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POWER, POLITICS AND ENVIRONMENT

N. GUNNINGHAM*

If the environment is as seriously threatened as some observers allege, then it is important to examine the possibilities of halting, or at least of reducing, some of the dangers. This article focuses on atmospheric pollution, and considers the possibilities of successful political action by legal means within existing social arrangements.

Environmental Control : Conflicting Perspectives

For the purposes of discussion, and at the risk of over-simplification, it can be said that three basic positions have been taken towards the environment.

(i) That it is not being threatened.

(ii) That some threat exists but that, given sufficient funds, it can be dealt with without changing the prevailing aims and policies of our society.[1]

(iii) That overpopulation, exploitation of natural resources and pollution will cause eco-catastrophe if present policies are not drastically amended. From this perspective it is claimed that the capitalist market economy has not, and will not, be able to deal with the environmental problems we are facing because its ethos of exploitation for individual gain, its reliance upon profit and expansion, are fundamentally incompatible with the ethos of environmental protection.

Politically active proponents of this view have included concerned individual scientists such as Dr. Paul Elrlich, the British Society for Social Responsibility in Science, materially disinterested groups of

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1. Thus the Royal Commission on Environmental Pollution saw the problem as "how to strike a balance between the benefits gained from economic and technical achievements and what is being lost in terms of deterioration of the environment". In economic terms, maintaining the free enterprise system whilst introducing mechanisms (e.g. taxing) to ensure that industries "internalise" the costs of the pollution they cause, so that the social costs of production (including pollution) do not exceed the benefits to society of the goods produced.

The moderate position then, includes spending more money on pollution controls, turning to less harmful methods of industrial production, but it does not include any basic change in an economic system based on profit making and economic expansion.

conservationalists (Friends of the Earth, the Conservation Society), and the Ecologist magasine.

At the other extreme, those who do not regard pollution as a problem are diminishing as some of its consequences become increasingly obvious and inescapable. In the past, most significant amongst these have been government and industry but political and economic necessity[2] are now forcing both to take some action. However, there are strong reasons why such action is unlikely to result in more than a mild interference with the present system, rather than in any radical present system, rather than in any radical reversal of our allegedly destructive growth technology.

In industry's case, the dilemma is that controlling pollution is expensive, but adds nothing to the value of the goods produced, and is thus bad business to any firm whose main concern is to maintain a level of profit in a competitive situation. In this respect, the interests of industry and government have coincided, since in Britain "Both major political parties appear to be mesmerised by two dominating notions; that economic expantion is essential for survival, and is the best possible index of progress and well-being; and that unless solutions can be devised that do not threaten this notion, then the problems should not be regarded as existing"[3]. The radical solutions of the *Blueprint For Survival*, for example, would produce a shrinking tax base, falling revenues, higher costs, shrinking markets, lower Gross National Product-all of which are antithetical to the present aims and policies of government,

The Resolution of Conflict

In no sense can it be said which of these conflicting perspectives is 'right.' The dispute cannot be resolved by reference to scientific evaluation not only because we lack adequate knowledge, but because the problem is essentially political. How one views pollution, and what level of it one should tolerate depends upon what one wants to do with the environment—upon, whether for example, one considers

2. Pollution now has vote-catching potential, and government must appear to act to safeguard the health of its citizens in order to maintain its legitimacy. At the same time, certain parts of industry are coming to realise that their long term aims may be better served by limiting their present level of pollution (within the confines of the profit margin) rather than by risking a possible total ban on their activites in consequence of a future ecological disaster (a detailed study of industry's position is contained in Gunningham N. A. *Pollution, Social Interest and the Law*, Martin Robertson. 1974.

3. *The Ecologist* Vol, 2 No. 1.

that inhaling toxic agents produced by various industrial processes, is a reasonable price to pay for the financially inexpensive goods those processes provide. The solution to this, and to other problems, can only be given in terms of values, and in the event of conflict between groups and interpretations as to what we should do with the environment, then correctness becomes a practical matter of power and political persuasion, not of scientific evaluation.

Recognising this, we must explain the operation of political power in order to understand the present balance of environmental forces, and the possibilities for further action. In doing so, we must reject as inadequate the orthodox view of the democratic functioning of power whereby the 'general will' of the people becomes enacted in legislation. Sadly, this does not reflect the practical workings of the political system.

First, since no working consensus exists on the extent to which pollution should be controlled, then the most that public opinion can represent is the views of a majority of the population, and in a 'mass' society, even this concept is becoming increasingly inadequate. The public can only act when it becomes aware of a problem, and lacking first hand knowledge of what goes on in society (except within a small sphere of personal experience) man is led to rely increasingly upon what he is told by the instruments of mass communication. The media then, have the power to shape, interpret and disseminate information. What they choose to turn their attention to, and what they ignore, depends largely upon what they deem to be newsworthy—a point to which we shall return.

In practical terms, this means that public opinion in relation to pollution is essentially reactive, and in the absence of obvious environmental threat (i. e. that can be seen, smelt, or heard), or media action, it is of negligible importance.

As such the role of interest groups and voluntary associations as representatives of the various factions within society, becomes increasingly important. Thus if we have a number of roughly equal competing groups lobbying M. P's exerting pressure, striving for media attention, then these can act as genuine instruments of the public.

Unfortunately, the evidence is that these groups are declining in importance, that the institutions of power are often large scale and inaccessibly centralised, and that instead of a plurality of pressure groups proportionally representing the views of the various factions within a balanced society, there are rather a small number of unequally powerul interests dominating the legislative struggle. Thus "the units

of power...that count in any balance are few in number and weightly beyond comparison with the dispersed groups on the middle and lower levels of the power structure."[4]

This model of the basis of power can be both substantiated and elaborated by taking legislation on atmospheric pollution as an index of the relative success of the various groups in defending their perspectives.[5]

It then becomes apparent that the law reflects the interests of those taking the first and second positions outlined at the beginning of this article. Thus legislation relating to atmospheric pollution is minimal, incoherent, and under-enforced. Only on the occasion of the Clean Air Acts was legislation passed which might have led to significant curbs on atmospheric polluters, but this covered pollution which is neither different in kind from, nor more serious than, many other types that still go unlegislated.[6]

To understand why legislation is so weak, and how powerful interest groups—specifically government and industry—may operate in influencing legislation, we may turn to events leading up to, and the passing of the Clean Air Act (1956). This Act is still today the foremost piece of legislation in the area of atmospheric pollution.

The initial impetus towards the passing of the Act lay in the recurrent, and often deadly smogs, which were experienced in major industrial cities, particularly London, for a number of years. However, despite the activities of pressure groups advocating a clean air policy (particularly the National Smoke Abatement Society), nothing was done until in 1952 a major smog struck London, and contributed to the deaths of an estimated four thousand people. At last campaigners for

4. Mills C. W. (1956) *The Power Elite* Oxford University Press.
5. Although legislation is not the only way to try and maintain a specific level of environmental quality (others include persuasion, economic sanction, negotiation, international agreement and education) nevertheless it is the index most appropriate to analyse a situation of conflict where one faction seeks to *force* another to comply with its own view of the necessary level of control.
6. See for example Bryce-Smith, D. 'Fresh Poison Delivered Daily' *Observer Magazine* June 1972. It is particularly interesting to note that there is still no statutory limit on any air pollutant in our cities, and that the test employed to determine what levels of pollution are satisfactory—the 'best practicable means', "reflects the economic convenience of industry. It is by no means adequate to prevent factories from passing on or externalising their air pollution costs to the local population" (J. Buglar; *Polluting Britain*: Penguin 1972).

clean air gained increased media coverage and public support which led to vociferous demands for legislation. In consequence the Beaver Committee was established to enquire into the causes of smoke pollution and to make recommendations upon which a subsequent Private Members Bill was based. This latter was withdrawn upon assurances that the Government would bring its own Bill, but there is little doubt that government would not have acted had it not been pressurised into doing so. As one M. P. remarked: "Minister after Minister has answered questions in the House in the most complacent manner during the past ten years. We do not have to thank them nor the Ministries, for taking resolute action".[7]

It was at the legislative stage that the impact of vested interest first became apparent. Unlike the originators of the former Private Members Bill, the government stressed consultations with Industry, and in the event, many M. P's were critical. Dr. Summerskill recognised that although the Bill adopted the principal recommendations of the Beaver Committee:

> It has been hedged with so many savers and waivers as to render it abortive unless we exercise the greatest vigilence in its administration. It seems to have provided a mask through which the indifferent or incompetent producer of smoke can escape. Indeed, listening to the Parliamentary Secretary, it appeared to me almost as though the government had deliberately framed the measure so as to let industrialists escape.[8]

Mr. Nebarro suggested that

> "the hands of the Federation of British Industries are writ large between the lines", and that the defence of using unsuitable fuel would make it "nearly impossible to prosecute the recalcitrant industrialist who is still largely responsible for black and dark smoke".[9]

Only the domestic householder, devoid of the direct power and influence of the industry, not organised in any lobby, and indeed often in favour of clean air measures in the abstract, bore the full force of the Clean Air Act in adapting to smokeless fuels within Clean Air Zones.

More recent legislative evidence indicative of government (and industry's) position and power on the pollution issue, and of its resistence to any firmly enforced laws imposing more severe penalties, is

7. *Hansard* Vol 536 p 1452.
8. *Hansard* Vol 551 10 April, 1956.
9. *Hansard* Vol 551 10 April, 1956.

available in the Alkali Inspectorate Bill (1973). This was an unsuccessful Private Members Bill which was introduced to Parliament because of

> The mounting criticism...of Her Majesty's Alkali Inspectorate [and of] a need for greater public accountability by the Inspectorate, with greater legal powers of enforcement being given to it in order that the public may have more knowledge of its work".[10]

A new philosophy of severe uncompromising enforcement of laws against industrial polluters was outlined.

In response, on behalf of the government, the Minister of Local Government and Development, meeting accusations of complacency, denied that the Inspectorate was too familiar with industrialists, or that the present system of cooperation was undesirable. He warned that the Bill would not receive government support and that "we would seek to maintain the present principle which I believe has worked well."[11]

The "present principle" has indeed been preserved, as is evident from the two recent Acts which have been passed in this area. Neither the Health and Safety at Work Act 1974 nor the Control of Pollution Act 1974, is likely to have a fundamental or radical impact on the law of atmospheric pollution, though both deserve comment.

The former provides if the words of the Government's explanatory memorandum, "For one comprehensive and integrated system of law dealing with the health, safety and welfare of work people, and the health and safety of the public as affected by work activities." As regards atmospheric pollution the Act aims at "Controlling the omissions into the atmosphere of noxious or offensive substances from (prescribed) premises."[12] However, the general duty laid on persons in control of certain premises is to use the "best practicable means of preventing harmful omissions into the atmosphere. This is the time honoured phrase employed by the Clean Air Acts which Bugler notes "reflects the economic convenience of industry. It is by no means adequate to prevent factories from passing on or externalising their air pollution costs to the local population."[13] Despite the serious criticism the phrase was subjected to in Parliament, it was nevertheless retained and provides little room for optimism that pollution will be more effectively curbed.

10. *Hansard* 11 May 1973. p. 943,
11. *Ibid*. p. 972.
12. Health and Safety at Work Act 1974 Part I, sl (1) (d),
13. Bugler J. Polluting Britain. Penguin 1972.

Nor is there so far any reason to believe that new Health and Executive (which amalgamated the staffs of the main health and safety inspectorates) will adopt a different policy to its predecessors, or specifically to the alkali inspectorate. It does indeed have wide powers, but these in themselves do not insure a higher degree of enforcement than before, nor that the courts will adopt a different outlook. Perhaps, as Bugler notes, "what the offensive against pollution in Britain needs is not only new laws, agencies, taxes and technologies but new attitudes"[14] a theme supported in the Royal Commission[15] of a new national pollution inspectorate to replace the much criticised Alkali Inspectorate.

The Control of Pollution Act, more specifically embraces atmospheric pollution, though it is far less radical in this respect than in the measures covering water, noise and land pollution. The Clean Air Act 1956 and 1968 remain intact, the powers and establishment of the numerically inadequate Alkali Inspectorate are left virtually untouched, and the atmospheric pollution provisions of the 1974 Act concern themselves principally with motor vehicle exhausts.[16]

Attempts to introduce into a law a "general standard" for environmental protection were abandoned. Such a standard would have required all government agencies to have regard to any potential harm to the environment as a consequence of the undertaking of any government or major private projects and, was inspired by the National Environmental Protection Act of the United States, which requires the formulation of an "environmental impact statement", before any major federal government was undertaken. Parliament however, did not feel it necessary to introduce this measure and once again, the standard required of an industrialist is to employ the "best practicable means" to avoid pollution.

Both these acts have the support of the government of the day, and indeed the Control of Pollution Act commenced life under the former Conservative Government as the Protection of the Environment Bill. Neither were radical in content nor fundamental in the changes they proposed. It was understandable therefore that neither met with the power or sustained opposition which greeted the Alkali Inspectorate Bill of 1973.

14. Bugler J. Polluting Britain. Penguin 1972.
15. Royal Commission on Environmental Pollution. Air Pollution Control. An integrated approach H. M. S. O. 1976.
16. This it attempts to do by empowering the Secretary of State to make regulations as to the composition and content of fuel in motor vehicles (s. 75) and also as to the sulpher content of oil fuel (s, 76).

The subsequent fate of that Bill illustrated that government is unlikely to create severe or efficient laws on pollution unless pressurised into doing so. Such pressure must be very strong in order to succeed and in the absence of environmental crisis which evoked strong public demand for legislation, there is every indication that the system will in essence continue.

It is apparent then, that some groups are more powerful than others and from the significant lack of pollution laws on specific environmental dangers, from the weakness of existing legislation and its enforcement, we suggest that the state of legislation not only favours, but has been strongly influenced by, powerful industrial and governmental forces whose economic base is one of financial and industrial capital.

Why these forces have been so successful, why legislation (if it exists) has perpetuated the interests of those who reject any radical change from existing aims and policies, becomes explicable if one understands the nature of the political power structure in Britain, where power can be seen as held largely by a small homogenous elite of wealth and private corporate property-politically entrenched in the leadership of the Conservative Party; strongly represented in or linked with, a variety of influential public and private bodies, assured of the general support of the press, its members sharing for a large part a common exclusive educational background, and united by fairly close ties of kinship and everyday association...it is an elite which (has) its economic base of financial and industrial capital.[17]

This industrial and governmental grouping, with similar material interests in resisting pollution control, is challenged significantly only by the labour party, other channels of opposition being either ineffective or being absorbed into the labour party, as the only effective channel of opposition in the long run.

Within this structure, the advocates of radical change (such as The Ecologist, Friends of the Earth, the British Society for Social Responsibility in Science), lack power in themselves, and have been unable to integrate themselves within the Labour Party because the latter is now a party of social improvement within the capitalist system[18], and

17 Westergaard, J. (1966). 'The withering away of Class : A contemporary myth' in Anderson and Blackburn (eds.) Towards Socialism Cornell University,

18. As Miliband has noted, from the late 1940's on, when the labour party opted for 'consolidation', and retreated from reformism, then theoretically, as well as practicably, it ceased to oppose capitalism. In relation to the Conservatives it remains to the left, but in any other perspective it is a

because it is faced with many of the same problems as a Conservative Government and uses the same policies to solve those problems.

> The generation of extra wealth which will be preferentially distributed to the poorer members of society, continues to be defended as the only politically feasible way of closing the gap between rich and poor in this country, and continued even faster growth, remains a plank of both Conservative and Labour Party Policy.[19]

Even if Labour adopted a radical environmental policy (which seems particularly unlikely in view of the short term threat to employment this would create), it would be unlikely to be implemented in legislation. Although the rise of labour has clearly imposed restraints upon the exercise of power by the primary elite, "the institutionalised compromise which characterises the scene of political conflict has been drawn up at a point which still predominantly favours the interests of capital."[20]

The future

In the light of the evidence discussed above, we must consider the possibilities for change, both in the immediate, and in the more distant future.

Since the interests of the dominant capitalist elite are best served by avoiding any radical reorganisation of present aims and policies, we cannot expect either industry, government, or its agencies, to be prominent in awakening concern about the environment.

In the past, pressure for action has come from two sources—interest groups activity and public opinion. Pressure groups have been predominantly groups with no material interest in pollution control, and in a society where power rests on property interests, have been unable to enforce their demands in legislation. Their warnings are met by a denial that the environment is being seriously threatened, and their views are treated as exaggerated or hysterical.

party of the modified status quo able to provide an alternative government, but not an alternative social order. The Labour leaders are firmly rooted within the present system, and differences between Conservatives and Labour concern the management of a system whose basic features both sets of leaders accept and support. The control of the leaders of the party apparatus placed them in an excellent position to ward off any substantial challenge from the left, and they may well believe that to adopt a radical environmental policy would be misguided, or irrelevant.

19. British Society for Social Responsibility in Science (1972). 'The Environment—A Redical Agenda'. Russell Press, Nottingham.

20. Westergaard, J. (1966).

Action has only been taken when pressure group activity has been accompanied by a strong popular demand for environmental protection. But this public opinion manifests itself only in situations of obvious environmental crisis, where a particular disaster, coupled with threat to life, can be attributed to pollution, or where a concerted media campaign draws attention to an immediate environmental problem (as happened in the case of the dumping of toxic wastes). When this happens, then government must act to maintain its legitimacy as representative of the people acting in the interests of society as a whole, and industry too, must appear to exercise social responsibility.

But even in these circumstances, any laws which result do not necessarily make any significant difference to the way in which we are treating the environment.

Pollution laws may be misleading for three reasons. First, since the government takes no steps to inform the public of hidden health dangers, it is only when pollutants are easily detected and obviously harmful that the public becomes aware of them-public opinion is more acted on than acting. Silence may lead the public to believe that the problem is solved when visible pollutants vanish whereas in reality the most dangerous pollultants may remain much as before.

Second, although the laws that are enacted may not be directly attacked in the face of strong public pressure, they are so weakened by loopholes built in at the legislative stage as to be virtually unenforceable. This is what happened to the 1956 Clean Air Act. Finally, although by legislation latent opposition to the practices of polluters may be forestalled, the gap between enactment and enforcement is extremely wide-thus for the example the Alkali Inspectorate made only three prosecutions in 1971 and 237 fewer visits to factories.

