to disputes requiring international arbitration and cooperative settlements. River water sharing treaty between India and Pakistan brokered by the World Bank in 1960s is a leading example in this context.

International environmental issues affect the whole globe and are equally worrisome for all countries. These in particular include ozone depletion, warming of the planet, rising sea levels and vanishing forest covers. These problems are interrelated and feed one another. They are also the mother of all sorts of environmental problems the world faces today. The UNO and various agencies it has created have remained constantly seized with the degrading health of the environment. Not much could come out of the periodic world deliberations until recently because a just distribution of responsibilities and costs sharing was obstructed by the grossly unequal in economic and political power sitting around the negotiation table could not have the same perception of costs and benefit proportions involved for each other.

Over the past fifty years or so it has been a story of vague national commitments and non-performance; Many sensible reports only gathered dust after momentary applaud until at last the world almost drifted to a point of now or never. The Paris Conference of 2016 on environment attracted the largest number of countries, past orthodoxies gave way rationality, rigidities to relaxation. The agreement contains realistic evaluations, pragmatic policy content and a collective resolve to act. All tis it is hoped will stand the test of time. Various countries – developing and developed - are launching ‘save environment’ programs. Special plans are in the pipeline to tackle pollution in major Indian cities, especially through developing non-conventional and sustainable clean energy sources as a national commitment, not compulsion.¹¹ Likewise, China is making

¹⁰ The steel mill may emit gases causing acid mixed rain fall on the nearby fishery lake that reduces the fish output for its owners. If it is coal fired the wind may scatter coal particles in the neighborhoods increasing the cleansing expenditure of the household apart from causing health hazards.

¹¹ The country is implementing a well-conceived graded plan to arrest pollution spread (See TOI, January 17,2).

concerted efforts to control pollution – a US dollar 2.6 billion plan just announced to fight the pollution menace for Beijing alone (Hindustan Times, January 16, 2017; 7,14).

6.2 Remedial plans

The generic conflict between private gain and public interest in free market economies has made the remedial measures contextual to environment a doctrinal concern. There is preference, if not insistence, that the measures to arrest damage to environment must be market oriented not imposed by public authorities from outside the system as has generally been the case. Professor Coase presented a market based solution suggesting the private creation property rights in environmental goods and encourage their trading in the market. We illustrate below the bar his theory below in bare bones and show its limitations. We support the governmental action and global cooperation now on to meet the situation.

6.2.1 Coase theorem illustrated

We take the case of a steel mill operating close to a fishery. The pollution generated from the mill causes acid rain to fall on the fishery pond reducing the fish production reducing the fishery's profits. Professor Coase suggests the government may grant property rights in fresh air to the mill or the fishery, even to third party. Evidently, none can store fresh air or reduce its availability to others. To keep the illustration simple. A check can be put on the production of steel to compensate the fishery for the loss of profit it suffers, the price being the reduction in the earnings of the mill. The bargain between the parties will lead them to an agreed level of steel output at the point where the loss of revenue to the mill will equal the gain of the fishery, the air pollution being the optimal. Interestingly, the outcome of the bargain will be the same whether we grant property rights to the mill or the fishery. Figure 4 helps explain the operation of the theory. Let us assume that the right in fresh air is with the steel mill. The fisher will have to make offer of money to the mill to curtail output. Prior to negotiations the mill was producing Q^{**} of steel with AOQ^{**} profit. The fishery was losing TQ^{**} of profit because of pollution the mill generated. The fishery would be gaining so long as it pays to the mill to reduce output less than or equal to what it gains in terms of increased profit. On the other hand, the mill will accept from the fishery any amount so long it is more than or at least equal to the

