AIR POLLUTION AND RESPIRATORY ILLNESS

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Abstract

Traditions in which the value of nature is imbedded merit attention not only because of the role they once played in ancient patterns of sustainable resource use, but because these traditions express fundamental cultural values that remain relevant. An informed appreciation of these cultural values is capable of providing insight and motivation about environmental issues that concern us today. Environmental destruction is not an issue related to quality of life - it is a question of survival. The Rio Summit of 1992 tried to achieve what had been missing 20 years back. lndustrialisation and mega-projects which have given material prosperity to the West are found suspect from the environmental point of view. Opinion is divided not only on global warming and ozone depletion, but also on biodiversity and forest conservation. Air pollution may be simply defined as the presence of certain substances in the air in high enough concentrations and for long enough duration to cause undesirable effects. "Certain substances" may be any gas, liquid, or solid, although certain specific substances are considered significant pollutants because of very large emission rates or harmful and unwanted effects. Two kinds of ambient pollutants are regulated under the Clean Air Act, and characterize five primary pollutants and one secondary pollutant as criteria air pollutants. The five primary criteria pollutants include the gases sulfur dioxide (SO_2), nitrogen oxides (NOx), and carbon monoxide (CO), solid or liquid particulate (smaller than ? m), and particulate lead. Ozone (O_3) is the secondary criteria pollutant. Although ozone near the ground is a harmful pollutant, in the stratosphere it helps block harmful ultraviolet radiation. Air pollutants associated with certain specific sources and that pose immediate threats to human health are called air toxins or hazardous air pollutants (HAPs). A number of scientific groups agreed that radon causes lung cancer in humans. During the past decade, the morbidity and mortality from adult asthma has been increasing. The success in understanding the environmental problems can properly be viewed in the dictum "THINK GLOBALLY AND ACT LOCALLY." Because of the rapid deterioration in environmental conditions, environmental pollution has emerged as a global menace. Therefore, effective pollution control is the need of the hour. The future generations will praise our foresight, if we cooperate in a global spirit to save the environment of our planet. The hope rests on the actions taken by the present generation towards wise

stewardship of the Planet Earth for a better quality of life. May our endeavors continue in this direction.

INTRODUCTION

Traditions in which the value of nature is embedded merit attention not only because of the role they once played in ancient patterns of sustainable resource use, but because these traditions express fundamental cultural values that remain relevant. An informed appreciation of these cultural values is capable of providing insight and motivation about environmental issues that concern us today. Because of the rapid deterioration in environmental conditions, environmental pollution has emerged as global menace. Therefore, effective pollution control is the need of the hour. The present environment mess, ranging from deforestation, soil and biodiversity loss, to pollution and change in chemistry of the air, is not a disease by itself but only a symptom; like high fever is not a disease in itself but can be a symptom of many diseases. When we try to pick out anything by itself, we find it hitched to everything else in the universe. We cannot command nature except by obeying her. Unlike the situation in the West, the question of environmental destruction is not an issue related to quality of life – it is a question of survival. The ecological notion of an ethic is that of a limitation upon freedom of action in the struggle for existence. Environmental impact analysis provides factual documents of various ecological disasters. Industrialisation and mega projects which have given material prosperity to the West are found suspect from the environmental point of view. Opinion is divided not only on global warming and ozone depletion, but also on biodiversity and forest conservation. The developing countries do not have this luxury of achieving development at the cost of the environment. The UN summit on environment held at Stockholm in 1972 was an eye-opener: it brought both the developed and developing countries to a common table. The Rio summit of 1992 tried to achieve what had been missed 20 years back.

MEANING OF POLLUTANTS

The substances which cause pollution are known as pollutants. According to 'The Indian Environment (protection) Act, 1986', a pollutant has been defined as any solid, liquid or gaseous substance present in concentrations as may be or tend to injurious to the environment. However, from the ecosystem point of view, the pollutants can be classified into two basic types. Nondegradable pollutants and bio-degradable pollutants. Air pollution may be simply defined as the presence of certain substances in the air in high enough concentrations and for long enough durations to cause un-desirable effects. Implicit in this definition is the assumption that the air pollution is anthropogenic, that is, caused by human activities. Air pollution can be termed as a battle between the ecosphere and techno-sphere, in modern times, both are essential for human kind.