What hope then, of change for the future, and specifically of legislative change ? A prominent social scientist has suggested that the first stage in the law making process comes when some person or group sees a set of objective conditions as problematic, posing a danger or containing the seeds of future difficulties".[21] After the problem comes to someone's attentions concern for it must become widespread if it is to become widely recognised as a social problem. If legislation in the enactment of the law to take the initiative and press for its passage. What he achieves will depend upon his success in bringing the problem to the attention of others, in convincing them that the situation is dangerous against others and on his access to the instruments of publicity and political power.

21. Becker, H. S. (1963), *Outsiders : Studies in the sociology of deviance.* New York Free Press.

It is particularly the latter two conditions that have proved stumbling blocks to those seeking to achieve radical change, and there is little indication of change for the future. The means of access to political power are governed largely by the two party system, the specific interests of which[22] militate against some more general interest in the preservation of the environment. Any radical change of present policies would depend upon the breakup of traditional constituencies and the emergence of a third force which is not densely built into narrow, particularist political and social structure, and which can overcome those who represent the issue as an alternative between environment and unemployment. Such a force has yet to emerge.

The chances of change by gaining media coverage of pollution issues are equally pessimistic. Certainly the mass communications media has an institutionalised need to maintain and extend its audience, and in order to do so must sensationalise newsworthy material and disseminate it widely throughout society. At times it has done so to the advantage of environmentalists—thus the Toxic Wastes Act 1972, was consequent on a flurry of press activity which created public awareness of the dumping of chemicals, and a demand for action. But media activity was not sustained, dumping ceased to be newsworthy, and in the absence of press surveillance, there is little evidence of enforcement of the Act.

In the future the media are even less likely to be of aid in drawing public attention to environmental dangers, because of the phenomenon of social habituation. Just as we learned to live with the nuclear bomb, so we learn to live with the threat of environmental catastrophe, and each new publicised environmental danger produces a weaker response than the previous one, and accordingly ceases to gain significant media coverage. From this we conclude that in the absence of an obvious environmental crisis stirring the public into action, then little will change, that even in this event, unless we are constantly aware of, and reminded of the danger, then any resulting legislation is likely to suffer the fate of the Clean Air Act in terms of enforcement.

Indeed, it may even be that the full enforcement even of existing law, is inconsistent with the workings of a competitive market economy—that strict enforcement would attack the very root of capitalism (profit making and the self expansion of capital). If this is the case, then environmental problems can only be properly solved in the context of a radically changed social order.

22. These are the Conservatives concern with profit, Labour with jobs (but no imaginative alternative job creation programme) and the interests in increased economic growth and expansion by both.

SOME ASPECTS OF LAW RELATING TO THE ENVIRONMENT

S. BHATT*

1. INTRODUCTION

During recent years there is world-wide concern for the deterioration of human environment as a result of the impact of science and techonology and population growth on the global landscape. In response to this, there is a new emphasis by scholars and decision-makers on the role of law, both national and international, for the protection of human environment and for ensuring the right to life. Environmental law is, therefore, that branch of law which pertains to maintenance of whole-some human environments.

By environment we shall refer to the physical environments of the earth. To understand the law of environment, it is imperative to understand the impact of environment upon man and society. Physical environments control the physiological functioning of human body, the choice of occupations, the consumption habits, and all the systems of human behaviour—political, philosophical, religious, scientific.[1] In other words, man's adaptation to environments is the function of ecology which is defined as "the science of correlations between all organisms living together in one and the same locality, and their adaptations to their surroundings."[2] Ecology has also been defined as "the study of interactions of organisms and environment which includes other organisms."[3] If ecology governs man's relationship to surroundings and with other organisms, international law, in broad sense, governs relations between States and between people. Therefore, there is a similarity between ecology and international law, in parti-

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1. See Amos H. Hacoley, *Human Ecology*, (New York, 1950), p. 84.
2. *Ibid.*, p. 67.
3. See IAN L. McHarg, "An Ecological Method for Landscape Architecture", in Paul Shepard and Daniel McKinley Ed., *The Subversive Science : Essays Toward An Ecology of Man* (Boston, 1969), p. 328.

cular natural law, which governs activities of man upon earth. Thus in a global sense, when problems of environment are interdependent, international law has acquired a new dimension and its postulates are increasingly being based on ecological foundations. Interrnational law, as common law of mankind, is now viewed more in the perspective of procuring for man a wholesome environment and a good life, as indeed is the role of law in general.

The problem of environmental degradation has arisen as a result of lack of discipline in man. There is no respect for laws of nature. Growing emphasis on mass consumption and mass disposal of waste has created problem of pollution. Therefore it is essential to create new attitudes and life-styles and develop new laws to protect environment.[4] The perspective has been stated most explicitly in the United Nations Declaration on Human Environment at Stockholm in 1972 which states at the outset that :

> Man is both creature and moulder of his environment, which gives him physical sustenance and affords him the opportunity for intellectual, moral, social and spiritual growth. In the long and tortuous evolution of the human race on this planet a stage has been reached when, through the rapid acceleration of science and techonology, man has acquired the power to transform his environment in countless ways and on an unprecedented scale. Both aspects of man's environment, the natural and the man-made, are essential to his well-being and to the enjoyment of basic human rights even the right to life itself.[5]

In this short paper, it is proposed to discuss some emerging problems of law and environment and analyse some economic sociological and ecological aspects involved in the development of enviromental law.

2. SOME ECONOMIC CONSIDERATIONS INVOLVED

The problems of environment faced by mankind today are a result of accelerated economic growth, industrial development and urbanization among the advance countries on the one hand, and poor rate of growth and backward economic conditions, among the developing countries on the other hand. With more and more application of technology to resources of earth, one sees an immense interaction of

4. See *Canada and The Human Environment*, A Contribution to UN Conference on Environment at Stockhelm in 1972.
5. See *UN General Assembly Report of UN Conference on Human Environment*, A/Conf. 48/14, 3 July 1972, Annex II, pp. 2-6.

knowledge, economics and power.[6] Affluence is the basic cause, however, which has caused deterioration of environments in the advance countries. For example an American carries in his car and household eleven tons of steel giving out one ton of waste per year.[7] In all 200 million tons of air pollutants are given out per year in USA alone causing annual damage of 4.9 billion dollars to vegetation and works of art.[9] Anti-pollution measures have been estimated to cost heavily in advanced contries. In USA, for example, in 1971 the private industry spent more than 3 billion dollars to reduce air and water pollution alone.[10] Then there is the question of non-biodegradable kind of substances like cyanides, minerals like mercury and lead which cannot be effectively eliminated as pollutants. Excessive utilization of resources of earth poses not only danger of pollution; the resources in themselves are likely to get depleted, and in certain cases exhausted, in course of time. Even the commonest source of energy, coal, is estimated to last barely 100 years.[11] Petrol may get exhausted by the year 2000.[12] And then there is rise in annual demand of energy which is estimated at 4 to 5 per cent. In twenty years, the requirement of electric energy is estimated to double the present demand.[13]

Thus we see the crisis of environment as a result of accelerated exploitation of resources by technologically developed countries. The other picture is of dismal poverty among world's greater number of people living in the developing countries of Asia, Africa and Latin America. As has been stated most aptly : "how can the worst of all 'pollutions', the daily grind of hopeless poverty on the fringe of farm and city, be countered by the growth of opportunity of work of shelter, of health, of hope ?"[14]

The United Nations Declaration on Environment has called attention to this aspect of environmental problem in the developing countries. It says : "In the developing countries most of the environmental problems are caused by underdevelopment. Millions continue to live far below the minimum levels required for a decent human existence, deprived of adequate food and clothing, shelter and education, health

6. See Barbara Ward and Rene Dubos, *Only One Earth*, p. 47.
7. *Ibid.*, pp. 41-42.
8. *Ibid.*, p. 99.
9. *Ibid.*, p. 103.
10. See *Newsweek* (New York) June 12, 1972, pp. 14-15.
11. See n. 6, p. 99.
12. *Ibid.*, p. 183.
13. *Ibid.*
14. *Ibid.*, p. 243.

and sanitation. Therefore, the developing countries must divert their efforts to development, bearing in mind their priorities and the need to safeguard and improve the environment."[15]

Looking at both sides of the problem involving the developed and the developing countries, we are drawn to the conclusion that there has to be a balance between demand and available resources. An economic system for the world where resources can last better and where environments are kept at wholesome level, has to be stable and not competitive.[16] Thus "The Club of Rome", a private international organization of businessmen and technocrate has published a computer study to demonstrate "that unless both population and economic growth could be halted in the near future, unless the entire world 'system' could be stabilized with tight controls, that system was due for a serious break down."[17]

Therefore the ecologists rightly believe that continuous economic growth is harmful for environments. Instead, we must consider how long can resources last and how best can environments be kept at wholesome level. This is also called applied ecology or conservation.[19] The UN Declaration stresses this point explicitly : "For the developing countries, stability of prices and adequate earnings for primary commodities and raw material are essential to environmental management since economic factors as well as ecological processes must be taken into account."[20] Therefore ecological organization is closely related to the economic organization at national and at international level. Prudent use of resource by the rich and advance countries, and skillful exploitation of resources by the developing countries is to be the response of a new world economic order to the economic challenges involved in maintenance of wholesome environment.

3. POPULATION EXPLOSION AND FORMATION OF MEGALOPOLIS

Population explosion coupled with the man's ability to apply technology for resource exploitation and human settlement is the main reason for the environmental degradation. The World-wide increase

15. See n. 5 of Section 4.
16. See generally Garrett Hardin, "The Cybernetics of Competition : a Biologist's View of Society", in *Shepard and MeKinley* ed., n. 3 p. 287.
17. Referred to in n. 10, p. 15.
18. See n. 3 p. 278.
19. See F, R. F. R. Fosberg, "The Preservation of Man's Environment", *Ibid.*, p. 333.
20. See n. 5, section 10.

in population has set the trend towards the formation of a world-city-state, as Professor Arnold Teynbes calls this development, or, the megalopolis that we see ourselves. The changing landscape of the world's major towns and cities during last thirty years or so bears ample witness to the danger of population rise and its adverse impact on the environment. Commenting on the difference between the world of ideas during the 19th and the 20th centuries, Bertrand Russell says that there is less of humbug in the twentieth century world of ideas than was true of the earlier period, but he was sorry to note that places that he had visited after long absence had marked deterioration in beauty.[21]

Therefore while we deliberate upon the law of environment, our foremost concern is with the regulation of world's population. In this aspect, we are concerned with the relationship of population to its habitat which is conceived as the problem of balance.[22] The balance of eco-system is at stake inasmuch as any finite area upon this earth can hold a finite number of people. For a while, we may adopt technology to sustain growing numbers; but by over-crowding upon this earth we may override fundamental human values.[23] Whereas in technologically advanced countries new values and pleasures have to some extent offset the disadvantages of life associated with megalopolis, countries in the developing world see a phenomenon in which the old values of gregariousness and human brotherhood are disappearing without much planning for individualistic new life styles.[24]

Countries of the world have lately joined together to take stock of the magnitude of the population problem. The U. N. Declaration in 1972 emphasises that "the national growth of population continuosly presents problems on the preservation of the environment."[25]

It says further :

> Demographic policies, which are without prejudice to basic human rights and which are deemed appropriate by Governments concerned, should be applied in those regions where the rate of population growth or excessive population concentrations are likely to have adverse effects on the environment or development, or where low population density may prevent improvement of the human environment and impede development.

21. Cited by George Macine, "*Land Use and Urban Development*", in n. 3, p. 369.
22. See n. 1, p. 149.
23. See n. 21, p. 377.
24. See *Reminiscences* (London, 1920), p. 124.
25. See n. 5, Section 5.

I would not like to touch upon the problem of low population density areas, for they are few and far between. By and large, our problem is with the overall growth of population upon this planet, its adverse effects on environment, the need for control, and, therefore, the need for the laws of population control. Should we leave the choice to individuals? Should we depend upon celibacy and such other doctrines which a common citizen cannot adopt? Or, should the countries, especially in the under developed world, seriously consider legislations to restrict the size of a family. This constraint on freedom to procreate is necessary for the survival of human race.[26] And precious time is running out.

It has been estimated that if the family size is restricted to two children by the year 2020 in the developed countries and by the year 2040 in the developing countries, the world population will stablize at 16 billion. If the population is allowed to grow unchecked, it will reach a figure of 28 billion by the year 2050[27]. In USA and USSR, the population growth rate is one per cent in view of higher literacy and awareness about the problem. In the developing countries, however, the growth rate is 2.5 per cent and even 3.4 per cent. By the year 2000 the population is estimated to touch 7 billion.[28] At the moment we seem to plan mostly towards settlements of the growing population. As has been stated aptly by Kingsley Davis, we are planning "to treat population growth as something to be planned for, not something to be itself planned"[29].

Thus, a projection of population explosion is the formation of megalopolis with too much noise, congestion, over-crowding, pollution, pressure on land, energy crisis, power break-downs, water scarcity and shortage of pure air and water[30]. Some describe it as Ecumenopolis that is "the city spanning the entire habitatable portion of earth"[31]. Moreover the shift from rural to urban areas is taking place at an alarming rate. It is estimated that world's rural and urban population in 1980 will be in the ratio of 90 and 60. In the year 2000, it will be 100 and 110[32]. In the Ecumenopolis of the future there can be 90 to

26. Potentially a woman can give birth to 30 babies. See n. 1, p. 104.
27. See n. 6, p. 213
28, *Ibid.*, p. 172.
29. *Cited* in n. 21, p. 376.
30. Megalopolis would mean a continuous chain of habitation and human activity. See "Megalopolis : Model of America to Come", in Claiborne Pell *Megalopolis Unbound, The Supercity and the Transportation of Tomarrow* (New York, N. Y. 1966), p. 21.
31. Cited in n. 21, p. 371.
32. See n. 6, p. 44.

95 per cent people living in urban areas.[33] Should Ecumenopolis be, therefore, the model of the future? This is the alternative available before mankind today.

4. METHOD OF RESPONSE TO PROBLEMS OF ENVIRONMENT

Law, as many modern jurists consider, is not a litany of prohibitions and permissions. Its main function is, to clarify values for policy purposes and for decision-making[34]. Clarification of response to problems is therefore a vital task for lawyers and scholars.

Man is the creature and moulder of environments, says the UN Declaration on environment.[35] This appears to be an over-statement inasmuch as man can only to a limited extent mould environments. Man can, however, cause extensive damage to environment if he does not respect laws of environment.

For the understanding of the laws of environment we must study physical sciences in order to properly understand the threat to the environment. "Education in environmental matters", says the Un Declaration, ".. is essential in order to broaden the basis for an enlightened opinion and responsible conduct by individuals, enterprises and communities in protecting and improving the environment in its full human dimensions".[36] Above all, education on population control, human health welfares, recycling of resources, planning for environmental emergencies, protection of endangered species, conservation of resources of sea, land use, water and air pollution, is essential to develop a response from common man to the problems.

It may be emphasized that the responsibility for the preservation of wholesome environment is to be shared by all countries. Strictly speaking, there are no territorial boundries to environmental problems. The UN Declaration stresses this point as follows :

> To achieve this environmental goal (of peace and of world-wide economic and social development) will demand the acceptance of responsibility by citizens and communities and by enterprises and institutions at every level, all sharing equitably in

33. See n. 21, p. 371.
34. See Myres S. DcDougal, "The Comparative Study of Law for Policy Purposes : Value Clarification as an Instrument of Democratic World Order", in Myres S. McDougal and Associates, *Studies in World Public Order* (New Haven, Conn., 1964).
35. N. 5, Section 1.
36. *Ibid.*, Section 19.

> common efforts. Individuals in all walks of life as well as organizations in many fields, by their values and the sum of their actions, will shape the world environment of the future.[37]

Hence there is the task for states to develop laws which will help in formulating an integrated approach to solving problems of environment. Laws are made not only to regulate human conduct or international relations between States; laws also shape the quality of life. Good life, therefore, calls for laws which are in conformity with good environments. In many spheres like weather, oceans, and outerspace, environmental laws are likely to be uniform for all States. Similarly laws of habitation and human settlement, of land-use and water and river management, should also be in conformity with maintenance of eco-system and wholesome environments.

To aid the propagation of environmental education and knowledge, United Nation is spearheading a world-wide movement. United Nations Environment Programme (UNEF) is a specialized agency of UN with great global responsibility. Among other agencies, mention may be made of the International Council of Scientific Union (ICSU) and WMO, WHO, FAO, ILO, UNESCO, IMCO, IAEA and UNDP. Furthermore, there is need of dedicated scholars and international servants dedicated to their work, as former Secretary General U Thant pointed out, who would help in the growth of world consciousness on environmental problems.[38]

5. THE FORM AND SUBSTANCE OF LAW OF ENVIRONMENT.

It has been stated earlier that the lack of discipline by man has created problems of environments. Therefore, as a starting point, man must return to the law of nature. Greater respect must be shown to the nature's processes which govern our eco-system, and artificial changes avoided. World is a big ecological system which must be treated as one whole unit under certain laws of nature. Apart from the laws of nature, man is bound to apply science and technology for development, affecting thereby to some extent other organisms in the system. There is need therefore to foster an ecological approach to law. Ecology like law is a process. To establish some sort of equilibrium with the eco-system, the answer is a broad-based ecological approach to problems of Law and order. For this it is

37. *Ibid.*, Section 7.
38. See Abraham Chayes, "International Institutions For the Environment", in John Lawrence Ed., *Law, Institutions, and the Global Environment* (N. Y., 1972) p. 7.

necessary that there should be transfer of scientific concepts from the world of science to the world of law and politics.[39]

Secondly, envirormantal law should provide that we take decisions bearing in mind envirormental consequences. Attention to this aspect has been called by the UN Declaration which says that "A point has been reached in history when we must shape our actions throughout the world with a more prudent care for their environmental consequences."[40] There should be ethical evaluation of our planning decisions which maximise social stability and human freedom.[41] We must also consider future orientation of national and international policy problems. Very often law-making is based on past practice whether as custom or as enactment. Our present conduct must safeguard interests of posterity. Hence our concern for the future in law-making is justified.