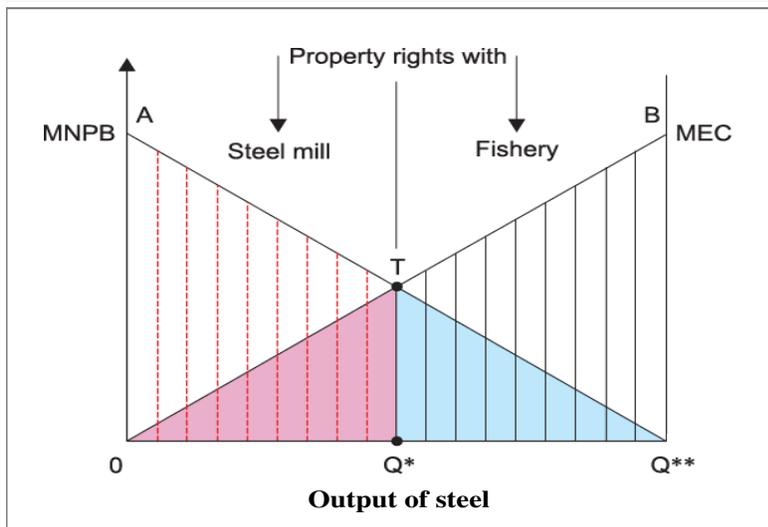


Fig. 4: Coase theorem in operation

shrinkage in its profit from output reduction. The settlement would be at point t where the marginal gain of the mill would equal the marginal payment of the fishery. The equilibrium output would be Q^* . Pollution would be reduced proportionately. The net profit of the mill plus compensation

received from the fishery would be $AOQ \cdot T$ and of the fishery minus compensation paid would be $Q \cdot TBQ^{**}$. You can easily reverse the argument if the property rights in fresh air were with the fishery to arrive at the same result. For details, see Hasan (2015),

Coase theorem widens the concept of resources firms use in production including in the concept also those which it uses for example air and water as receptors of waste for which they do not pay but impose various sorts of costs on the society. In that it widens the concept of scarcity and extends the meaning of efficiency. Passing of resources not paid for through the market the theory internalizes the externalities. It raises the cost of production for individual firms which the attempt to pass on to the consumers in charging higher prices. The changes in concepts mentioned are incorporated in the *fundamental theorem of welfare economics* derived from the Pareto optimality conditions: $MRT_{YX} = MRS_{XY}$ ¹² Figure 5 depicts these implications in operation,

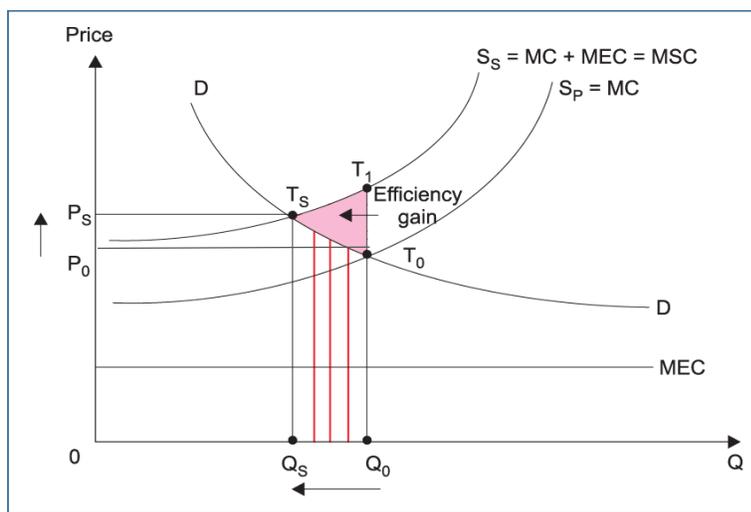


Figure 5: The impact of internalizing externalities

to Q_S . The shaded area shows the efficiency gain enhancing social welfare.

6.2.1.1 Weaknesses of Coase theorem

- **Narrow outlook:** One serious pollution problem that the Coase theorem fails to take note of is *global dimming* – the increasing reduction in the volume of sunshine reaching the crest of the earth day by day. The phenomenon is caused by the clouds absorbing the chemical droplets and gas particles hanging in the air, oil burning in airplanes, devastating carpet bombing the places like Afghanistan, Syria, Iraq, and Yamen have witnessed in more recent years, not to mention the past follies. Unceasing activities of the sort restrict the needed sunshine from reaching the earth surface. To illustrate, the pollution coming from the industrially advanced Europe and America blankets the Indian Ocean south of Africa in smog and the rising *dimming effect* it results in does not allow enough cloud formation over North Sahara for rain. This has caused perennial crop failures, spread of famines and diseases. The desert is on the march

¹² For further explanation, see Hasan (2015 chapter 12), 318-321.

impoverished people even from places rich with unexplored natural resources. The Coase theorem is powerless to deal with such monumental issues.