GLOBAL AIR POLLUTION

Pollution occurs at various places around the globe and is not unique to individual locations.   Scales of pollutant transport in the atmosphere can be described as follows:
Local: Up to a few kilometers from the source and mainly associated with plumes. Regional :   Up to 1000 km from the source and associated with the merging of individual pollutant plumes

Continental: Up to a few thousand kilometers from the source; an inter-change of pollutants between the troposphere and stratosphere is possible at this scale. Global: More than a few thousand kilometers from the source and potentially throughout the entire atmosphere.

AN ENVIRONMENTAL ORDER

For establishing an international environmental order an imperative-action paradigm have been evolved which may prove to be more helpful. Environmental impact assessment (RIA) is an interesting but challenging field of study and practice. The simple relationship for econometric analysis is:

$BD = f(F, P)$; BD is a measure of bio-diversity, F is forest cover, and p is human population in the area of the study.

CRITERIA AIR POLLUTANTS

Two kinds of ambient pollutants are regulated under the Clean Air Act, listing five primary pollutants and one secondary pollutant as criteria air pollutants. The five primary criteria pollutants include the gases sulfur dioxide (SO_2), nitrogen oxides (NO_x), and carbon monoxide (CO), solid or liquid particulates (smaller than ? m), and particulate lead. Except perhaps for lead, the primary pollutants are emitted in industrialized countries at very high rates, usually measured in millions of tons per year. In the past, major sources of lead (Pb) fumes were motor vehicles that burned gasoline containing a lead-based antiknock additive. Ozone (O_3) is the secondary criteria pollutant regulated under the NAAQS. Although ozone near the ground is a harmful pollutant, in the stratosphere it helps block harmful ultraviolet radiation.

GLOBAL WARMING

Average land surface temperatures are increasing worldwide. In fact, the decade of the 1990s was the warmest ever recorded, and the trend of gradually rising average temperatures seems to be continuing. By some estimates, global mean temperature has risen roughly 0.5°C (1°F) since the end of the 19th century. This may seem to be an insignificant rise, given the wide variation in temperatures that occur on a daily and annual basis at any given location, as well as the obvious difficulty in measuring, collecting, and interpreting world-wide temperature records dating as far back as a century or more ago. But most atmospheric scientists think that even a small increase in average global temperature can have a noticeable impact on Earth's climate.

GREENHOUSE EFFECT

To understand this theory of global warming, it is necessary first to distinguish between a natural greenhouse effect and an anthropogenic greenhouse effect. The natural greenhouse effect is a normal result of the presence of a blanket of air around earth, while the anthropogenic greenhouse effect is considered to be a direct result of the accumulation of trace gases in the air from human activities. It is important to note that without the natural greenhouse effect, life in its present form would not be possible to earth. Hundred of modem instruments are available from manufacturers for analyzing gases. Colorimetric and bubbler techniques are what may be called first and second

generation air analysis devices. An example of a widely used third generation device is the nondispersive infrared analyzer. This is used to measure gases that absorb infrared radiation, such as CO, SO_2, NO_x, and HC. The measurement is based on the principle of selective absorption; different gases transmit and absorb different wave lengths of infrared radiation.

CLEAR AIR ACT

There have been several amendments to the clean air act of 1963 and the air quality act of 1967; together, the original acts and their amendments may be referred to simply as the clean air act (CAA). The clean air act amendments of 1970 began to strengthen the federal air pollution control effort. The primary NAAQS (as of 1990) for six criteria pollutants are presented in Table Primary standards were established to protect public health; secondary standards were established to protect against nonhealth effects, such as crop damage or visibility.