Thirdly, the constitutive process of decision-making pertaining to environments should be global to encompass all the participants of the global eco-system. Only by a global constitutive process we can assure "what role can international law play in efforts to safeguard the global environment ? What steps toward new institution-building should the international community now take?[42] Decisions, for instance, relating to common subjects like dwindling resources of the world, pollution of air and outer space, pollution of high seas, nuclear damage and liability, population control, should emanate from international institutions wherein states share collective responsibility. This sharing of decision-making will also determine that States "ensure that activities within their jurisdiction or control do not cause damage to the envirnment of other States or of areas beyond the limits of national jurisdiction."[43]

At the national level, State should give lead to the environmental problems at the federal level with the federal units and municipal systems coordinating in implementation of environmental law and policy. Environmental Boards in India set up in most of the States provide an example of this institution-building. Moreover, subjects for legislation in the central, State and concurrent lists may be readjusted keeping regard to environmental requirements.

39. See generally Z. J. Slouka, "*International Environmental Controls In The Scientific Age*", in n. 38, p. 209
40. Note 5, Section 6.
41. See n. 18, p. 295.
42. This seems to be the purpose of a thoughtful book on the subject, sponsored jointly by the Carnegie Endowment for International Peace and the American Society of International Law. See n. 38.
43. See U. N. Declaration, n. 5, Section 21.

Fourthly, in the making of environmental laws, the advice of educational centres, industry and the public at large is neccssary to determine overall perspectives from time to time. These sources can analyse the desirable level, the acceptable level and the tolerable level of environmental hazards on which legislation can be based. There has to be a standard of care keeping due regard to the quality of environments and deprivation of enjoyment by others.

Fifthly, there have to be laws to determine liability for damage to environments. Liability can promote compliance through deterrent effect on the pollutor for damages to be paid and through conformity to standards imposed on a pollutor as conditions for insurance.[44] The UN Declaration states that "States shall cooperate to develop further the international law regarding liability and compensation for the victims of pollution and other environmental damage caused by activities within the jurisdiction or control of such States to areas beyond their jurisdiction."[45] The extent of liability is proportional to the damage to eco-system. To promote the goal of stablility, law must consider not the act alone but the state of the system, says a biologist.[46] This is also somewhat the approach of Professors Mc Dougal and Lasswell in their theory of Contextual jurisprudence as they sum up :

> A relevant jurisprudence must, in sum, seek a comprehensiveness and realism in focus which will encourage both a systematic, configurative examination of all the significant variables affecting decision and the rational appraisal of the aggregate value consequences of alternatives in decision.[47]

In the normal course, fault liability should be the principle of liability for environmental damage. However, in the case of ultra hazardous activities, such as the nuclear damage, activities involving large scale changes in global climatology through weather modification, absolute liability should be the principle of liability. In the case of depletion of ozone layer around the earth by spacecraft and aircraft, the doctrine of *res ipsa loquitor* has been suggested by Professor Carl Christol in his report to US Senate.[48]

44. See Daniel Serwer of UNITAR, "*International Cooperation for Pollution Control*", in n 38, p. 194.
45. See n. 5, section 22.
46. See n. 18, p. 287.
47. Harold D. Lasswell and Myres S. McDougal, "Criteria For A Theory About Law", *Southern California Law Review* (Vol. 44, 1971), p 377.
48. See "*International Legal And Institutional Aspects of Stratospheric Ozone Problem*", Staff Report prepared for Committee on Aeronautical And Space Sciences, United States Senate, Washington, 1975.

Sixthly, we must provide a legal framework to pay for keeping environments clean. Cost of clean air and water is analogous to the cost of education and health.[49] The US Council on Envirnmental Quality says that in 1971 alone 3½ billion dollars were spent in USA on clean-up of pollution.[50]

6. AIR LAW NOT ECOLOGICAL

I have selected the domain of air law to show how much does one piece of invention—that is the aeroplane—affect the human environment and even the ecology of earth.

Traditionally and before the arrival of aeroplane air law was concerned with the property rights of an individual land owner over air space above one's land or the sovereign rights of a state over its airspace. Though contemporarily the sovereign ownership of airspace by states colours most of our thinking of air law and air transport problem, the greater concern should, however, be with the growing ecological problems of airspace and the environmental impact of this little machine-aeroplane.

Admittedly, aeroplane is a convenient means of transporation between long distance. It helps in international communication and economy, and, it is an instrument of solidarity as Winston Churchill described it at Chicago Conference of 1944.

However, with the growth of global aviation on an unprecedented scale (even ICAO member countries alone run 8290 aeroplanes in service in their scheduled services)[51] and given the technology of modern size aircraft, aeroplane affects our environment in many ways.

Aerial pollution by gasoline and burnt gases of aircraft, noise pollution, and the impact on the airport envirenments and habitat including large areas around most of the modern cities where air parts exist have created an intolerable situation. The perspective on this aspect of aviation was stated in an international meeting as follows :

> The future not only of aviation but of all transporation will depend also on how well we are able to soften the impact of transporation on world whose people are increasingly crowded together; increasingly vulnerable to noise, pollution and disruption of their neighbourhood and lives.[52]

49. See n. 6, p. 106.
50. *Ibid.*, p. 197.
51. See *Annual Report of the Council of ICAO, 1976*, ICAO DOC 9188, p. 33.
52. Statement of ALAN S. Boyd, US Secrctary of Transportation in "A Symposium on the Future of World Air Transport" at the 29th Annual General Meeting of the International Air Transport Association, Munich, October 1968.

Out of all the factors affecting human environment by aircraft, noise is the single most polluting factor which has made our living uncomfortable. In big cities of US like Dallas, a constant noise fills the airport neighbourhood with almost 10 to 15 miles radius from the Dallas Fortworth airport. Many citizens who like to live in quieter environments have protested against this genocide in the name of progress.[53] The impact of noise on the emotional and nervous make-up is a serious cause of our environmental changes.[54] What we need is silence and freedom from this onslaught on human system.

Air pollution caused not only by aeroplans but from industries discharging toxic gases in air, domestic fires, motor vehicles discharging gases into air is another serious concern for mankind. In USA alone, 200 million tons of air pollutants are discharged into the environment each year.[54] Each year there is half per cent increase of carbon dioxide gas in atmosphere all over the world.[56] This has effect on the earth's radiation balance with consequent impact on world climatology. Another world-wide pollution of air which has come to light recently is the formation of lead iodide. "Perhaps the entire world is being subjected to some artificial nuclearisation in the form of lead iodide," says a noted authority on atmosphere, Dr. Schaeffer.[58] The exhaust of automobiles combines with natural iodide present in air forming lead iodide. Even violent changes in the pattern of land-use and large-scale human habitation is a major cause of changes in the world climate.[59]

Thus large-scale inadvertant weather modification can effect ecology. Air law must respond to halt this transformation of environment. Both in the stages of designs of aircraft and automobiles, and during the stage of performance of these vehicles law must provide for

53. A citizen's forum in Florida did protest as many more in the world do. See *Christian Science Monitor*. January 2, 1970, p. 20.
54. See generally C. D. Darlington, *The Evolution of Man and Society* (London, 1969), pp. 753. This book deals with genetic changes in society due to changes in environments.
55. See n. 6, p. 103.
56. See Dr. Walter Or Roberts, Director, National Centre for Atmospheric Research, Boulder, Colorado, in Howard J. Taubenfeld, ed. *Weather Modification And Law* (New York, 1968), p. 17.
57. Cited *Ibid.*, p. 183.
58. See Aldo Leopold, "The Land Ethic", in n. 3, p. 412. Some aspects of law and weather modification especially relating to Indian conditions are dealt by the present writer in "Some Reflections on International Law and Relations Involving Weather Modification Activities, Including Some Special Features Relating to India," *Journal of Indian Law Institute*, Vol. 15, 1973, pp. 253-272.

ecological and technical standards which are tolerable and acceptable to human environments.

7. CONCLUSIONS

In conclusion, I submit that we ought to sharpen our focus on ecological perspectives of law, national and international. This might open a new chapter in the Indian legal system. Environmental law should be developed for management of problems of environment. Some fields like changing climatology, weather modification, land-use, pollution of air space and rivers and oceans, human habitat and settlement, management of eco-system and endangered species, population control and movement, management of natural resourees are vital where environmental law should be developed and applied. Even the constitutional law should be examined in environmental perspective and legislation made depending upon the overall interests of an eco-system and communities involved.

Finally, in the development of environmental law the main question is the relationship of knowledge to action. Hence, academic and research institutions, both scientific and legal, and international institutians in this field should co-operate to develop law in this respect, and bring about world consciousness on environmental issues.

STANDARDS AND CRITERIA FOR WATER POLLUTION CONTROL : AN OVERVIEW

M. S. NARAYANASWAMY*

Water is a resource, which has an uncommon feature unknown to other natural resources. Its magnitude has remained almost constant since the birth of our planet, though it is ever changing in its physical forms. No life can exist without water is of common knowledge. Yet, the same life-giver can be a threat to life, if it is associated with pathogens or carry toxic substances in it. Many water-borne diseases are known to man and they can be controlled through various treatment processes. There are many chemicals which cannot be removed from water through conventional treatment processes. Modern industrial processes use both organic and inorganic chemicals which ultimately find their way through their waste water effluents into natural bodies of water. Some of them are biodegradable (i. e. converted into simpler stable components by the microbial action) and others or not. Some of them are toxic to all life both plants and animals, being cumulative poisons. Some are known to be carcenogic (causing cancer). There are many chemicals and yet more to be invented, whose effects on life is still to be asessed or to be proved. Thus, it can be said that it is no more safe to drink water, which may appear to be clean and crystal clear, because it may contain within it substances unwholesome for health.

When waste waters like domestic sewage and industrial effluents enter the natural courses, initially the concentration of the pollutants gets reduced due to dilution. If the effluent contains organic matter, which are bio-degradable, they are stabilised by the metabolic activity of the micro organisms. In other words, the waste waters in turn provide the necessary food for the microbes, while they exert a demand on the dissolved oxygen present in the water for their respiration. This decreases the dissolved oxygen content in the natural body of water. Simultaneously reaeration will be taking place by the diffusion of oxygen from the atmosphere into the natural water. These natural processes are dependent on several factors, the most important being the ratio of quantity of waste water to natural water into which it is disposed, the temperature and the time. If the

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natural body of water is not over loaded beyond its self purifying power, the dissolved exygen content remaining will be able to support acquatic life. Otherwise death may result to the flora and fauna due to dissolved oxygen deficiency. Through these natural processes the pollutant level will ultimately come down and it may reach such low levels that it may not be harmful to life. Because of the innumerable uses and even increasing demands of water, it may not always be possible to wait long enough until the pollutants reach the permitted levels. Necessarily, alternative methods have been envolved to hasten the reduction of pollutants to the desired minimum concentrations. These are achieved through the treatment of waste waters. Thus, the level of treatment to be given to a waste water is dependent upon the assimilative capacity of the natural body of water and the quality of water required for beneficial uses. Further, the process should be economical, so that it will not be an excessive burden on the agency involved for treatment. In fact, the water pollution control and abatement measures simplify themselves into the study of qualitative and quantitative requirements of both natural body of water and that of the effluent which flows into it, so that the beneficial uses of water is assured.

According to Concise Oxford Dictionary, the term *quality* is defined as a degree of excellence of relative nature. The term 'water quality' covers a broad spectrum of meanings qualified with reference to specific use of water. Newsome (1972) observes that the number of combinations of constituents describing water quality is so high that it would be impossible to handle the result of all possible variations even with the largest computer.

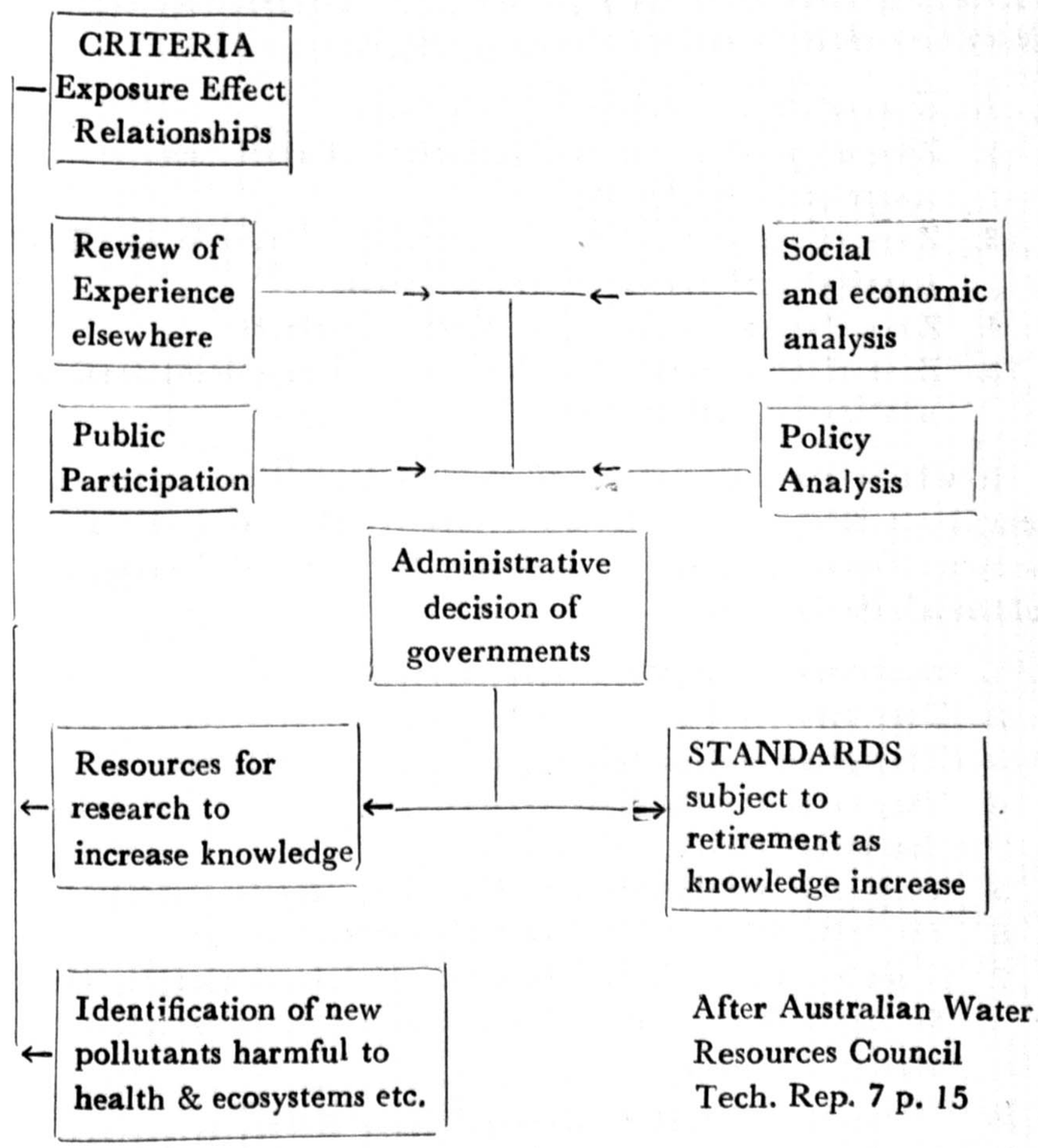
In defining water quality, the two terms *standard* and *criteria* are extensively used. Their meanings and limitations are further discussed. A *standard* is a definite rule, principle or measure established by an authority. It is supported by an official or quasi-legal status. The Australian water Resources Council (1974)[2] has adopted the following definition for the environmental criteria based on a definition after Sanderson and Watkin, according to which, criteria are observed qualitative or quantitative data that predict the chance or magnitude of effect caused by an agent* or agents on a defined receptor** under

1. Newsome, D. H.—*The Derivation and use of water Quality States, Water Poll. Contr.* (1972) (Lond). 71, 560.
2. Australian Water Resources Council Canberra, 1974. A Compilation of Australian Water Quality Criteria, *Tech.* Paper. No. 7, Bary. T. Hart, p. 14.

* Agent (pollutant) ** Receptor (or target) is the organism, Population or resource being effected by the agent.

specified circumstances defined by environmental variables and receptor variables.' The figure below shows a schematic diagram showing the relation between criteria and standards, and how they are evolved.

Figure : Relationships between Water Quality Criteria and Standards



After Australian Water Resources Council Tech. Rep. 7 p. 15

A standard provides only an arbitrary point of reference, but backed by rationalised knowledge known at the time of its formulation. However, experience has shown that standards have the danger of elimination of creative thinking and commonly taken as granted, namely, as though it is the best to be followed and therefore obeyed literally. Yet, it must be realised that it should be revised with better understanding of constraints which affect them. It is therefore not to be static, but a dynamic reality. Unfortunately, a standard, if changed

often would confuse people and therefore it should not be changed too often. A standard must be capable of being workable statistically, and must be set as a minimum and be controlled as a maximum.

In the realm of control of environmental quality, including water as resource, Stead made five zones of concern taking into consideration the increasing social goals into perspective. In descending order of urgency they are as follows (Mc Ganhey, 1968)[3].

1. Zone of aesthetic enjoyment (top zone)
2. Zone of physical comfort, at bottom of which man becomes aware of non-well-being.
3. Zone of chronic illness or morbidity (chronic ill effect) impaired performance of man or system.
4. Zone of acute morbidity (ill affects and serious)
5. Zone of simple survival, at bottom of which is death or failure of a system (bottom zone).

It will be the endeavour of all concerned with the social good to provide standards, so that the water quality will always be above Zone 3, mentioned by Stead. According to Mc. Ganhey[4] the standards should satisfy the following :

"1. Measurement of quality factors is encouraged.
2. They permit self-control by discharges.
3. They preserve fairness in application of policy power.
4. They furnish a historical documented story of an event and thus assist in controlling future.
5. They make possible the definition of a problem.
6. They establish goals for design of systems.
7. In setting standards one must face his own ignorance, or in forcing arbitrary standards one must say definitely why they are inappropriate.
8. They assess what we are getting from a system."

Two types of standards are commonly in use in the control of water pollution, namely the stream standards and the effluent standards. Stream standards are established as a measure of sanitary quality of the river water to assimilate the pollutants without damage to aquatic life, and to maintain the quality at a level that it does not impair other beneficial uses. For example to satisfy the needs of aesthetics, the

3. Mc. Ganhey, P. H—Engineering Management of Water Quality. Mc. Ground Hill, 1968, p. 119.
4. Mc Ganhey, P. H. *Loc. cit.*

standard for the river water has to include the parameters like absence of grease, oil, colour, floating material, turbidity, presence of equitable temperature and favourable PH. These standards should also include the water quality requirements for preservation of aquatic life, wild life and recreational quality for such uses as bathing and swimming. One of the significant factors for body contact with water is the bacteriological quality of water. Presently, no specific standards are available in our country for bacteriological quality of natural waters for swimming. The following table is used by the Australian Water Resources Council as a guide for classification of the bacteriological quality of recreational waters. In order that aesthetically pleasing conditions should exist, the body of water must be free from water blooms or heavy growths of attached organisms. This needs the control of nutrients entering into such bodies of water. The above are only typical of the factors to be considered for one of the many beneficial uses of water.