- **Non-availability of information:** Even at the domestic level, one seldom comes across examples of successful bargains in environmental goods except few cases of some nuclear power stations indulging in negotiations with people in their neighborhoods. Pollution mitigating market solutions are severely handicapped by the non-availability of the needed information and moral hazard of the parties involved. In our mill-fishery illustration above, the fishery would rarely know the reduction in the mill's profit the curtailing of steel output would cause nor could the mill know for sure the value of damage acid rain, and rain alone might be inflicting on the fishery. The bargain takes place in vacuum. The agreed rate of compensation T_0Q_0 would most likely be the rental of the guess work.
- **Transaction costs:** Pollution is pervasive. We would require numerous bargains all the all the time. In case the polluters are not willing to bargain or the bargains breakdown for any reason, legal action may have to be taken involving costs in terms of time and money. The court proceeding are slow, identification of polluters may be difficult, and the estimation of damage caused for compensation may not be easy. For example, in our illustration, the mill alone may not be the cause of pollution harming the fishery; Its moving sources like the automobiles could be the culprits, partially at least, but can easily evade negotiations with the steel mill or the fishery. Costs involved in handling such situations may keep people away from bargains.
- **Free-riding:** Suffers from the same source of pollution such as advertising on the TV channels may be irritating and repulsive to many for its repeated hammering, obstructions, and the noise it makes but nobody files a PIL suit waiting for someone else spend money and time; for, they would benefit automatically free of cost, if he wins. In the business as in politics free-riding may bring in enormous gains.
- **Identification problem:** Even when transaction costs are not prohibitive, and negotiations promise net gain to the parties, bargain may not take place for two reasons. First many pollutants hang in the air for long and the damage they cause is unveiled in many cases after decades, even centuries. Many toxic chemicals, radioactive wastes, global dimming and green - house gases fall, for instance, in this category. The sufferer may even have died before he could know the cause, let alone think of taking action. Second, the sufferer may not be knowing which pollution has hit him and what or how much damage it has caused. The regulatory authorities may fail to identify all the polluters or estimate the monetary value of the injury they are inflicting on others.
- **Market imperfections:** Finally, the Coase theorem rests on the assumption of perfect competition in both the product and factor markets. Under perfect competition we have: $MNPB = P - MC$ in conventional economics. However, in environmental context we find $P = MC + MEC$ where MEC we know is the marginal external cost. Thus, $MC + MEC$ constitute social cost (SC). This puts $MNPB = P - SC$ in a state of equilibrium.

It is this formulation of the MNPB which constitutes for the mill in our illustration at the bargain table. But recall that for a firm operating under perfect competition $MR - MC$ gives the marginal

profit curve. The equation $MNPB = P - MC$ is valid under perfect competition only because AR equals MR . The condition does not hold under imperfect competition – $MR = MC$ is less than AR . Here $P - AC$ is the measure of the per unit profit, nor $P - MC$. This detracts much from the basis of Coase theorem. Theoretically, the bargain is feasible under imperfect competition though (Pearce et al 190), but would be much complicated beset with many imponderables. Its practical utility is much restricted.

6.2.2 Other policy options

There are a number of measures public authorities use to control pollution. Fixing standards for various sort of emissions on transport vehicles, for example, and imposing penalties on the standard violators is perhaps the oldest and commonly used measure in the list.¹³ Taxation and subsidies entered the popular list presumably in the early decades of the preceding century. Emissions trading came in late possibly the Coase effect. The last two measures we briefly discuss below.