PRIMARY NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)

Pollutant	Averaging time	Allowable concentration
PM_{10}	Annual arithmetic mean	$50\ ?\ g/m^3$
	24 h	$150\ ?g/m^3$
SO_2	Annual arithmetic mean	$80\ ?\ g/m^3$
	24 h	$365\ ?g/m^3$
CO	8 h	$10\ ?\ g/m^3$
	1 h	$40\ ?\ g/m^3$
NO_2	Annual arithmetic mean	$100\ ?g/m^3$
O_3	1 h	$235\ ?g/m^3$
Pb	3mo	$1.5\ ?g/m^3$

AIR QUALITY INDEX
HAZARDOUS AIR POLLUTION STANDARDS

Pollutant	Averaging time	Allowable concentration
Asbestos	8	$1\ fiber/cm^3$
Beryllium	8	$2\ ?\ g/m^3$
Mercury	10	$0.01\ mg/m^3$
Vinyl Chloride	8	1 ppm

AQI	Health Effect
0 to 50	Good
51 to 100	Moderate
101 to 200	Unhealthful
201 to 300	Very unhealthful

Episode Criteria. AQI levels above 100 may trigger preventive actions by state or local officials.

POLLUTION AND LUNG DISEASES

The study of environmental health is undergoing revolutionary changes as we begin to understand more clearly the relationships between human health, wildlife health, and ecosystem health. In effect, a new field of study is being born. Attempts are being made at naming this emerging transdisciplinary field. One such name is "conservation medicine": a book on that topic was recently reviewed in Environmental Health Properties (EHP). Multiple exposure of pollutants, within or between classes, may usually be referred to as potentiation. Sometimes the combined effects of two pollutants are less rather than more severe, and this situation is referred to as antagonism. The occurrence of synergistic effects makes it difficult to study the effects of pollution since so may different pollutants are present in the environment and this makes it hard to predict the effects that might take place when certain air or water quality standards are met.

The Workshop on Environmental Exposure and Cancer was held by Cancer Care Ontario (CCO) 25-26 April 2001. An expert panel convened to achieve consensus on a list of important environmental exposures, priority environmental exposures in Ontario, and recommendations for CCO in the areas of surveillance, research, and prevention activities to address these environmental exposures. Panel members developed a working definition of environmental exposure and criteria to prioritize the identified exposures.

Toxicoproteomics is the use of global protein expression technologies to better understand environmental and genetic factors, both in episodes of acute exposure to toxicants and in the long-term development of disease. Integrating transcript, protein, and toxicology data is a major objective of the field of toxicogenomics. Because the morbidity and mortality from adult asthma have been increasing, the identification of modifiable environmental exposures that exacerbate asthma has become a priority. Numerous epidemiological studies demonstrate an association between exposure to tobacco smoke and recurrent wheezing, bronchial hyper reactivity, as well as a diagnosis of asthma. Tobacco kills over 5 million people worldwide annually (WHO, 2003). By 2020, it is predicted that tobacco will cause more deaths worldwide and HIV, tuberculosis, maternal mortality, motor vehicle accidents, suicides and homicides combined. Cigarette smoke contains over 4000 poisonous chemicals and over 40 of them have found to be carcinogenic (cancer – causing). The poisonous gases – hydrogen cyanide, sulphur dioxide, carbon monoxide, arsenic, nitrosamines – and residual pesticides in tobacco affect the health, including reproductive health of men and women.

Upon contact with allergen, sensitized mast cells release highly active proinflammatory mediators. Allergen-mediated mast cell activation is an important mechanism in the pathogenesis of atopic asthma. Transition metals and endotoxins

associated with particulate matter (PM) may influence cytotoxic and proinflammatory effects.

Consumption of food containing mercury has been identified as a health risk. The U.S. Environmental Protection Agency (U.S. EPA) and the National Academy of Sciences recommend keeping the whole blood mercury level < 5.0 ? g/L This corresponds to a reference dose (RFD) of 0.1 ? g/kg body weight per day. All patients in a 1-year period (n = 720) who came for an office visit in a private internal medicine practice in San Francisco, California, were evaluated for mercury excess using the current RFD.