Table : *Bacteriological Quality of Recreational Waters*

Faecal coliform level (organisms/100 ml.)	Classification
72000	heavily polluted, water objectionable
1000 to 2000	distinct pollution, water suspect
50 to 200	slight pollution
50	satisfactory water

(After : Australian Water Resources Council. *Tech. Paper.* 7, p. 165, (1974)

In contrast to the above, the customary standards sanitary quality of river waters are based on only two parameters suspended solids and BOD (Biochemical Oxygen Demand), originally recommended by the Royal Commission.

The effluent standards provide a second alternative for water pollution control. In these limits are given to each one of the parameters, as a maximum permissible value, that can be discharged into the receiving body of water. Presently in our country, the Indian standard 2490 : 1963, Tolerance Limits for Industrial Effluents discharged into Inland Surface Waters is being used as a guide by Water pollution Control Boards established at the Centre and State Governments.

Considering the magnitude of effective organisation required for continuous monitoring of both the river waters and industrial discharges, it is doubtful how far water pollution abatement can be practised through the use of stream standards. Further, it may be difficult for

the enforcing agency to emphatically prove, who the real culprit is when serveral industries are discharging their wastes into the same stream. It must be appreciated that some of the pollutants may change their characteristics through interaction within the stream itself. All these factors may result in long drawn legal battles and as such the immediate use of stream standards for water pollution abatement may not find favour in developing countries, because of operational complexities and high costs of implementation.

The choice will therefore be limited to the adoption of effluent standards for water pollution control one important limitation of the use of these standards being, its inability to take into account the changing capacity of the stream during different times, of variation in flows and other environmental factors. Its importance can be more easily understood by the more fact that the average flow in any river during any season does not remain constant even in successive years. Reductions in flows may also result due to changes in usage of water and increased demands with the years, and thus affect the self purifying power.

In general, a regular monitoring of all parameters of pollution for streams must be made during critical periods of low flows in the rivers in addition to the quantitative measure and characteristion of discharges from industrial waste waters Both in collection, transportation and testing of samples great care has to be exercised, because some of the characteristics may change during storage. If excessive pollution of any source or sources are noticed beyond the set standards, it becomes necessary and essential to identify them and confirm their existence beyond doubt. Again, this needs careful examination both in terms of quality and quantity of the discharges being made by the offending industry.

Once the offender is located, the controlling agency must be endowed with sufficient legal powers to bring to book the industry and be able to force it to take the corrective measures. Here, it must be noted that the remedy cannot be delayed, until the dispute is settled legally. It is probably for this reason many authorities of implementing pollution abatemens prefer the use of persuasion, with the help of public support. This may not be easily forthcoming in developing nations, where mostly the people are negligent about the rights of citizens. One must appreciate that the public good[5] should be given perference over

5. A public good is defined as a commodity whose utility to an individual is dependent on the total amount of good available not only quantity available to the individual. In this regard, the public good is characterised by

the inconvenience to a private party. In this context, levying only fines may not prove to be an effective measure, and ethically the question arises about its real value when one considers the damage that can done to the public good.

Davis (1975) observes[6] that effluent standards should not be fixed arbitrarily without reference to the ultimate use of receiving waters. It is suggested therefore to adopt a system of categorisation of the stretch of a river depending upon its utility.

Accordingly the four classifications are suggested.

Category 1. Potable supply, requiring only normal supply treatment, supporting a thriving fishery.

Category 2. Potable supply but requiring extended treatment including storage or physico chemical treatment. Trout or Coarse fishery, the former maintained by restocking.

Category 3. Industry use with normal treatment Coarse fishery maintained by restocking.

Category 4. Unsuitable for any use other than navigation except with extensive treatment. No fishery.

In India, as in United Kingdom the Indian standard specifies an effluent quality in terms of limiting the 5 day BOD at 20°C to 30 mg/l and suspended solids to 20 mg/l. In recent years, in U.K., the volumes of sewage effluents requiring disposal to rivers is so large that in many cases more stringent standards are considered necessary to maintain the river water quality as reported by Truesdale (1975)[7]. In India many of our rivers have such limited flows during the dry season. whether to

indivisibility and nonexclusiveness. In other words, satisfaction only results if an individual cannot be excluded from enjoying it. Private or 'normal' goods do not have the above characteristics. Consequently satisfaction associated with their consumption is a function of the amount that the individual alone possesses. Furthermore, Consumption of a private good by others reduces the potential utility for an individual by reducing total supply.

Water quality can be classified as a public good since utility is a function of total supply available, and consumption by one individual has no effect upon that of any body else. Irrigation water on the other hand, is a private good, in that each user only receives benefit from the quantity of supply individually consumed (Mitchell, W. B. (1968) Water Pollution Charges : Ponacea or Predicament, Water and Water Engineering, 72, 460,

6. Davis, D. G.—A Practical Approach to Setting Effluent Standards. Wat. Poll. Contr. (1975) (London), 74, 403.

7. Truesdale, G. A,—A Practical Approach to Settling Effluent Standards. Wat Poll. Contr. (1975) (London) 74, 403.

accept a blanket standard for effluents to be dischrged into all our receiving waters is thus debatable.

Ideally, environmental criteria are complete sets of quantitative exposure-effect relationships for all environmental factors, for different effects and for different population groups, covering the whole range of exposure levels. Criteria being subject to many qualifying factors, which are to be identified, so that final criteria be as complete, accurate and a reflection of available evidence. Thus, it is not an easy task to establish any criteria. According to Lafontaine and Lindsay (1977)[8] the following rules about criteria must be respected.

'(a) a criteria [*Sic*] is always a scientific judgment and never an exposure limit it is excessive to consider a criteria [*Sic*] as an exposure limit or to speak of criteria when we consider a no-effect level (a no-effect level must, as a matter of fact be considered as primary protection standard).

(b) a criteria [*Sic*] is a direct relationship between an exposure and a target; we must be careful to use the term criteria when speaking of identification of pollution".

Thus, the development of a water quality crteria will involve the following steps-chemical identity; estimation of production, use and emmissions from industrial discharges, persistance in biota, accumulatory tendencies in animals and plants; toxicity; and interaction with other pollutants.

Often it may not be possible or necessary to wait until criteria are fully developed for local conditions. A beginning can be made by the adoption of suitable and modified levels for the criteria making a careful analysis of available information, with due regard to the impact of their utilisation under local circumstances. These levels of exposures may be considered as primary standards. Yet, an immediate implementation of even these primary standards may sometimes be not feasible taking into consideration the economic capabilities of the regional industries in question. Thus the primary standards may form the goal to be reached in the ultimate, but as an immediate measure be followed by norms or working limits of primary standards. These norms can be considered a temporary criteria for adoption for abatement of water pollution. Hence, the above norms may have to be fixed arbitrarily, which can be updated with the accumalation of date.

8. Lafontaine, A. R. and Dale R. Lindsay—what must be understood by criteria and standards, in water Quality—*Proc. of an International Forum* (eds) F. Conlson and E. Mrak. (1977), p. 197-8.

Any standard of criterion must therefore be practical and be applicable to the local conditions depending on geographical, factors. David Donaldson (1977)[9] has in a lucid manner focussed the special problems of developing nations in handling the water quality problems. According to him, the strategy of control is to be centered on the fabric of populations exposed to various factors as already discussed above. In villages, with dispersed populations, where basically gastro intestinal diseases and lack of sanitary facilities are a common feature, the bacteriological criteria is of great significance. Again, we have towns and cities, further with slums in them Some of them are exposed to a level of pollution of their sources of water and air comparable to developed nations. Thus, for practical reasons, often it may be necessary to develop a series of multilevel sets of criteria that can respond to the requirements of different resources found in different areas of the country.

9. David Donaldson—Latin American Water Supply, in Water Quality—*Proc. of an International Forum*, (Eds) F. Coulston and E. Mrak, (1977) pp 213-218.

LEGAL CONTROL OF AIR POLLUTION IN INDIA

H. G. BALAKRISHNA*

Never in the history of mankind, did the quality of life depend more on the quality of environment than in the 20th century. Man has been relentlessly waging a war against poverty and ignorance. His mastery over science and technology and his inventive genius have solved many a problem The growing threat of air pollution, which is an ally of noise pollution, is a formidable challenge to the human race since it affects the lives of billions of people all over the Globe. The problem transcends all national and political barriers. A disaster makes no distinction between the developed and the developing nations. The malady of air pollution is universal, escalating with the march of time. Man has to conquer pollution for his own surviral.

In July 1970, stagnant air hung for nearly a week over the Eastern States of America choking Washington, Baltimore, Philadephia, New York and other cities and towns beneath a noxious blanket of smoke and dirt. After several days, fresh winds swept away the calamitious cloud. The presence of the cloud served notice to millions of citizens that air pollution had reached a dangerous level. It is true that the crisis has not yet arrived in every part of the world since air pollution is not equally severe in every region. However, wisdom lies in not waiting for the doom's day. Across our country, the quality of air continues to deteriorate and if the present trend is not controlled, a time may come when no town or city will have immunity and "the garbage will fill the nation's skies from sea to shining sea."

The popular feeling among the enlightened is that only a determined and early assault on pollution can prevent it from becoming a disaster to Indian life and well being in the years ahead. Pollution which strikes at specific occupations has drawn the attention of the public, ever since an English Surgeon Sir Percival Pott in 1775 discovered that London chimney sweeps, who were exposed to soot and coaltar, had an increased incidence of Scrotal Cancer.

Elaborate research and intensive study have revealed that in the U. S. A., over 200 million tons of pollutants are poured into the air each year. This includes 100 million tons of carbon monoxide, 28

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million tons of particulate matter like lead and asbestos, 20.6 million tons of Nitrogen oxides. 32 million tons of sulphur oxide, an equal amount of hydro-carbons and a lesser amount of other poisons. Between 40 to 60 percent emanates from automobile emissions alone. The remaining pollution stems from stationary sources of fuel combustion, particularly the burning of high-sulphur fuels, to produce electricity and also from industrial processes, solid waste disposal, forest fires and a miscellaneous assortment of lesser causes.

Today's industrial and urban society with its components like speedy transport, modern food-processing, craving for miracle drugs, mechanised agriculture and desire for material prosperity and stability, contribute to pollution either directly or indirectly. In America for instance, the roots of environmental pollution are traced to spills, wastes or the law-abiding factories producing chemical compounds thought to be harmless. Smog and garbage, chemicals and additives are stirring grave concern for the nation's health of today and tomorrow.

It is medically proved that air pollution increases the incident of Emphysema, Bronchitis, Pneumonia and Asthma. It is suspected that air pollution is an ancillary cause of Lung Cancer and Arteriosclerosis. Air pollution obscures vision, damages buildings, destroys crops and even alters weather. Particles suspended in the air scatter and absorb sun-light, reducing the amount of solar energy reaching the earth, producing hazes and reducing visibility. Research has confirmed that the suspended particulate matter plays a significant role in bringing about precipitation and there is some evidence that rain-fall in cities has increased since the cities have developed industrially. The dangers come from particulates, sulphur oxides, carbon monoxide, photo chemical oxidants, hydro-carbons and Nitrogen oxides. Air pollution affects health, materials, vegetation and climate, as confirmed by the National Air Pollution Control Administration of America.

It is well known that carbon monoxide reduces the amount of oxygen which the blood carries to the brain and to the other parts of the body. Sulphur oxide and particulate matter damage the respiratory system. The limited evidence available indicates that the effects of photo chemical oxidants and Nitrogen oxides pose serious health hazards.

The screaming caravan of transport carriers, travelling through cities and towns, belching black smoke from the diesel engines is a common sight in our country. Cars and other motor vehicles account for the major part of air pollution closely followed by industries. In

the U. S. A., automobiles contribute approximately 60% of the air pollution and, in the largest cities, the figure is nearly 90%. The single largest source of carbon monoxide is the automobile. Automobile is also the major source of hydrocarbons and Nitrogen oxides. These two components are the principal constituents of Photo chemical smog. Carbon monoxide reduces the oxygen-carrying capacity of the blood and in small doses causes headache and impaired vision and, in large doses, it can be fatal.

The increased use of auto-rikshas, buses, lorries and trucks carries with it an increased air pollution potential which has a telling effect on the urban population's health. Lorries and trucks owned by municipalities, Health departments, State controlled transport corporations, industries and the private enterprise do not appear to evince much regard for public health and seem to be ignorant of the danger engendered by smoke which escapes from the exhaust pipes of the automobiles at undesirable emission levels. The implications of smoke or air pollution are not fully realised.

In India, potential sources of pollution are found in energy chemicals, additives, fertilisers, synthetic fibres, metallurgy, ceramic industries, Pharmaceutical industry, Sulphuric and Nitric acid producing industry, domestic consuption of low-grade fuels, use of automobiles, garbage and solid waste.

The effects of air pollution are assuming unpredictable dimensions. The National Institute for Occupation and Health (NIOSH) U. S. A., estimates that 100,000 deaths from on-the-job pollution occur annualy in America with 3,90,000 new cases of illness reported each year.

According Dr. Joseph K. Wagoner of NIOSH,

"In every industrial setting, you can find some substance that is at least suspected of being mutagenic (causing changes in gene structure), if not Carcinogenic (inducing Cancer)."

A number of studies have shown that the constant exposure to contaminants in certain occupations results in an increased risk of disease. Dr. J. W. Lloyd formerly of NIOSH observed that Coke-Oven workers in Steel industry are 10 times more susceptible to Lung Cancer than other steel workers.

Asbestos workers have a 1 in 5 chance of contracting lung cancer, a 1 in 10 chance of getting a digestive-tract cancer and a 1 in 20 chance of getting Mesothelioma which is rare cancer of the lining of the lung, according to research conducted by Dr. I. J. Selikoff at the Mount Sinai School of Medicine.

According to the report recently published in the annals of the New York Academy of Sciences following a study by a team of NIOSH scientists, the workers who are exposed to Vinyl Chloride have a much greater risk of developing cancer of liver, brain and lungs than the general population.

Employees in Texas Plant producing pesticide, called Leptophos, have suffered crippling disorders of the Central nervous system including partial paralysis.

Lead poisoning is a problem in mines, smelters and lead battery factories. Almost half of the employees at a Salt Lake City lead smelters were treated, in 1975, for symptoms such as Nausea, abdominal cramps, irritability and tremors.

Historically, chronic lung diseases go with the work in mines, foundries and sand-blasting operations. NIOSH estimates that 25% of those exposed to silica dust for more than 30 years will have Silicosis which is a crippling respiratory disease.

Health researchers are collecting hundreds of case studies such as the above in an effort to further protect workers with information on the factory environment and assessment of its hazards to the outside world.

Dr. Wagoner was prompted to remark :

"We are experiencing diseases today from hazards we didn't control yesterday. What we don't take care of today will be there for our children to handle tomorrow."

Johns-Mansville Corporation which is the largest miner ahd miller of asbestos in the Free World has spent 50 million dollars during the last decade to reduce the asbestos hazard to its workers.

The American Iron and Steel Institute estimates that it will cost the industry 800 million dollars to clean up its coke ovens by 1985. Non-cleaning could cause a shut-down throwing out of employment thousands of workers.

The estimated cost of controlling air pollution in America over the next decade is 143 billion dollars. As a result of effective control measures, the people in America from Boston to Los Angeles are enjoying cleaner air. Air pollution levels have steadily declined in major urban areas ever since EPA (Environmental Protection Agency) first adopted the National Air Quality Standards in 1970. The latest analysis prepared by EPA shows major reductions in air pollution.

In 1974, 24 million fewer Americans were exposed to harmful levels of particulates like smoke and dust, which cause breathing problems

and respiratory illness than in 1970. This amounts to the reduction of 33%. The most notable improvement was observed in the North East and Great Lakes regions. The levels of sulphur dioxide which cause irritation to the upper respiratory tract have decreased by 30% in urban areas. Most of the cities fullfill Federal health standards. The pollution from carbon monoxide which affects the heart and brain has decreased by about 5% a year as a result of improved emission control on automobiles.

In India, a draft legislation was submitted by the National Committee on Air Pollution in 1971 but it is yet to see the light of the day. Indiscreet location of industries devoid of ecological considerations add to the confusion. Powerful and short-sighted political lobbying interests very often jeopardise public good in the selection and location of areas for setting up industries at the cost of ecological standards.

Industrially developed cities like Calcutta, Bombay, Ahmedabad and Kanpur have Smoke Nuisance Laws which are not effectively enforced. Municipal laws seem to compete for futility. Public awareness, adequate legislation, machinery for enforcement and determination is crying need of the hour. Classification of industries on the basis of pollution potential is a necessity so that they could be zoned suitably. Emisson levels have to be standardised and rigidly enforced.

Water discharged by factories are exposed to the atmosphere and allowed to stagnate in open areas causing air pollution. Active measures are necessary to control pollution at the source. In view of collosal financial implications, preventive measures assume priority.

Man is the biggest polluter. More people, more factories, more automobiles and more gadgets produce more pollution. It is estimated that by the year 2000 the population of U. S. A. may reach 320 million with as many as 275 million people concentrated in and around cities where air pollution is most severe. The use of electricity which has doubled in a decade is calculated to increase 5 times by the year 2000. Similarly the number of automobiles in use is expected to increase twice as fast as the number of people.

Alive to the explosive situation, the U. S. Congress observed.

"The growth in the amount and complexity of air pollution brought about by urbanisation, industrial developments and the increasing use of motor vehicles has resulted in mounting dangers to public health and welfare, including injury to agricultural crops and cattle wealth, damage to and the deterioration of property and hazards to air and

ground transportation. This is not to mention the hazards to human health."

The 1970 calendar of America is replete with Bills to reinforce the Federal Air Pollution Laws. One bill supported by the Nixon administration was passed by the House of Representatives in 1970. Another bill supported by Senator Muskie and other members of the Senate Public Works Air and Water Pollution Sub-committee, submitted its report to the Senate for taking action.

The famous Muskie Bill was introduced to control air pollution. The bill envisaged the establishment within E. P. A. an office of pollution abatement and control and also to study the effects of noise on human health and environment.