Pollution charges: pollution charge is imposed per unit of output. The charge is usually imposed equal to the estimated social cost. The tax reduces the equilibrium output as the producer raises the

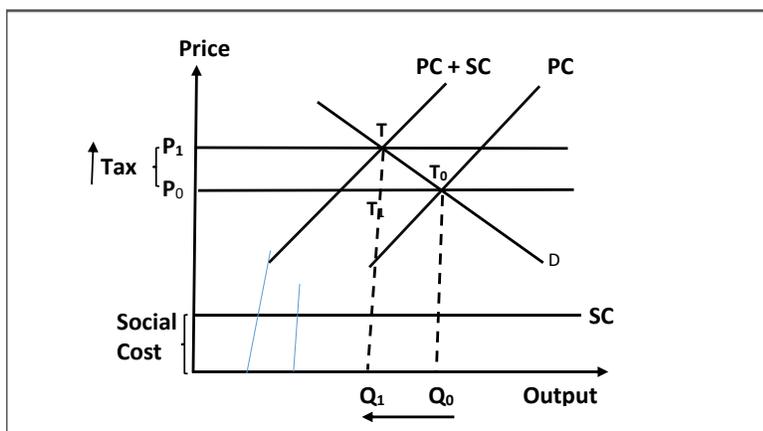


Figure: 6 Taxing polluters to cover damage cost would raise price reduce output and conserves resources

Price to recover the tax. In Figure 6 the social cost is assumed constant to keep matters simple. The pre-tax equilibrium of demand and supply based on private cost only is at point T_0 for P_0Q_0 combination. Imposition of tax equal to SC internalizes externalities (Fig.5) and shifts the supply curve to the $PC+SC$ position reducing equilibrium output to Q_1 and raising the price to P_1 . Notice that the rise in price is less than the

tax amount. The reason is that the seller and the buyer have to share the tax depending on the relative elasticities of demand and supply curves. The two limiting cases are: if the demand is perfectly elastic, the seller will have to bear the entire tax. In contrast, in case the supply is perfectly inelastic the seller would be able to shift the entire tax to the buyer.

These taxes may be applied indirectly as well e.g. on consumer goods using which can damage the environment such as excise taxes on gasoline or cigarettes. Environment-related provisions can be inserted in other taxes also. There are, however a few problems with taxation.

First, the charges do not exempt the pollution absorbed by the natural agent – air or water. To reiterate, this issue stands resolved for practical reasons the public authorities have property rights in the environmental gods. Second. A more serious difficulty is that once a firm under the threat of taxation has already curtailed the output to optimal pollution level, why should such output be subjected to tax? The firm would be burdened with two sorts of losses. It loses profit on the output

¹³ These levies are also known as green taxes, emission taxes or "Pigouvian taxes" as professor A.C. Pigou was probably the first to suggest their use.

voluntarily foregone but even so pays tax on what it produces. It is a sort of double taxation (Hasan 2015, 334). Third, it is difficult to estimate the damage and its money value. Damage figures are easy to manipulate. The idea that the amount of an optimal tax can be justly determined is unreal.

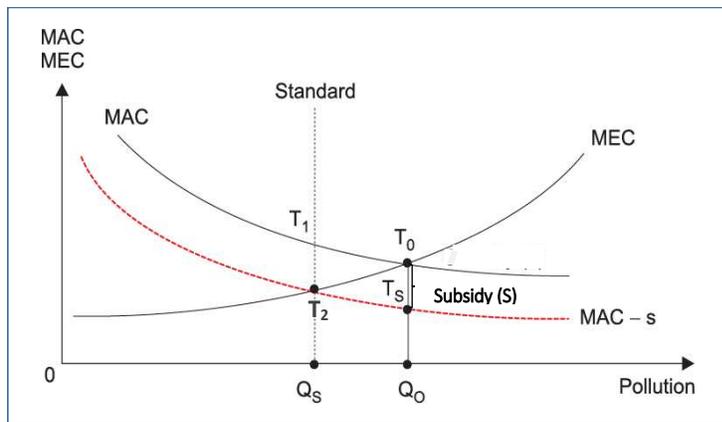


Figure 7: Subsidy helps cut pollution

Finally, taxing pollution is a relatively recent idea. It still has not fully caught the imagination of the policy makers and the bureaucracy tends to stick to the conventional standard-penalty policy as a measure to check pollution.¹⁴ In fact, the prescription of a subsidy grants to encourage the polluters use more efficient technologies as damage abates is gaining ground – the use of scrubbers or filters in the coal burning