Hazardous air pollutants (HAPs) are compounds shown to cause cancer or other adverse health effects. Population-based childhood cancer incidence rates in California census tracts were analyzed. For each census tract, exposure scores by combining cancer potency factors with outdoor HAP concentrations modeled by the U.S. Environmental Protection Agency were calculated. The relationship between childhood cancer rates and exposure scores for 25 potentially carcinogenic. HAPs emitted from mobile, area, and point sources and from all sources combined were evaluated. Using Poisson regression, we estimated rate ratios (RRs) adjusted for age, race/ethnicity and sex it was estimated at about 97.8% were found to be affected by lung diseases.

A panel study of 22 children with asthma who were 10-16 years old and living in a Los Angeles community with high traffic density was conducted. Subjects filled out symptom diaries daily for up to 3 months (November 1999 through January 2000). Pollutants included ambient hourly values of ozone, nitrogen dioxide, sulfur dioxide, and carbon monoxide and 24-hr values of volatile organic compounds (EC) and organic carbon (CO) PM_{10} fractions. Although acute adverse effects on asthma have been frequently found for the U.S. Environmental Protection Agency's principal criteria air pollutants, there is little epidemiologic information on specific hydrocarbons from toxic emission sources.

Koken et al compared daily cardio-vascular hospital admission for people > 65 years of age with measures of temperature, particulate matter, and gaseous pollutants. Ozone was associated with hospitalization for myocardial infection, coronary atherosclerosis, and pulmonary heart disease. Higher temperatures were associated with hospitalization for myocardial infection and congestive heart failure and with a decrease in visits for coronary atherosclerosis and pulmonary heart disease.

The effect of cooking smoke on the reported prevalence of asthma among elderly men and women ($\geq$ 60 years old) was examined. The analysis is based on 38,595 elderly persons included in India's second National Family Health Survey conducted in 1998 – 1999. Effects of exposure to cooking smoke, ascertained by type of fuel used for cooking (biomass fuels, cleaner fuels, or a mix of biomass and cleaner fuels), on the reported prevalence of asthma were estimated using logistic regression.

CONCLUSION

The Bhopal disaster of 1984, the worst environmental disaster in history, focused bluntly on the need of environmental awareness & education in India at the cost of several thousand lives. There has to be a social and economic transformation in the country at the grassroots with minimal or manageable environmental effects. This would enable us to keep the environment clean. Conservation is not an abstract principle, but a vital link between today and tomorrow which teaches us to work with nature and not against it. The economic and environmental movement have to go hand in hand. If the human race does not follow and respect the principles on which Nature operates, its wrath will take over. The principle of "Environmental Backlash" will operate, This principle states that "in practice, the earth system acts as a gigantic living organism and shows irritability and response to any natural or human-induced interference". These create impacts which may often be unpredictable. In short, the system reacts to any intrusion. A sustainable society has faith in science and technology as an instrument of environmentally friendly social and economic change. The basic needs of the people are to be met without any serious detriment to the environment. Thus Gross National Product should be replaced with Gross Natural Product (GNP). This will show the real situation of development. The success in understanding the environmental problems can properly be viewed in context with the dictum "THINK GLOBALLY AND ACT LOCALLY." For short term gains, long-term environmental and economic costs must be avoided. The earth provides enough to satisfy every man's needs, but not everyman's greed. In order to improve sustainability, we need appropriate environmental policies, and a whole range of environmentally - friendly technologies. Furthermore we need a strict environmental code regarding environmental impact assessments and environmental management plans: We also need to introduce relevant and environmentally - clean technologies that are carefully planned, directed, absorbed and regulated taking into account environmental safety and employment-generating aspects. The kinds of strategies to minimize human hazard depends upon the nature and cause of the exposure, the pesticides involved, and the resources available. Already Japan is developing a 100-year plan to capitalize on environmental concerns by designing "Green Technologies", and the European nations are also trying to move in the same direction. It is obvious that those who do not plan ahead on the present and emergent environmental issues, and do not pursue environmentally responsible development are going to be left behind in dust and smoke. The future generations will praise our foresight, if we cooperate in a global spirit to save the environment of our planet. The hope rests on the actions taken by the present generation towards wise stewardship of the Planet Earth for a better quality of life.

"MAY YOUR ENDEAVOURS CONTINUE IN THIS DIRECTION."

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