A number of laws have been passed in America to control air pollution by effective enforcement of air quality and emission standards. 1955 Air Pollution Act, 1960 Air Pollution Control Act Amendment, 1963 Clean Air Act, 1965 Clean Air Act Amendments, 1966 Clean Air Act Amendments, and 1967 Air Quality Act are some of the legal control measures undertaken in U. S. A. Apart from these statutes, important bodies like EPA, NAPCA, HEW and NIOSH have been set up.

As a part of a newly developed six year plan intended to reduce pollution, due to motor vehicle NPCA earmarked 45 million dollars during 1970-1975 to develop unconventional sources of power. Among the types of engines to be developed are gas turbine engines, stream engine, electric engine and hybrid engine. As a part of the six year plan, non-governmental research and development on alternate sources of power will be indirectly supported through federal purchase of unconventional proto-types. The General service administration already has purchased a dozen care powered by standard internal cumbustion engine modified to burn liquid natural gas. Such cars may not be suited for routine use as family cars due to their very limited range, but they may be practical for fleet operations which account for as much as 10 percent of motor vehicle population in urban areas. Federal purchase of low-emission vehicles is expected to increase substantially within the near future as unconventionally powered vehicles are developed.

In an interview, Dr. David P. Rall, Director, National Institute of Environmental Health Science, U.S.A. observed that the air in America, over all, is cleaner in 1977 than it was in 1970 when the Americans really launched a crusade against pollution in right earnest. According to him, the total sulphur di-oxide level has decreased. In some cities,

a dramatic progress has been achieved. Pittsburgh today is certainly a very different city than it was before clean up began. He predicted that the knowledge of chemical hazards in water is only about 2 years old; before that America was totally concerned with Bacteriological hazards and did a superb job of controlling them. In fact, he remarked that today an out break of water borne infectious disease is very rare. He also observed that the enactment of the Toxic substances control Act by the Congress in 1976 will go a long way in cleaning up the U. S. environment. This act makes possible the prohibition or limitation of the manufacture of chemicals which are highly toxic are persistent. An outright ban may not be feasible but it is preferable to limit and control the toxic chemicals. He said that the exhaust emissions of the automobiles could be decreased with the lean-burning engine. The catalytic converter now required on all cars does some good. However, it has a possibly deleterious effect, because it converts the sulphur in Gasoline to sulphuric acid which is probably one of the most toxic agents in air pollution. The converter releases the mist at ground level rather than distributing it throughout the atmosphere. The problem has become acute today on account of adverse effects emanating from manufacture of chemicals. In fact, physicians are looking for clues to modern diseases in a complex environment that has been shaped by the post-world war II chemical revolution. The fight against air pollution is estimated to cast the U. S. Government over the next 10 years as follows :

On Automobile pollution control	—36 Billion Dollars
On Industrial pollution	—49 Billion Dollars
On utilisation pollution	—32 Billion Dollars
On pollution from public buildings, Incinertors, other Govt. facilities	— 6 Billion dollars

In India the smog over the Hoogly River is bewildering and a greater awareness through information and intensive publicity is necessary to rouse public opinion against the growing menace of air pollution. The control of air pollution in India cannot be tackled in isolation by a local authority or by a State, since the problem involves the whole nation. Both the Union and the states have to evolve a well-integrated and concerted drive against air pollution. Certain extent of union control is necessary without overlooking the federal structure of the constitution. As between the states, it is necessary to formulate inter-state agreement to combat air pollution as well as the sources of pollution. Though uniform pattern of control may not be possible, a nearness to uniformity could be reached after taking into account the local and regional peculiarities. A national programme entails the

allocation and utilisation of huge funds to support enforcement measures. The funds mainly have to come from the Union and a supervisory control could be exercised in the allotment of funds to the State subject to the satisfaction of the norms to be observed and the standards to be complied with. Control of air pollution is both a social and human problem calling for an objective assessment of economic realities coupled with operational eficiency. To a developing country like ours the economic aspect of the problem presents a grim picture, Nonetheless, the danger of air pollution cannot be ignored. It is said that noise is a slow agent of death which tends to cause mass societal neurosis. Air Pollution is a fast agent of death.

An investigation made by EPA has revealed some new aspects. The studies conducted by EPA indicate that some of the air pollution problems are shifting from urban centres to rural areas where the air is getting dirtier. In the U.S.A., the automobile makers maintain that it is impossible to adhere to 1978 emission standards and they are manufacturing 1978 Cars with 1977 emission controls in anticipation that the congress will relax the emission standards. Many business tycoons have doubted the wisdom of spending huge amounts of money in cleaning up the environment for the sake of a marginal return. Roger Strelow of the EPA bitterly remarked—"future gains in air quality are going to be much harder to achieve than the ones in the past".

The existing legal remedies under the law of Torts available to an individual are inadequate. Air pollution should be regarded as a violation of the right of the community itself and not merely of an individual. The other remedies suggested are :

(1) public remedies,
(2) National and International action,
(3) Population control,
(4) Emission standards,
(5) Air quality standards,
(6) Statutory measures,
(7) Preventive measures,
(8) International co-operation,
(9) Education, publicity and communication.

Conferences and seminars on air pollution and its prevention with the participation of industrialists, economists, Engineers, Architects, Factory Inspectors, Health Organisation Representatives, Insurance Executives, Scientists, Medical Doctors, Politicians, Machine Designers,

Manufacturers, Trade Union Officials and lawyers as well as Legislators, may contribute to the the measures to be taken for the solution of the problem.

The polycentricity of the problem requires a careful consideration by all concerned from different angles. Legislators and legal counsel for legislative bodies must be familiar with the scientific intricacies of air pollution as well as the legal intricacies of anti-air pollution legislation. Environmental legislation and environmental lawyers would be indispensable to the nation's health. Unless immediate steps are taken it will be difficult to stem the mass societal distruction.

Environmental pollution has ushered an era of environmental legislation and environmental lawyers.

OCEAN POLLUTION : INTERNATIONAL LEGAL CONTROLS, PROBLEMS AND MEASURES TO COMBAT THEM

R. A. MALVIYA*

I. GENERAL

The increasing water pollution in territorial waters and the high seas has lately become a new and major problem in the law of seas. The search for solutions and resulting intensive studies, proposals and counter-proposals had the effect of calling in question the relevance of the present international law as the last resort for the control of ocean pollution. Relief available in international law, however, is not yet sufficient because applicable precedents, concepts and agreements among states fall short of stating uniform and actionable controls. Instead, such controls as exist are found in scattered conventions, bilateral treaties and arbitral decisions which bear on a specific point. It is not surprising therefore that international control of water pollution was not a clearly defined component of sea law until recently. It is in the process of evolution, and agreements among states provide an example of this process in operation. Pollution in various forms, among the worst menaces facing mankind, is also engaging the attention of the United Nations. The U. N. agencies concerned with science and technology are pooling their resources and efforts to fight this global threat to the very survival of mankind.

II. MARINE LIFE ENDANGERED : SOME MAJOR, SOURCES, FACTS AND FIGURES

The oceans of the world's may become lifeless in less than 50 years. This warning was given by a Swiss marine researcher, Professor J. Piccard. The threatened seas are the Baltic, the Adriatic and the Mediterranean. Every year, Professor Piccard has said, about 10 million tons of oil and unsoluable matter, thousands of tons of mercury, chemicals and insecticides are being poured into the sea. All this is a big threat to the formation of "plankton" the stapple food of marine life. Very likely fish would become inedible because of the poisonous mercury content in their bodies.[1]

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1. S. P. Jagota, "Sea Around Us", *Illustrated Weekly*, Vol. XCVII. 51, Dec. 19-26, 1976, p. 15.

Captain Jacques Coustean, the well known undersea explorer, indicated that 25% of the DDT compounds so far produced have been dumped into the sea. It is only a matter of time before the remainder goes into it. "We believe that the damage done to the oceans in the last 20 years is between 30% and 50% which is a frightening figure. And this damage is going on at a very high speed", he said. "Our latest observations in the Pacific, in Micronesia and New Caledonia and in the Fiji Islands are even more frightening. Everywhere round the world the coral reefs are disappearing at a very fast rate..." He stated that the pollution of the Mediterranean was "visible and measureable". Underwater pictures taken off Monaco in 1957 showed a rich variety of plants, shell-fish, invertebrates and jelly fish. Ten years later, the local flora and fauna had disappeared, except for an especially tough form of algae. Only a few bacteria and viruses could survive in a biologically dead Mediterranean. The waters would be in a state of putrefaction and would spread diseases all around. Cities like Barcelona, Nice and Genoa would have to be evacuated. This could be a reality in some decades—if nothing was done about it. The Mediterranean could be a test case for the big oceans. What is happening there will later on occur in the big oceans.[2]

Accidental spills are estimated to cause less than one-fifth the amount of marine oil pollution produced by marine tanker operations involving tank cleaning and deballasting. Commercial vessels of all types place 2.5 million tons of oil and oily water into the ocean annually. Routine tanker operations are thought to account for about 40% of this total while tanker accidents account for only 10% of the total.[3]

The enormous ocean dumping as reported by the U.S. Federal Council on Environmental Quality is worth nothing. The Council estimated that in 1964, more than 300,000 water using factories in the U.S. released over 13 trillion gallons of waste water, 22 billion pounds of organic wastes and 18 million pounds of suspended solids into the country's waterways.[4]

The effects of organic waste dumping are interesting from the stand point of defining the problem. The most direct damages are from desease-causing organisms, from sewage of human and livestock origins. Synthetic organic chemicals, such as pesticides like DDT, may be directly harmful to human life and are known to be toxic to acquatic life.

2. *Ibid.*
3. Lawrence Juda, 'IMCO and the Regulation of Ocean Pollution from Ships", vol. 26, *I. C. L. Q.*, 1977, p. 563, f n. 28.
4. V. Petaccio, "Water Pollution and she Law of Sea", Vol. 21, *I. C. L. Q.* 1972, p. 34-35.

Some inorganic chemical and mineral substances kill acquatic life forms, produce excessive hardness in water, corrode metals and in cases such as lead and cyanide, are poisonous. Radio-active wastes are known to be harmful to life forms in present and future generations.

A major water pollution problem is the eutropephication of water bodies. Eutropephication results from excessive accumulation of plant nutrients, including nitrogen and phosphorous, in streams and lakes. It intensifies the growth of algae - a growth which initially renders water unpleasant to see, taste and smell. Then gradually marine vegetable decays and dies, producing larger oxygen-damanding wastes. At this point, so much of the available exygen is consumed as to make fish and most other acquatic life impossible. Heat from thermal pollution further reduces the ability of oxygen to dissolve in water. As the wastes in a water body rise beyond the biodegrading capabilities of its oxygen supply, the water body is said to be dying, as is happening in lake Erie.[5]

These developments illustrate not only the presence of water pollution but why it is a problem. What may be unfit for human consumption because it has been previously borrowed and returned to its source in contaminated form is becoming increasingly necessary for reuse. Water supply is finite, while the demand has been rising to the point where it presses on the quantity available. Moreover, a pollutant becomes concentrated as it rises in the ecological system. Thus even when the water in a polluted lake might be relatively safe for man to drink, the fish might prove poisonous to eat.[6]

Another major source of pollution is accidental oil spillage. The Torrey Canyon wreck of 1967 spilled oil over English and French coastal areas; the break up of the Ocean Eagle in Peurto Rican (USA) waters in 1968 and the Island Santa Barbara (North America) off-shore oil leak in 1969 underline dramatically the continuous presence of oil spillage threats and death to marine and bird life.[7] In 1969 over 40 million fish were killed in an accidental chemical spill in the Rhine River.[8] World wide, the releases of acids from mine drainage, water craft wastes, and the potential of nuclear accidents compound the problem. The price of water pollution indeed includes death and lasting damage to the marine ecology.[9]

5, *Ibid.*
6. *Ibid.*
7. *Ibid.*, p. 36.
8. *Ibid.*, p. 36.
9. Death of fish and marine fanna; contamination of recreation waters (swimming and boating); curtailment of fishing operations due to unsafe contamination levels. In Dec. 1970, 85,000 eaves of canned tuna fish were

Environmentalists too have voiced their concern in order to mobilise public awareness. Paul Ehrlich[10] has warned of a pending "eco-catastrophe." Ehrlich's desire to shock his readers into conscious concern over inaction vis-a-vis needed controls is matched by a computer forecast reported by Professor E. Pestel of Hanover, West Germany. Using the Forester Model with four factors - exhaustion of raw materials, increase in population, over-population and food shortages - Pestel concludes that the quality of life peaked in 1969 and pollution will be 6 times as great in the year 2060 as today.[12]

III. JURIDICAL BASIS OF POLLUTION CONTROL :

Reasonableness of water use bears upon balancing of rights and needs. The exercise of every right, contends Stowell, is subject to the proviso that it be not abusive so as to interfere unduly with the exercise of their rights by others or cause them undue inconvenience or injury. Stowell too argues that States should accept some diminution of national ends in order to maintain harmony of interests in the international community. They bear an obligation to avoid harm to other states even when such harm is not explicitly in contravention of existing law.

Every State is subject to limitations based on general principle of international law precluding it from infringing the rights of another member of the international community. No State has the right to cause substantial injury to the interests of another state by the use it makes of the waters of a natural waterway.[13]

Every State has the duty to ensure that conditions prevailing in its territory do not menace international peace and order.[14] By extension, this principle equally embraces "international waters". *The Corfu Channel Case* already affirms the obligation that national territory be

removed from U. S. super-markets due to suspected mercury presence. Fish have also been reported to contain cancer germs and high levels of lead and zink thought to be dangerous to human consumers. In Sweden, the consumption of fish caught in most of the internal lakes and streams is banned. West Garman authorities recently outlawed the use of DDT in agriculture. *Ibid.*, p. 37, f. n. 55.

10. *Population Resources and Environment : Issues in Human Ecology*, 1970,
11. V. Petaccio, "Water Pollution and the Law of the Sea", Vol. 21, *I.C.L.Q.* 1972, p. 33. See also R. Carson, *The Silent Spring*, 1962; R. D. McCarthy, *The Ultimate Folly*, 1969,
12. E. C. Stowell, *International Law : A Re-Statement of Principles in Conformity with Actual Practice*, 1931, p. 112,
13. *Annual Digest of Public International Law Cases* (Lauterpacht ed.) 1927-28, p. 128.
14. Draft Declaration on Rights and Duties of States,

used in consonance with the rights of other States.[15] The obligation is explicit in the Supplentary Report of the U. N. Committee on the Balkans which recommended :

> "That the attention of Albania and Bulgaria be again drawn to their obligation in conformity with international law, to prevent use of their territories in any way against the security of the Greek State."[16]

Again, by extension, use of national territory to introduce pollutants into the commonly shared high seas faces no logical impediment to falling under a general prohibition that states should not use their territory contrary to the rights of other states. When the right to an ecologically healthy marine environment is established[17], the doctrine of abuse of rights will have application in the law of the high seas pollution control. The theory of abuse of rights (*abus de droit*) holds that states may not exercise rights if solely to cause mischief or injury to another state. To counteract the abuse of rights, there is need for the principle of good faith which governs international relations and controls also the exercise of rights by States. The theory of abuse of rights is merely an application of this principle to the exercise of rights. Also essential here is acceptance of the concept that the high seas combined constitute a continuous international water course and that the states adjacent to or subsisting on the high seas are in law international riparians.

IV. INTERNATIONAL CONTROL OF POLLUTION

1. The International Convention for the Prevention of Pollution of the Sea by Oil, 1954.

The Convention called upon the ratifying states to forbid the discharge of oil from ships flying their flag within specified areas of the sea - normally extending upto 50 miles from the land. (Arts. 2 and 3). Every ship covered by the Convention was also obliged to maintain an

15. The I. C. J. held that Albania was under obligation to notify and warn the approaching British warships based on : elementary considerations of humanity, even more exacting in peace than in war; ...; and every State's obligation not to allow its territory to be used for acts contrary to the rights of other States. *Digest of International Law*, Vol. 5, p. 249. See also, *Digest of International Law*, Vol. 3, pp. 1050-1051: *Ibid.* pp. 1069, 1072; *A, J. I. L.* Vol. 53, 1959, pp. 156-161.
16, V. Petaccio, "Water Pollution and the Law of the Sea", Vol. 21, *I. C. L. Q.*, 1972, p. 34.
17. Here it may be suggested that the right to a clean and wholesome environment be added to the U. N. list of universally recognized human rights.

oil record book which competent authorities of a contracting government could inspect while the ship was in port in that state. Evidence indicating that a ship of a contracting state had acted in contravention could be furnished to the government of the ship's registry, which would then be responsible for investigating the matter. Should sufficient evidence of a breach of the convention be discovered, the flag state would be obliged to prosecute the case and to inform the complaining state and IMCO of the proceedings (Arts. 9 and 10). In accordance with this Convention, contracting States were to send to IMCO the texts of laws, decrees, regulations and orders which give effect to the Convention and also official reports which indicated the results of the application of the treaty (Art. 12).[18]

Amendments to the 1954 Convention :

The 1962 International Conference on Prevention of Pollution of the Sea by Oil was convened by IMCO and it adopted amendments to the 1954 Convention.[19] These amendments tightened somewhat restrictions on contracting states, increased the number of specific areas in which the 50 mile prohibited zone was replaced by a wider zone and gave IMCO additional technical responsibilities, such as preparation of nautical charts indicating the extent of prohibited zones. The added Art. 3 (c) provided a starting point for considering construction standards for ships as a means for dealing with ocean pollution.

These amendments will supplement the concept of prohibition of oil discharges in specified ocean areas with one providing for limitations in the amount of oil released anywhere in the ocean. Tankers were now to be subject to restrictions in ocean areas beyond 50 miles from shore. Upon the coming into force of the amendments tankers of contracting states will not be permitted to release more than 16 litres (15.9 gallons) of oil per nautical mile. A ceiling was placed on the amount of oil that could be released during a voyage; that upper limit was designated as 1/15,000 of the total cargo carrying capacity of the tanker. Vessels other than tankers, if they released any oil, were to do so as far away from land as practical and in such a manner that the oil content would not exceed either 60 litres per nautical mile or 100 parts of oil per million parts of effluents.