mills and the passing the smoke through water before it releases into the air are the examples attracting subsidies for meeting full or partial cost of the equipment. Here the vertical axis measures marginal abatement cost and also the marginal external cost while pollution is measured on horizontal axis. initial equilibrium is at T_0 the firm incurring some cost to control pollution. The regulators feel that emissions must meet the standard at point T_2 . They offer the firm T_0T_s subsidy to meet the loss so as to reduce output to Q_s level. Notice that the MAC is lowered appropriately to meet the desired standard. The firm has the option to use better pollution control methods to lower emissions such that it could continue producing Q_0 output. Subsidies can be provided in other indirect ways; for example, firms using green technologies may be provided accelerated depreciation in taxation.

Emissions trading

Emission trading is a market based approach for curbing pollution and operate via tradable pollution permits it seeks to combine the profit motive with incentive for good performance. The measure is democratic and is commensurate with freedom of choice devoid of threats of penalties or taxation. Developed in the 70s and 80s, presumably under the Coase influence, emissions trading originated in the US in 1990 to combat acid rain. More recently it has assumed increasing significance for fighting greenhouse gas emissions linked to climate change.

In this measure, a cap on emissions is set and permits are created up to the level of this cap. The companies or other entities covered by the scheme need to hold one permit for every specified unit of pollution e.g. tonne of CO₂e, they can emit. The price put on a permit multiplied by the number of permits purchased is the cost the buyer has to bear. Each firm is free to buy permits for as much pollution as meets its production needs. The market for permits thus imparts flexibility to he distribution of permits among firms and over space. There are two main considerations that

¹⁴ However, despite limitations pollution charges tend to gain currency since the closing decades of the twentieth century and their share in the public tax revenues is on the rise even if at a slow pace. Norregaard et al (2000).

influence decisions of business firms in the matter. First what criterion public authorities would adopt to ensure an efficient distribution of emission rights between firms and regions? Second, how would this criterion be put into operation? Figure 9 helps us to fix and explain the criterion for an efficient distribution of rights. It shows how the two hypothetical firms – A and B would be

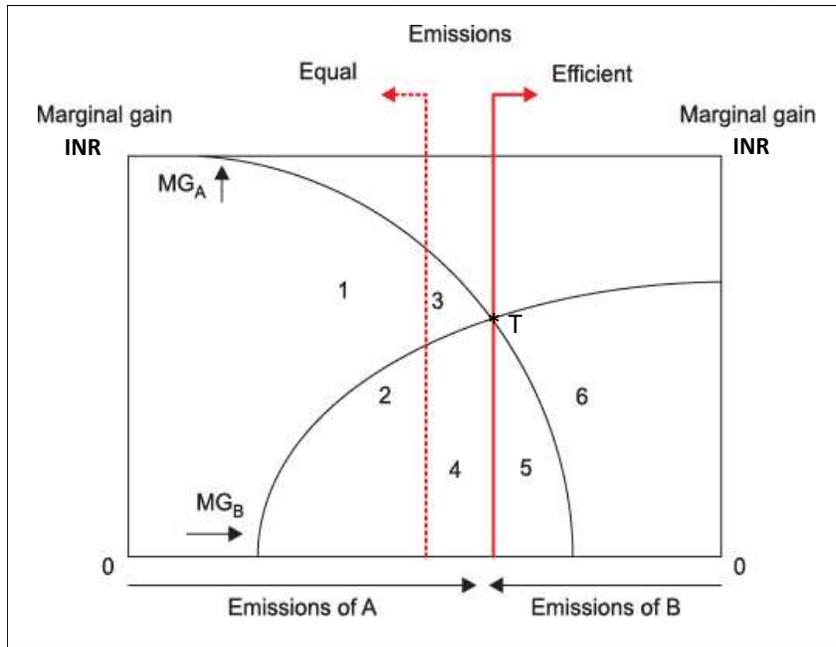


Figure 8: Efficient emissions

in an efficient permit distribution state regarding their rights with reference to the value each puts on them. Emissions of firm A increase from left to right and of firm B from right to left. Likewise, the curves MG_A and MG_B provide the marginal value A and B respectively put on emissions. The lower segment of MG_B (i.e. before crossing MG_A) indicates that B puts a smaller profit value on emissions than A.