18. Regretably enough, the practical consequences of the 1954 Agreement have been slight, owing to the limited number of states which have seen fit to ratify the instrument. D. W. Bowett, *The Law of the Sea*, 1967, Ch. V.
19. Lawrence Juda, "IMCO and the Regulation of Ocean Pollution from Ships", Vo. 26, *I. C. L. Q.*, 1977, p. 561.

In 1971, the IMCO Assembly once more voted to amend the Oil Pollution Convention. An 'Annexe' was added to the Convention establishing construction standards for new tankers based on the ship's dimensions. The chosen formula would require compartmental separation of oil-bearing tanks and would control their size and position in such a way as to limit the maximum amount of oil flow should the tanker be grounded or involved in a collision.[20] The use of construction standards, as opposed to reliance upon a standard of oil discharge, has a distinct advantage in terms of enforceability : violations of construction standards are much easier to prove.

2. The Brussels Convention on the Liability of Operations of Nuclear Ships, 1962.

This provided for liability of nuclear ship operators in national courts. With armed warships exempted, this agreement has not in fact provided legal bench-marks since nuclear tankers or merchantmen are not active in international shipping.[21] Also, the general prohibition against nuclear testing on the high seas in the 1963 Nuclear Test Ban Treaty relates to pollution question only remotely.

3. The Agreement for Cooperation in Dealing with Pollution of the North Sea by Oil, 1969.

In it the signatories agree to inform each other of developing or threatening oil pollution situations (Arts. 4 and 5). Specific action responsibilties to counteract and control oil pollution situations will be concluded bilaterally between and among the signatories (Art. 6).

4. The Convention Relating to intervention on the High Seas in cases of Oil Pollution Casualities, 1969.[22]

The purpose of this Convention was to provide littoral states with indisputable authority to take steps to limit or avoid the incalculable damage, both proprietary and environmental, which had hitherto flowed from spillages and discharges of oil, of which the "Pacific Glory" and the "Torrey Canyon"[23] fiascoes were the most spectacular incidents.

20. Supra note 19, p. 568.
21. D. W. Bowett, *Ths Law of the Sea*, 1967, p. 49.
22. Text : 9, *International Legol Materials*, 1970, p. 25.
23. The Torrey Canyon, registered in Liberia, ran aground on the Seven Stones Reef of the Southwest coast of Great Britain in 1967 and poured some 60,000 tons of oil into the sea and within a few days damaged 100 miles of resort coast line and killed countless number of fish, birds and other forms of wild life. The British government ordered that the wreck be bombed so as to set fire to remaining oil, after salvage attempts have failed, in order to reduce the pollution and to prevent further harm to British

Art. I grants contracting parties the right to take such measures on the high seas as may be necessary to prevent, mitigate or eliminate grave and imminent danger to their coast line or related interests[24] from pollution or threat of pollution of the sea by oil, following upon a maritime casuality, which may reasonably be expected to result in major harmful consequences. Coastal states acting under Art. 1 agree to consult with concerned governments and interested parties as proposed measures before taking action. Prior consultation with independent experts named by IMCO is also provided. In Art. II, maritime casualities include a collision of ships, strounding or other incidents, resulting in damage or imminent threat of damage to ship or oil cargo, Art. III provides for taking measures without advance consultations in cases of extreme urgency. Art. V requires that actions taken must be proportionate to the actual or threatened damage. Controversy machinery progresses from bilateral negotiations as initial resort to settlement to conciliation procedures and arbitration.[25]

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coast. Even so British and French coasts received serious pollution resulting into considerable economic and environmental damage and it has been estimated that the British government spent over 2 million pounds in cleaning up the oil spills. Supra note 19, p. 55 p.

This type of incident raises a variety of interesting legal issues. Brown, Vol, 21, *Current Legal Problems*, 1968, pp, 113/136. Remedial action may be justified on the ground of necessity but not of self-defence. I. Brownlie, *Principles of public International Law*, 1973 (2nd ed,) p. 251.

The lesson learned from this incident was that the law relating to oil pollution by international shipping was inadequate. Therefore an agreement on the use of remedial measures against ships of other nations on the high seas became obviously desirable. The Torrey Canyon affair propelled IMCO to direct its attention to ocean pollution problems. Thus the 1969 gathering in Brussels, sponsored by IMCO, was successful in producing two conventions relevant to oil pollution, namely, Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualities and Convention on Civil Liability for Oil Pollution Damage.

24. Art. I (1) lists a number of related interests which should also enjoy the benefit of protection and refers specifically to health in coastal communi ties, and to the conservation of wild life.

25. The Intervention on the High Seas Convention and the approach it embodies signifies recognition of fact that ships and their cargoes are today capable of extensive economic and ecological damage to the coastal states. These states must be allowed to protect their legitimate interests even to the extent of destroying a foreign ship passing at a distance beyond the coastal state's territorial sea. While this Convention is limited to cases in which shipthreatened or did damage through its oil discharges, the 1973 protocol (when it comes into force) will provide some degree of protection to the coastal state in the light of the increasing volume of dangerous chemical eargoes being shipped on the high seas.

5. The Convention on Civil Liability for Oil Pollution Damage, 1969.[26]

This agreement assigns liability to ship owners where a maritime incident results in pollution damage caused by oil which escapes or is discharged.[27] No liability attaches to incidents caused by an act or omission done with intent to cause damage by a third party or caused by the negligence or other wrongful act of any government or other authority responsible for maintenance of marine lights or other navigational aids. This Convention applies to damage caused on the territory or in the territorial sea of a contracting state and to preventive measures taken to prevent or minimise such damage. Servants or agents of the owner are exempt from liability. Shipowners are to establish a common fund, or availability of funds, either ensured coverages or presentment of bank gurantees to the extent of liability imposed by the Convention-2000 Frances for each ton of ship's tonnage. Except for incidents where the shipowoer is totally at fault, a limitation per incident of 210 million Francs is stated. When oil escapes from two or more ships and results in pollution damage, the owners, except when entitled to exempted liability, will be jointly and severally liable for damage which cannot otherwise be apportioned. Successful actions for compensation in the national courts of states which have acted to prevent water pollution will be enforceable in all contracting states.[28]

6 The International Convention on the Establishment of an International Fund for Compensetion for Oil Pollution Damage, 1971.[29]

The fund to be established and maintained by the oil companies in contracting states, is to indemnify the tanker owner or his insurer for

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26. Text : Vol. 64, *A. J. I. L.*, 1970, pp. 481-490. It came into force on May 6, 1975.

27. Exceptions to liability include incidents resulting from acts of war, hostilities, civil war, insurrection or a natural phenomena of an unexceptionable, inevitable and irresistible character.

28. Thus, we find that under the terms of this Convention, the shipowner becomes liable for damages resulting from the release of oil from his ship and he must carry appropriate insurance to enter the ports of contracting states. Such insurance will obviously be extremely expensive or even impossible to obtain by a shipowner with a bad oil discharge or safety record. Thus, if he wants to remain in business, the shipowner will have a very strong inducement to reduce the possibillties of accidents or oil discharges from his ships. The subsequent Convention on an International Fund for Compensation for Oil Pollution Damage provides the oil companies with an additional motive to charter ships from states party to the Civil Liability Convention.

29. At a second Brussels Conference called by IMCO and held in 1971, this

the portion of his liability he incurs under the Civil Liability Convention in excess of 1,500 Francs (120 Dollars) for each ton of ship's tonnage or an amount of 125 million Francs (10,000,000 Dollars) whichever is lesser. This Convention has not, however, yet come into existence.

The 1969 Brusseld Conventions provide to date the most complete legal framework to control oil pollution. They stand as pace-setting mile-stones in view of prospects they offer for legal intervention to counteract and even evert water pollution situations. They also provide for recovery through assignment of civil liability for incident of pollution subject to actions under national judicial process.[30]

6. The 1973 Brussels International Conference on Marine Pollution : The International Convention for the Prevention of Pollution from Ships : Non-Petroleum Pollutants.

As awareness increased of the dangers of various other shipborne chemical substances to the marine environment, the IMCO became involved more in that area. In 1971 the IMCO Assembly amended the recommended code for the construction and equipment of ships which carry dangerous chemicals in bulk, so as to take account of potential pollution problems. The Code was also extended to cover ships which carry compressed or liquified hazardous gases. At the same time the Assembly amended the International Maritime Dangerous Goods Code, so that Cargoes which presented a serious hazard to the ocean environment, even if they do not endanger the crew and the ship, were included. In 1972 the Martime Safety Committee of IMCO adopted a resolution recommending governments to exter d the existing voluntary reporting system for oil spillages to include other pollutants.

The 1973 International Conference on Marine Pollution dealt with the problem in a more substantial manner and adopted the International Convention for the Prevention of Pollution from Ships.[31] Its terms re-

convention was adopted to supplement the 1969 Civil Liability Convention. The new treaty provides for the compensation of those who suffer pollution damage and are unable to obtain full and adequate restitution under the terms of the earlier agreement. Injured parties whose state are bound by the new convention may collect damages even if caused by a ship from a non-contracting state. Considering it unfair that the economic consequence of oil pollution from tankers should be borne solely by the shipowners, the Convention places upon the oil cargo interests financial responsibility for pollution damage.

30. It would appear that the immediate legal questions of enforceable oil pollution controls have been laid to rest awaiting new litigation arising from real incidents.

31. IMCO Marine Pollution Conference. Reproduced in 12 *International Legal Materials*, 1973, pp. 1319-1443.

quire that discharge of "harmful substances or effluents containing such substances" be prevented in accordance with the stipulations of the Convention.[32] The Convention applies not only to tankers and other ships above 500 gross tons, but also to a vessel of any type whatsoever operating in the marine environment and includes hydrofoil boats, aircushion vehicles, submersibles, floating craft and fixed or floating platforms.[33] Parties to the Convention are obliged to punish violation by a ship flying its flag, regardless of where the violation occurs. Should a ship violate the Convention within the jurisdiction of a state party to the treaty, that state will either undertake proceedings in accordance with its law or provide the flag state with the evidence it possesses that a transgression has occurred (Art 4).[34] Should the violation, however, involve a ship of a foreign flag and occur beyond the jurisdiction of the observing state, that state may only report the occurrence to the flag state and may hope that the flag state, if it is a party to the treaty, will fulfil its obligations and take appropriate action.

Attached to the treaty are two mandatory annexes and three[35] optional annexes and two[36] other protocols. Annex 1 is entitled: Regulations for the Prevention of Pollution by Oil.[37] Every oil tanker of 150 gross tons or above and all other ships of 400 gross tons and over are subject to inspection prior to receipt of a required International Oil Pollution Certificate issued by the flag state. Periodic inspections, not exceeding 5 years, are required for the purpose of assuring compliance with the Annexe requirements (Regu. 4 and 5). As to oil discharge, the obligations are similar to those contained in the amended 1954 Oil Poillution Convention (which the new Convention, when in force, will

32. The Convention defines harmful substance as "any substance which, if introduced into the sea, is liable to create hazards to human health, to human living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea, and includes any substance subject to control by the present Co nvention" (Art. 2). *Ibid.*

33. *Ibid.*, Art. 3 exempts warships and government non-commercial ships from application of the terms of the treaty.

34. *Ibid.*

35. These are entitled as : (1) Regulations for the Prevention of Pullution by Harmful Substances Carried by sea in Packaged Forms or in Freight Containers, Portable Tanks or Road and Rail Tank Wagons; (ii) Regulations for the Prevention of Pollution by Sewage from Ships; and (iii) Regulations for the Prevention of Pollution by Garbage from Ships. 12 *International Legal Materials*, 1973, pp. 1421 1438.

36. They deal with : (i) Reporting of Incidents; and (ii) Arbitration of Disputes arising from the Application of the Convention.

37. 12 *International Legal Materials*, 1973, pp. 1335-1386,

supercede). New oil tankers are made subject to more stringent standards. They are limited to a totol discharge of 1/30,000 of their oil cargo as opposed to 1/15,000 for existing tankers (Regu. 9). Further, tankers of over 70,000 deadweight tons are to be constructed with segregated ballast tanks so that on return voyages oil tankers would not have to be filled with water for ballast (Regu. 14 & 15). Contracting states are to provide facilities at their ports for offloading oil or oily residue from ships so as to eliminate the need to flush tanks at sea (Regu. 12).

Annexe II is entitled : Regulations for the Control of Pollution by Noxious Liquid Substances in Bulks[38]. The party states undertake responsibility for providing facilities for the off-loading of residues and mixtures containing noxious liquid substances (Regu. 7). A cargo record book is to be kept for inspection by the competent authorities of any party state, while the ship is in its port (Regu. 9). Each ship to which this annex pertains is to be issued with an International Pollution Prevention Certificate for the carriage of noxious liquid substances in bulk and to be subject to periodic inspections (Regu. 10). The Annexe also requires party states to issue detailed specifications as to the design, equipment and operation of ships carrying noxious liquid substances (Regu. 13).

Continued concern with pollution of the sea was also manifested in the adoption in 1973 of the Protocol Relating to Intervention of the High Seas in Cases of Marine Pollution by Substances Other than Oil.[39] Upon its coming into force, party states will be empowered to take those measures on the high seas to prevent or mitigate grave and imminent danget to their coastline from pollution or threat of pollution by substances other than oil following upon a maritime casuality, which may result in major harmful consequences.[40]

7. The Nuclear Test Ban Treaty, 1963: Radio-Active Substances.[41]

It Provides for putting an end to the contamination of man's environment by radio-active substances and permits no nuclear explosions in the three parts of the bio-sphere, namely, atmosphere, outer space *under water* (emphasis added).

38. Supra notee 37, pp. 1386-1421.
39. Vol. 68, *A. J. I. L.*, 1974, pp. 577-580.
40. The "substanecs other than oil" are those which are to be so designated by IMCO and those which are liable to create hazards to human health, to harm living resources and marine life, to damage amenities, or to interfere with other legitimate uses of the Sea (Art.1 (2)).
41. *U. N. T. S.*, Vol, 480, p. 45.

8. U. N. General Assembly Resolution (1971) on the Urgent Need for Suspension of Nuclear and Thermonuclear Tests.[42]

This resolution emphasies the need to keep as much of the planet free of radio-active waste as possible. The Assembly's primary concern is stated to be the injury to animal and human life and the fear that such fallout may poison the earth's atmosphere for decades to come.

9. United Nations Conference on the Law of the Sea (UNCLOS):

1. *UNCLOS-I :* The four Geneva Conventions concluded by UNCLOS-I (1958) make reference to provisions for some water pollution control.[43] These provisions are quite general and represent policy rather than action rules. They remain essentially unimplemented. However, the 1958 Convention on the High Seas offers the most direct focus on the problem. Art. 24 of this Convention stipulates that the state should draw regulations to prevent pollution of the dischargeof oil from ships or pipelines or resulting from the exploration or exploitation of the sea-bed and sub-soil taking existing account of treaty provisions on the subject. Art. 25 provides that each state should take measures to prevent pollution of the seas from the dumping of radio active waste, taking into account any standards and regulations that might be formulated by competent international organisations. Art. 25 also calls for cooperation by all states with the relevant international agency in taking measures for the prevention of pollution of the seas or of the air space above, resulting from any activities with radio-active materials or other harmful agents.

Both Articles dealing with pollution omit reference to foreign ships operating on the high seas : by implication, each state could enforce preventive measures on the high seas only against vessels flying its own flag.

2. *UNCLOS-II* : The UNCLOS-II (1960) was also not devoted to the problem of water pollution and like the earlier UNCLOS-I treated the subject incidentally to the territorial water boundary definitions and fishery rights questions.

3. *UNCLOS-III (1973)* : The continuing search for workable approach to pollution control now amounts, fortunately, to an international dialogue with distinct clear policy and legalistic outlines. In the forefront rests the iniative taken by the Maltese Ambassador to U. N., Mr. A. Pardo, who, in August, 1967, launched in the General Assembly

42. *U. N. G. A. Reso.* No. 2828 (XXVI), Dec. 16, 1971.
43. For example, Art. 24(1) of the Convention on Territorial Waters & Contiguous Zone, 1958; Art. 5(7) of the Convention on Continental Shelf, 1958; Art. 7 of the Convention on Fishing and Conservation of Living Resources, 1958.

what amounts to an international movement to centralize management of oceans, resources. The Maltese Ambassador submitted a memoarandum to the General Assembly. This memorandum contained a proposal contemplating a treaty which would authorise the creation of an international agency to assume jurisdiction over all areas of the sea-bed beyond the limits of present national jurisdiction (i. e. beyond Economic Zone and Continental Margin); to regulate, supervise and control all activity thereon; and, to enforce the principles and provisions of the treaty. The Secretary-General's note of Oct. 31, 1967[44] and the earlier studies called for by the Resolutions 1112 (XL and 2172 (XXI) instigated the General Assembly's establishment of the Standing Committee on the Peaceful Uses of the Sea-Bed and the Ocean Floor Beyond the Limits of National Jurlsdiction. The charter of this body includes measures to control pollution resulting from exploitation and exploration activities.[45] When the sea-bed, ocean floor and sub-soil are beyond national limits of jurisdiction and thus in the "internationlised zone', several states have declared that in regard to any activity with respect to international zone, states shall pay due regard to the rights and interests of all other states, in particular those of any costal state adjacent to the area of that activity. Close and continuing consultations shall be maintained with the coastal state concerned with a view to avoiding any infringement of such rights and interests. States shall also adopt and ensure the applicaton of appropriate measures, including internationally acceptable standards and procedures, for prevention of pollution and other hazards to the marine environment.

Outright proscriptions against pollution are also replete in the dialogue. Typically, it is argued that pollution of the marine water especially by radio-acive contamination, be avoided by means of international cooperation and no damage be caused to animal and plant life in marine environment. Damage caused by any such activities shall entail liability.[46]

44. *U. N. Doc.* A/C 1/952. This note pointed out that the consideration of the Maltese proposal might be facilitated and even sharpened, by distinguishing between : (9) the question of peaceful use, (b) the scientific activities, and (c) those of resource exploitation.

45 *G. A. Reso.* 2467 (XXIII) Dec. 21, 1968, (A/7477).

46. *U. N, Doc.* A/7230, Para 88, Aug. 30, 1968.
If more direct action is unavoidable, states may for certain purposes, notably those of police, revenue, health and fisheries, enact laws affecting the seas surrounding its coasts to a distance seaward, which exceeds the ordinary limits of its territory. See *Craft* V. *Dunphy* cited in *Steenholf* v. *Assistant Collector of Customs, India*, High Court of Kerala March 7, 1960, 31 *International Law Reports*, pp. 132-137.

However, the UNCLOS-III, meeting since Dec. 1973, has produced some draft articles on pollution control which are contained in the Revised Single Negotiating Text (RSNT). The RSNT was prepared in the 1976 session of the UNCLOS-III held at New York. Under the RSNT the coastal state enjoys the following rights.[47]

(i) the right to establish and enforce anti-pollution regulations with respect to sea-bed activities, artificial islands, installations and structures under its jurisdiction, third-state pipelines on the sea-bed and dumping of wastes in the zone (Part II, Arts. 67 (2); Part III, Arts. 18, 20, 24, 26).

(ii) the right to designate special areas meeting certain criteria in which it may implement, in absence of disapproval by the competent international organization, such anti-pollution rules and standards for foreign vessels as have been made applicable for special areas by the competent international organization. (Part III, Arts. 21 (5), 30 (3-6, 8)).

(iii) the right to establish and enforce anti-pollution regulations for vessels in ice-covered areas meeting certain criteria (Part III, Art. 43).

(iv) the right to undertake physical inspection in case of vessel discharges in violation of international standards, in more extreme cases, subject to considerable safeguards, such as prompt release on payment of bond, and "flag state pre-emption" of coastal state proceedings if flag states are effectively enforcing environmental regulations against their vessels, except where there is a major damage to the coastal state (Part III, Arts, 4 (4), 5, 21 (4), 40 (3-7), 33-41).

(v) the already established right of intervention, i. e., the right to take preventive measures in the event of grave and imminent danger from pollution or threat of pollution following upon a maritime casulity.[48] (Part III, Art. 31).

None of the pollution provisions apply for practical reasons to warships and other government non-commercial vessels and state aircraft, (Part III, Art. 45).

The Economic Zone as elaborated in RSNT establishes a measure of concurrent rights or jurisdiction with respect to some vessel-source

47. Bernard H. Oxman, "The Third U. N. Conference on the Law of the Sea: The 1976 New York Sessions'', Vol, 71, *A. J. I. L.*, 1977, p. 262.

48. International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualities, 1969 : 9 *International Legal Materials*, 1970, p. 25; Protocol Relating to Intervention on the High Seas in cases of Maritime Pollution by Substances Other Than Oil, 1973 : 13 *International Legal Materials*, 1974, p. 605.

pollution, but it does not eliminate the traditional role of the flag state. The rights of the coastal state do not displace the rights and duties of the flag state to control pollution from its vessels, but rather supplement them (Part II, Arts. 79, 80, 82. 85; Part III, Arts. 4, 21 (2), 26 (1) (b), 27, 28 (2, 3), 30 (4, 7), 38, 40, 44, 45)[49].

Under Art. 44 (1) (a) of the RSNT, the coastal state has jurisdiction with regard to the preservation of marine environment, including pollution control and abatement.[50] Proceedings can be taken only if a vessel has committed a flagrant or gross violation of national laws (Art. 20 (6) RSNT). Furthermore, physical inspection of a vessel may only take place if there are clear grounds of believing that a breach of relevant regulations has resulted in "substantial discharge and significant" pollution of the marine environment (Art. 36 (6), RSNT) and only if the vessel refuses to supply information necessary to establish whether a violation has occurred or that information is manifestly at variance with the evidently factual situation (Art. 39 (6), RSNT).

Thus, these provisions preclude the coastal state from taking action unless substantial pollution has occurred. These articles relating to the inspection of vessels may also be seen to be unsatisfactory because they do not allow the coastal state to check whether its legislation has been complied with, unless the violation is manifestly clear from afar.[51]

10. The 1972 Stockholm Conference on the Hu . an Environment.

The world has become more sensitive to ecological issues. The 1972 Stockholm Conference on the Human Environment[52] and the warnings of a number of writers[53] have helped an awareness of the importance of protecting the physical environment. There is now more and more support for the philosophy according to which maritime waters need general protection, as they constitute...a sort of global

49. Supra note 47.
50. The degree to which coastal state should be able to exercise its jurisdiction in this regard has been a major source of dispute. J. C. Phillips, "The Exclusive Economic Zone as a Concept in International Law", Vol. 26, *I. C. L. Q.*, 1977, p. 590.
51. Supra note 50, p. 594.
52. Report of U. N. Conference on Human Environment, *U. N. Doc.* A/Conf. 48/14/Rev. 1.
53. Barbora Ward, *Spaceship Earth*, New York, 1966; R. Falk, *The Endangered Planet*, New York, 1972; Lester Brown, *World Without Borders*, New York, 1972; Paul Ehrlich, *The End of Affluence*, New York, 1974; Denis C. Meadows (ed), *Toward Global Equilibrium*, Cambridge, 1973.

resource, and the flora and fanna living in these vast quantities of waters must be protected in the interest of all.[54]

The Stockholm Conference adopted a Declaration of Principles to guide governments in their handling of the world-wide environmental crisis. States shall take all possible steps to prevent pollution of the seas by substance that are liable to create hazards to human life and other livings and marine resources.[55] Not only that, States have the right to exploit their own natural resources but also the responsibility to ensure that activities within their jurisdication or control do not cause damage to the environment of other states beyond limits of national jurisdiction.[56] The Conference recommended the necessity of coordinating and stimulating the actions of the different U. N. organs in connection with environmental problems and this would require two things : (i) development of an internationally accepted procedure for the identification of pollutants of international significance and for the definition of the degree and scope of international concern; and (ii) consideration of the appointment of appropriate inter-governmental expert bodies to assess quantitatively the exposures, risks, pathways, and source of pollutants of international significance (Recommendational 35). Recommendation 74 speaks of a desire to improve the international acceptabiliry of procedures for testing pollutants and contaminants.

V. Limitations and Drawbacks of the Present Conventional Law : An Appraisal.

Increasingly the oceans, though vast and covering so much of the surface, are perceived to be a finite system, limited as to the amount of abuse it can tolerate if it is to continue to provide man with oxygen he breathes, the food he eats, and the recreational opportunities he desires. Through the Conventions and Treaties the international community has begun to respond to the challenge posed by pollution from ships. The conventions, mentioned above, attack the problem of shipbased pollution from various perspectives, namely, safety standards, discharge standards, construction standards, coastal state intervention on the high seas, liability compensation, coastal and port state inspection, and observation and reporting responsibilities. Both, petroleum and non-petroleum pollutants have become objects of regulatory schemes and recommendations. These diverse approaches to control pollution have certain drawbacks and limitations however.

54. *I. L. A.* "Draft Articles on Marine Pollution of Continental Origin", Report of the 58th Conference, New York, 1972, p, 101. See also, *Ibid.*, Art. II, p. 100.
55. Principle 7 of Stockholm Declaration on the Human Environment.
56. Principle 21, *Ibid.*

(i) Through safety standards approach attempt has been made to reduce ocean pollution by lessening the number of collisions and groundings. This approach, however, has definite limitations in controlling ocean pollution from ships. One estimate suggests that only 20% of total tank discharges into the sea result from accidents, the rest coming from routine tanker operations involving tank cleaning and deballasting[57].

(ii) Discharge standards are vulnerable on two fronts: (a) that such standards have been too liberal and (b) that discharge standards are simply unerforceable. Practical difficulties are encountered in enforcing discharge standards. For example, the coast guard would have to be on the scene taking samples at the time an incident occurred in order to satisfy the burden of proof required by the Oil Pollution Convention.[58]

(iii) Construction standards approach does not apply to ships already in existence. As a result of sharply increased oil prices and world-wide attempts to conserve this fuel, a number of crude oil tankers remain idle. This condition, if it is sustained, may slow down the impact of construction standards, as the number of tankers built may be minimal, with those buying tankers often opting for existing vessels.[59] On the other hand, as oil producing states become more involved in refining,[60] new and different kinds of vessels may be required for the transportation of refined petroleum products. For example, the importance of liquified natural gas has been growing rapidly in the present decades. But, this growth, however, is dependent upon the availability of special ships to transport the gas.

(iv) Liability limits contained in the Civil Liability for Oil Pollution Damage Convention and the Eatablishment of an International Fund for Compensation for Oil Pollution Damage Convention are inadequate and do not make provision for compensation for any damage

57. Lawrence Juda, "IMCO and the Regulation of Ocean Pollution from Ships", Vol. 26, *I. C. L. Q.*, 1977, p. 580.
58. Therefore it is suggested that the capability to trace the source of particular oil spills through investigation and the use of "chemical finger prints" be developed. As is the case with finger prints, the spill from each ship is said to be unique. *New York Times*, Nov. 8, 1975, p. 1.
59. *New York Times*, March 23, 1975, p. 1; *Ibid.*, March 11, 1975, p. 45; *Ibid.*, Nov. 8, 1975, p. 35.
60. A task traditionally undertaken by consuming states.

on the high seas. Furthermore, the Conventions create a liability that requires compeesation only in case of oil damage.[61]

(v) Under the 1969 Brussels Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualities, the parties are allowed to act oniy against "*grave and imminent danger*" to the coastline or related interests from the pollution of the sea by oil, following upon a maritime casuality and acts related to such casuality, which may reasonably be expected to result in "*major harmful consequences*.[62]" These words and phrases are not defined in the treaty. Therefore, apart from difficulties in logic and methodology, there is considerable linguistic problem in the sense that there is no generally accepted definition of these terms.

(vi) Clear-cut standards of actual acceptable damage to the marine environment have not been worked out. Emphasis on damage (where restricted to tangible injury of a determinable pecuniary nature), unless very widely defined, offers little positive guidance about man's interaction with environment. It stresses a series of levels and degrees of prohibition (as "serious and grave"), rather than providing international law with a progressive and cooperative approach to the problem of maintaininig the integrity of natural systems while allowing for social and economic development.

(vii) All these IMCO Conventions declare in their titles the intention of preventing pollution. Yet none defines pollution within the context. As for example, International Convention for the Prevention of Pollution from Ships concerns itself with the discharge of "harmful substances' from ships.[63] The Convention is still confronted with the problem of deciding when a given level of interference becomes illegal. In other words, how to describe with precision the level of environmental degradation considered illegal ? What is and what is not legally significant pollution ? What demands regulation and what does not ?

(viii) The control of pollution has been rendered difficult by existence of the sovereign nation states system and by traditional inter-

61. It is therefore suggested that civil liability for pollution damage from substances other than oil be provided for and the topic should be included in the future work programme of IMCO.
62. 9, *International Legat Materials*, 1970 Art. I (1), p. 25.
63. "Harmful substances" are defined as "any substance which if introduced into the sea, is liable to create hazards to human health, to human living resources and marine life, to damage amenities, or to interfere with other legitimate uses of the sea". 12 *International Legal Materials*, 1973, p. 1320 (International Conference on Marine Pollution : Convention for the Prevention of Pollution from Ships. London, Nov. 2, 1973).

national legal concepts such as "freedom of the high seas" and "exclusive flag state jurisdiction" over ships on the high seas.

(ix) Apart from the 1969 IMCO Conventions, states seem to have avoided international pollution agreements covering the territorial sea. No state has welcomed internationl control of thermal, industrial or agricultural wastes emptied into international waters. International dialogue is easily characterised by demands for retaining sovereign rights in coastal and adjacent waters.[64] Invoking the strong imperative of national survival, a trend is underway among states to extend, in some cases unilaterally, territorial zones of control. To preserve jurisdiction over off-shore waters and resources, claims of 12 to 200 miles of exclusive coastal jurisdiction-down to a depth of 4,000 to 5,000 metres - are now extant.[65]

(x) The Geneva Conventions are not addressed to controlling water pollution. Like the Nuclear Test Ban Treaty they merely provide generalized proscriptions for pollution control. Therefore, the sanctions presently found in conventional law have not yet embraced the problem comprehensively - defining it, stating controls over domestic as well as international pollution sources, applying appropriate principles of law and establishing detection and enforcement machinery including judicial disposition of disputes and litigations. Nor do the 1969 Brussels agreements, certainly the most far-reaching accords to date, represent the final outlines of the future law. Here, too, more signatories are needed before they become world-wide in application.

VI. CONCLUSIONS AND SUGGESTIONS

Pollution is an extremely important concept in international environmental law and integral part of many international agreements, including the Stockholm Declaration on the Human Environment of 1972.[66] But the stark fact is that pollution is a word whose meaning

64. The Security of state demands exclusive national control of its shores and approaches. To further its economic, political and fiscal interests, a state rightly supervises all ships entering, leaving or anchoring in the sea near its coasts. Additionally, through the exclusive enjoyment of sea-products found close to its shores, a state promotes the existence and welfare of its people. The surrender of sovereignty over these resources is not acceptable since it amounts to relinquishing exclusive claim to coastal zone and the jurisdiction needed to realise economic advantages and avert nuisances and abuses. *Official Records of UNCLOS-11* Geneva, March 17-April 26, 1960, Committee of the Whole, Verbatim Records of the General Debate' (A/Conf. 1919), p. 72.

65. See generally, Supra note 50, pp. 585-618.

66. *Report of U. N. Stockholm Conference on Human Environment*, Stockholm, June 5-16, 1972, A/Conf. 48/14.

in law, particularly international law, is not easily discerned. It has been used in a variety of contexts to describe different levels and kinds of man-induced changes in the natural world.[67] State practice has given rise to confusion and the general principles of international law have created uncertainty with regard to pollution. Therefore, the word 'pollution' be given a generally acceptable meaning for the future, not limited by specific usages and concepts.[68] As soon as this is done, some needs arise : (1) need to identify human activities and their by-products which cause unacceptable environmental change and the levels of environmental change considered unacceptable; (ii) need for precise threshold values of what this unacceptable level is, to be determined case-by-case, given working limits, by groups of highly trained experts in the field; and (iii) need for identifylng and setting limits of pollutants of broad international significance and recommending procedures for these purposes.

Attempts to legally define[69] water pollution vary between prescriptive to proscriptive provisions. Pollution standards, identification of offender and offended parties and tolerability of pollution remain open questions. It is precisely these questions which would seem to command the most attention in the international dialogue. Although beginnings have been made, yet at the moment it is difficult to tell to what degree an international harmonisation of pollution standards is

67. A. L. Springer, "Towards a Meaningful Concept of Pollution in International Law", Vol. 26, *I.C.L.Q.*, 1977, pp. 531-557.

68. In this connection the various questions to be considered are : What is pollution ? How can it be defined ? What kind of changes may be considered pollution ? When a given level of interference with environment becomes illegal ? To what the damage must be done to be considered pollution—damage to man and his property, damage to the environment ? What level of damage is necessary ? What human interests should be protected so that the level of pollution could be applied to it ? Interests alleged to have been injured might reflect aesthetic, conservational, recreational as well as economic values—Can such interests be injured in a legal sense (Because aesthetic and environmental well being, like economic well-being, are important ingredients of the quality of life in society) ? Can an individual claim injury to himself on the basis of aesthetic and ecological changes made in the environment which might not be easily translatable into economic terms ? Should the damage resulting from pollution include only tangible injury translatable into probable monetary damages ? Does any alteration serve as the basis of international claim ? Can absolute purity be made basis for creating pollution standards ? At what point should the law intervene before pollution begins or when it affects a wider circle and cannot be absorbed into the ecology ?

69. Supra note 4, p 37, f. n. 56.

possible. Given different national and individual conceptions of how best to manage environment and the various criteria which are used to define "pollution" there is room for skepticism. More work needs to be done in defining clearly the types of criteria on which the experts should base their studies. General principles must be formed into strict policy guidelines which look ahead to both the problems to be faced and the economic and social goals sought.

Indeed, the Geneva and IMCO Conventions are uniform in requiring impiementation through national statutes. Yet other pressing needs far control persist. Little is really known about water pollution routes, pollutant rates and variations. More extensive monitoring facilities and sophisticated measurement systems are essential to fill in data gaps. Domestic and industrial waste that the oceans can assimilate may vary from water to water and therefore the assimilative potential or capacity of a given water needs to be determined. This would facilitate defining pollution standards in terms of water quality for a particular body of water. Model abatement schemes for test purposes remain to be developed Gross impact on national health, economic activities and costs to control effluents is little known. The economic costs of pollution are now recognized to be very substantial. This is clearly the case with respect to ocean pollution. Shipping interests cannot help but be alert to the reality that if meaningful controls of pollution are not developed through international law, unilateral action by coastal states is inevitable[70].

These, and more, are to be the subject of planned future meetings which will accelerate the dialogue. Thus the WHO, IMCO and the U. N. have scheduled gatherings in 1970s to study the feasibility of controlling internal pollution sources. Similar efforts are planned by the FAO, the WMO, the UNESCO, the Economic Commission for Europe and the Council of Europe.

The prevailing legal distinction between pollution of international rivers and waterways and the pollution of the high seas is no longer tenable and must give way to universal rules to govern what is essentially a universal problem. International water pollution controls need no longer be impeded by virtually unbridled *jus abutendi* and de facto *resnullius* vis-a-vis high seas.[71] The right of sewerage and drainage and

70. For example, Bill introduced by Senator Magnuson in Feb 1977, which would establish unilaterally a 200 mile Pollution Control Zone: Lawrence Juda, "IMCO and the Regulation of Ocean Pollution from Ships", Vol. 26. *I. C. L. Q.*, 1977, p. 583, fn. 128.

71. *Supra* note 4, p. 38.

drainage clearly requires updated international definition. Territorial waters as *mare clausum* will have to ultimately fall under the reach of international law which, to be effective, must respond to public programmes aimed at ensuring that internal water usage and exploitation arc conducted without destroying its ecological substance. The high seas and internal water shall have to be regarded as the "common heritage" of mankind even at the risk of delimited sovereignty on the part of user states. International law, thus, has to set limits of permissbility to the external effects which the use of internal waters might entail. These are the immediate imperative which can hardly be overlooked in any future diaiogue.

Pollution also should be made unprofitable—taxed so that offenders wlll find the sport costly. The idea of a system of international monetary penalties to be levied in support of pollution clean-up costs has an intrinsic appeal. A Commission composed of broad-based representation of internal riparians might superintend the levying, collecting and disbursing details.