After the intersection point the position is reversed; B puts greater value on emissions than A.

Let the dotted perpendicular show an equal distribution of rights between A and B. Then, with reference to the intersection point T, the total gain for the form A would be 1 +2 and for B the area 4 +5 +6. An efficient allocation of rights takes place when the marginal gain of the two firms become equal as at point T. Now, firm A gains 1 +2 +3 +4 and firm B, 2 +4 + 5 +6. It is easy to see that total gain is maximized under efficient distribution regimen.

Emissions trading was a central element of the Kyoto protocol in the form of the Clean Development Mechanism (CDM) and has been the cornerstone policy of the EU, whose Emissions Trading System (ETS) is the largest in the world even as its progress is slowed down in the US due to the inter-state differences on implementation.

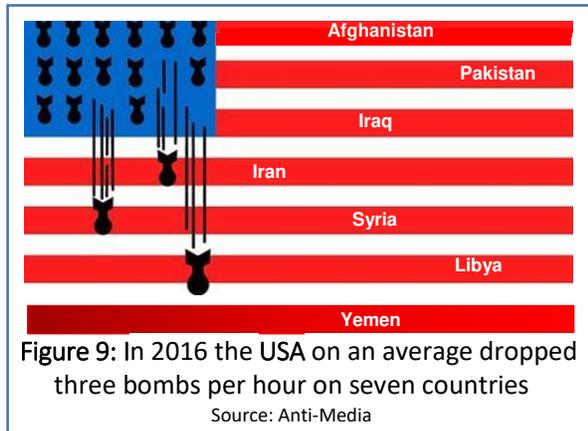
The system is democratic frictionless and flexible. New comers can be entering the market without realignments. Either the raising of the cap or the price or both can do the needful (Hasan 2015, 136-137). However, emission trading has its limitations. It presumes an honest and efficient regulator. For, it is found that the emissions trading has often been marred by weak caps, free handouts of permits to the biggest polluters and the purchase of "offsets" – carbon credits imported from outside the cap-and-trade system.

7 CONCLUDING REMARKS

We have discussed the nature environmental problems and how serious these are becoming with the passage of time in the foregoing pages including the measures which are or can be taken to

handle them. Species extinction is one major and worrisome issue.¹⁵ the problems epitomize in climate change. However, most environmental problems tend to epitomize in what is described as ‘climate change’ the result of global warming. And the world seems to have really become concerned about it. The 2016 Paris Accord was a big deal. The US as the world’s biggest polluter joined in such an agreement for the first time. The resistance from two largest populations of the world – China and India – has also gone. But Trump the new president has made some alarming statements. He calls ‘the idea of climate change, a ‘Chinese creation’. (TOI, January 20, 2017, 24).

Finally, we have shown the modern warfare as a major contributor to international pollution.



As per estimate recently released by the Council on Foreign Relations (CFR), in 2016 alone, the Obama administration rained at least 26,171 bombs in seven different countries, averaging three bombs an hour, every day, every month, the whole year. The figures, says the report, are relatively conservative, meaning the number of bombs dropped by the Obama administration in 2016 may be much higher: May be, in the last year of his administration the president was trying to glorify democracy in the American history

under his signatures. The Report concludes that there was no legal validity for this action save, if at all, the stretching the interpretation of an old permissibility for military action.

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¹⁵ A research reported from Illinois University claims that that 60% primates – the closest biological relatives to human-beings - face treat of extinction largely due to human activities; many species are down to just a few thousand (Times of India, January 20, 2017, 23).

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