Proposals for control also might include collection of data and distribution of data analysis including long-range forecasting and evaluations; adoption of measures which improve the durability of the ship and their safety of navigation; establishment of clearly defined sea lanes; guidance of ships within a certain distance from the shore by shore-based stations; equipping vessels to prevent pollution; speed restrictions within a specified distance from land; periodic testing of shipborne navigational equipment; formulation of international standards for the training of officers and crew on oil tankers and other vessels carrying hazardous cargoes; more coordination between international organizations concerned with the oceans to produce unified action programmes[72]; radio-active waste disposal under the regulations of the International Atomic Energy Agency and through the proposed International Sea-bed Authority; amendment of the 1960 Convention for the Safety of the Life at Sea so as to control the design construction and equipment of ships which carry hazardous cargoes; establishment of procedures whereby states, regionally or inter-regionally, can cooperate at short notice to provide manpower, equipment and scientific advice to deal with the discharge of pollutants into the sea; intensification of

72. Because, unless international pollution control standards are binding on all, discriminatory treatment and bilateralism are most likely. B. J. Abrahamsson, "The Marine Environment and Ocean Shipping: Some Implications for a New Law of the Sea", Vol. 31, *International Organization*, 1977, p. 291.

research and exchange of information on pollution control methods, on limiting the impact of oil spills; more and more assistance to developing countries for implementation of IMCO Conventions technical requirements to control pollution.

Finally, it is suggested that an intlligence service should be established by IMCO composed of cooperating states to control sub-standard ships. In accordance with this scheme, any state, after inspecting a ship in its port, could report to the flag state and to IMCO that it was a sub-standard ship. And a sub-standard ship should be defined by reference to a list of qualifying defects. Further, Regulation 19 of Chapter I of the 1960 Safety of Life at Sea Convention and Art. 21 of the 1966 Load Line Convention be effectively enforced as it would reduce the number of sub-standard ships in operation.[73] Also, IMCO should evolve meaninful patterns of regulation with respect to "sub-standard" shipping.

Lastly, voluntary control and discipline should be coupled with the enforcement of international legal measures to combat pollution. Law alone would not be sufficiet to combat pollution Civic consciousness among the people is important.

73. Under these provisions the port state could inspect a ship and detain it until that ship could proceed to sea without endangering passangers and crew.

NOTES AND COMMENTS

LEGAL CONTROL OF NOISE*

The globally immense expansion of scientific knowledge and engineering technology correlates closely with the process of modernisation. An element of universality in modernisation has been the progressive substitution of inanimate form of energy for human beings and animals and the consequent exponential increase of productivity through multiplication of power driven machines. This modernisation process has acclerated denudation and depletion of our puerile natural environments. A by-product of the present day expansion is the enormous growth of population.

Such an increase in the population coupled with destructive propensities of the human animal speeds up pollution and denudation making the earth progressively less healthy and more unsafe. Industrialisation and modernisation bring the environmental crisis and that is the price which humanity pays for the progress of material development.

Only radical changes in huaman values, attitudes, economic practices and styles of living accompanied by massive alternations in the allocation of goods and services and concerted international and national action of a scope and on a scale only dimly imaginable as yet will be required if the earth is to continue to be a congenial habitat for its human population. The potentiality of progressive unchecked piecemeal depletion, denudation and pollution of the human ecology poses much greater threats than even the nuclear war.

The report on the Problems of the Human Environment[1] dated May 26, 1969, identified three basic causes as responsible for the deterioration of the environment, namely, accelerated population growth, increased urbanisation and an expounded, expanded new technology, with their associated increases in demands for space, food and natural resources.

Greater attention has been paid by many countries for the protection of water and air being polluted as a necessary step towards ensuring

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1. U. N. Docu, E/4667.

better environment. Legislative intervention has been sought in several countries for securing better habitat. Incredibly, however, much lesser attention or no attention has been aptly paid for the control of noise, though noise has been recognised as a potential pollutant and its harmful effects on the human and animal world realised.

The present paper proposes to discuss the anatomy of noise, its impact on the human body and behaviour, Noise as a nuisance, as a pollutant and the legal regulation of noise in industry and the outside world.

Noise simpliciter means any unwanted sound. Sound is a type of energy that is propogated as a series of pressure waves in air or in any other elastic medium. Much of the waste energy is at once dissipated in the form of heat but a small proportion of it takes very little energy to produce a loud noise. A mechanical disturbance in gases, fluids or solids is sound. With airborne sound, the vibratory movement of molecules of the atmospheric gases sets up small variations in atmospheric pressure known as "sound pressure." Noise may scientifically be defined as a sound without agreeable musical quality, or as an unwanted or undesired sound. In the present age of the internal combustion engine, the jet plane and more and more complicated machinery of all kinds, noise has become a permanent part of human life. Today the noise is more than an occupational hazard, it is a public nuisance and a danger to mental and physical health. Auditory damage from excessive noise was known hundreds of years ago. The Romans are said to have prohibited chariot racing in the nights and early physicians in England had attributed hearing losses in boiler makers and blacksmiths to their occupation. Queen Elizabeth forbade husbands from beating their wives after 10.00 p. m.

It is estimated that the tolerable noise for human ear is 120 dB[2]. 140 dB produces insanity. Mice are supposed to get killed by sounds that measure 175 dB. Noise with its annoyance potentialities greatly effect the working of the adrenaline glands and other endocrine glands. Noise besides having an adverse effect on the human behaviour causes annoyance which is largely an individual response and varies with persons and situations. Many noisy occupations cause "nervous irritability and strain." Excessive noise may cause dizziness. Some persons exposed to the sound of a jet engine at full thrust experience nostalgia and uncontrollable oscillation of the eye balls.

2. dB means decibel, being the one tenth part of PEL which is the fundamental division of a logarithmic scale used to express the ratio of the two specified or implied quantities, the number of bels denoting such a ratio being the logarithmic to the base 10 of the ratio. Sound levels as measured on a sound level meter with weighting net work "A" is expressed as (dB) (A)).

The neurological examinations of Italian weavers have shown their reflexes to be hyperactive : in some electroencephalography revealed a diffuse desynchronisation resembling that seen in psychoneurosis in personality disturbances.

Noise comes within the definition of pollutant adopted by a committee of the National Academy of Sciences (U. S. A.) ".....any undesirable change in the physical chemical or biological characteristic of our air, land and water that may or will harmfully affect human life or that of any other desirable species or industrial process living conditions or cultural assets or that may or will waste or deteoriorate our raw material sources." Besides the known adverse effects of noise relating to auditory response, Dr. Pruce Welch observes that "sound activates subcortical neuronal systems to continuously modify the pacing by the brain of cardiovascular, metabolic. endocrinal, reproduction and neurological functions. These activating neuronal systems are themselves restrained by inhibitory neuronal systems with which they interact.

Noise interferes with our activities at three levels—

1. At audiological level, where noise interferes with the satisfactory performance of our hearing machanism.
2. At the biological level where the interference takes place with the physiological functioning of the body;
3. At the behavioural level where it affects our sociological behaviour.

In this context it is pertinent to find out the various sources of noise in the modern civilised world. Noise is produced through (1) Industry and machinery (2) Transportation (Surface and air) and (3) some forms of entertainment and community activities. Industrial noise is for the most part local and persons who are affected by this are the workers and the residents of the locality. Noise not only, causes annoyance but interferes with the efficiency, by including stress and disturbing concentration. Noise may result in accidents by hindering communications and signals. Regular exposure to noise of any kind for unduly long periods may result in accidents by hindering communications and signals. Regular exposure to noise of any kind for unduly long periods may result in the destruction of certain inner ear structures and the loss of hearing which is permanent and incurable. The present workmen's compensation laws and the factory legislation are inadequate to deal with ever increasing complex problems that may result in by way of hearing loss etc. Noise, being an occupational hazard should be controlled at any cost by making suitable legislation

with a view to reduce the level of noise. The environmental control of noise should aim at the separation of noisy process or equipment away from the buildings. The reduction of noise at the source is another effective method of securing a diminution in noise levels. This includes proper design of the noisiest machines, their proper maintenance and upkeep and provision for specially designed silencers, replacement of metallic wheels with pneumatic wheels etc. Noise that may be transmitted through air or building structures can be reduced by increasing the distance between work area and the source of noise, provision for enclosures, heavier barriers, sound absorbing material and baffles, which may considerably reduce the intensity of noise. Compensation Laws must provide for this hazard, and stringent measures provided for the violation of such laws. Manufactures then prefer to have safer and noise proof working conditions rather than paying heavy compensations. In the long run provision for the former proves more economical. Alterations in working arrangements also reduce the risk to the workers. If the above methods fail to bring about the desired results the workers should be protected by ear defenders. Audiomeric tests should be taken before workers are placed on noisy processes and also at regular intervals.

The most effective way of controlling noise is the construction of enclosures. These enclosures must be uniformly heavy and should not have permanent openings. Sound absorbing lining to the roof gives substantial reduction of noise if the noise sources are not too closely spaced or if the noise is impusive. Sound absorbing treatment can advantageously be combined with thermal insulation.

Transportation noise has invaded vast areas of large cities and is affecting millions of city dwellers. This is the most persistent form of noise and is growing at the rate of 10dB per decade with the increase in number of motor vehicles and faster conveyances. The following table gives an idea about the noise levels of various modes of transport.[3]

S. No.	Noisy source/Area	Noise Level (dB) (A)
1.	Air Traffic	100-110
	(a) Jet take off at about 300 metres	100-110
	(b) Propeller type take off at 300m	90-110
2.	Rail traffic (at about 30 m)	90-110
3.	Heavy road traffic (Highway)	80-90
4.	Medium Road traffic (Man street)	70-80
5.	Light road traffic (side street)	60-70

3. See "Noise Control" in *Encyclopaedia Brintanica* (1969).

A team of officials engaged in the study of noise pollution in Bombay city have expressed that unless some immediate steps are taken to control noise pollution in Bombay, all will face severe mental and physical hazards. Similiar studies were undertaken in Ahmedabad, Calcutta and Banaras and the conclusions too remained unchanged, Airportmufflers should be installed to allow noiseless full powers testing. Airports should be located in such a place so that the aircraft can approach and take off over water wherever possible, as is the case of HongKong and San Francisco International Airports.

Steel bridges greatly magnify the noise of passing trains. Where the railways are to run through housing areas, separation by open spaces is essential. Long distance heavy lorries at night passing through built up areas cause serious noise pollution. Hilly roads present further noise and nuisance of gears changing.

Creation of green belts, particularly on the perimeter of aerodromes, along railway lines and arterial roads through or past built up areas and adjoining noisy industrial zone should be made compulsory by legislation. Trees with heavy foliage on both sides of carriage way will help reduce the harmful effects of noise. The norms fixed by the National Building Code of India 1970 may be of considerable help in framing legislation for the control of noise. The plan should be to keep the noise at a distance. Housing should be separated from traffic noise by interposing buffer zones and the protection of schools and hospitals by green belts and public gardens. The principle of shading and screening also helps reduction of noise.

Noise from entertainment and community activities are very peculiar to human beings. The Oriental people are commonly considered as noisy people. The only Indian reference on social noise is that of Abroletal (1970), who has measured the noise in discotheques and found it to be as loud as a punch press viz. approximately 110 dB. Cultural traditions demand noises in the community on special occasions. The use of crackers on occasions like Diwali and winning of elections is a characteristic feature with Indians which produce 120 dB (A). The problem of adjusting one's duty, not to harm or irritate others in the process of exercising one's right of freedom of speech and expression of happiness is a very difficult one.

To take care of noise pollution the following steps should be taken :

(1) Limits should be progressively reduced as technology advances, the rate being fastest for noisiest vehicles.

(2) Instruments for measuring noise should be standardised.

(3) Fiscal policies and procurement incentives as well as judicial penalties should be used to reduce noise.

(4) Government should restrict and re-route traffic away from residential areas, use town planning for noise abatement, encourage tunnels, cutting or noise screens-sound insulation for houses and quieter alternative transport methods. Research into the social and medical costs of noise as well as the economics of noise abatement should be promoted.

Noise alone may constitute a nuisance.[4] Most of the decisions as to nuisance by noise are actions for nuisance caused to individuals suffering particularly therefrom or under bye-laws made by local authorities. The making or causing to be made of such a noise or vibration as materially interferes with the ordinary comfort of the neighbouring inhabitants is an actionable wrong.[5] Writing on the control of noise R. S. Forster remarks that the passing into law of the Noise Abatement Act 1960 and the decision in the case of *Halsey Esso Petroleum*[6] are instances of where a David triumphed over a Goliath.

The Indian Law regarding noise as a nuisance is contained in S. 268 of the Indian Penal Code but is not very satisfactory. Causing noise and disturbance at night so as to affect the sleep of people living nearby may amount to a public nuisance. But such nuisance must be one which affects the people in general living in the locality. Making of excessive noise, so as to annoy and disturb beyond a reasonably tolerable extent the people in the neighbourhood, will be a public nuisance.[7]

Compensation legislation in many countries provides only for accidential injuries. Now many industrialised countries are becoming increasingly aware of the problems created by noise. Even in 1961, occupational hearing loss was compensable in 22 of the American States and traumatic hearing loss in every State. Some Canadian Provinces will not compensate unless there has been a loss of earning capacity : or awards are not made until deafness has become a social handicap.

Depending upon the degree of industrialisation and the social and political characteristics of a country the Public Health Administration should propose specific legislation on noise hazards. In countries like the Union of Soviet Socialist Republic the Acts and Regulations are

4. *Crmp* V. *Lambert* (1867) L. R. 2 Q. B. 233-
5. *Halshnry's Statutes of England*, Vol. 28, p. 137.
6. [1961] 1 W. L. R. 683.
7. *Kishorimal* V *The State*, A. I, R. 1958 Pnnj. 11.

very detailed and specific. In Austria very noisy machines or manufacturing processes must be physically separated from other places of work. In Czechoslavakia, risks are reduced wherever possible by the introduction of automation and remote control. In Finland if harmful noise cannot adequately be dealt with otherwise, the process must be intermittently reduced or interrupted.

Under Common Law a nuisance is an act or ommission that interferes with a person's enjoyment of ownership or occupation of land and noise is such a nuisance. But Common Law cannot adequately protect society against the evergrowing problem of community noise. The very concept is subjective and is incapable of objective definition. The Noise Abatement Act of 1960 in the United Kingom widened the scope of statutory provision which formerly required a noise to be hazardous to health before abatement could be enforced. When a noise is clearly established as a public nuisance as far as health is concerned, Local authorities are given enforcement powers, as well as the property owners may complain to the magistrate. The effectiveness of this legislation largely depends upon the definition given to nuisance. In Denmark bicycles with motors may not produce noise exceeding 79 dBs measured outdoors at a distance of 7 metres. In Hesse (Germany) a 1959 ordinance prohibits noisy work between certain defined hours. In Japan noise is a serious problem. At a typical central place of Tokyo cross roads one measures 74 dB during the day and 68 dB late at night. The Noise Regulation Law (Law No. 98 of 1968) of Japan was introduced with the purpose of protecting the health and the living environment of the people by regulating noise generated by the operation of factories and other types of work sites as well at construction work affecting a considerable area, and by setting maximum permissible levels of motor vehicle noise. The penalties proposed for violation are one year's penal servitude and/or one hundred thousand yen. Not only the offender but the juridical person or agent violating the penalty clause shall also be punished.

In the Words of Biologist Rene Dubos 'The human body and brain have not changed significantly during the past 100,000 years and there is no ground for belief that they will change appreciably in the foreseable future. The biological needs of modern man as well as his biological capabilities and limitations are essentially the same as those of the paleolithic hunter and the neolithic farmer. Civilisation provides man with techniques which greatly enlarge the scope of his activities, but it does not change his fundamental character. Wherever he goes and whatever he does—man must maintain around himself a microenvironment similar to the one in which he evolved.

In order to make the human existence pleasant and devoid of harmful noise and its effects, noise control legislation is of greater importance. Each such legislation or legislative consideration should survey the problems including methods, instrumentation and standards. The definition of harmful noise should be clear with reference to intensity, frequency and duration of exposure, specification of the persons, places and circumstances is to be made, where the law applies. Details of enforcement machineary and severe penalties for infringements are to be provided for the effective observance as well as implementation.

The experiences of other countries and their legislative efforts for the control of noise will be of great help to us.

It is to be seen whether the world will die with a whimp or with a BANG !

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NOISE THE SOUND KILLER AND THE LAW*

It may be that in ancient India no possible mechanism to abate noise existed; but it is clear there was great appreciation accorded to silence. The concept of *shanti* was not unrelated to silence in many instances. Further, the sage who was greatly venerated was a *muni*, a man of solemn silence. The ancients therefore valued silence and impliedly were not fond of noise. Very often one notices that noise was associated with anti-social activities like war at international level. There may be some casual connection between silence and *shanti* on the one hand and the spiritual strength and even the physical prowers of the saint on the other. Airplanes may not have been flying over Valmiki, but a *valmikam* appeared to have been some protection to him from the noise produced by the prowlers of the forest. It is some such *Valmikam*—an armour against noise—that we should furnish ourselves with. As we in India are considered to be so spiritually inclined that we tend to forget everything that is good for us, except in the spiritual sphere, it is essential that the Government in a welfare state take all necessary steps to protect the citizens from their indifference to their own material needs, to hinder hindrances to their welfare in their earthly life. It is in this respect that the state is obliged to adopt laws that will protect the citizen from the nuisance of noise which, in the long run, tends to be a sure sound killer.

It has been found that some varieties of noise cause dizziness, nausea and difficulties in breathing. To stop a heart from beating, all that is necessary to do is to subject oneself to noise of the right amplitude and frequency. Noise has been found to be a contributory factor in causing cancer, stomach ulcers and heart disease. There are many other deleterious effects of noise which are more frequently suffered and observed. Deafness is caused by long exposure to noise. When people say that loud noise does not bother them, because they are use to it, what they unwittingly communicate is that they have become perceptibly deaf. That noise often prevents and sometimes interrupts sleep is no revelation to any one accustomed to noise anywhere and especially in our capital city. The effect of noise on the nerves may be seen manifested in irritability which may easily lead to

* This paper was presented at the Nagpur Seminar on Legal control of Environmental Pollution organised jointly by the Indian Law Institute, New Delhi and the Law Faculty, Nagpur University.

short temper and readiness to fight with all their likely effects on health and life.[1]

It is in this connection that the government of a welfare state should engage itself actively in making the citizen aware of the harmful effects of noise. It is perhaps a great pity that we do not have a law corresponding to the one promulgated by Queen Elizabeth II of England. She declared it illegal for hushands to beat their wives, by way of chastisement, after 10 p. m. Perhaps the Virgin Queen did not concern herself with the physical welfare of wives; it was probably her neighbourly love that inspired this piece of legislaton. In independent India domestic quarrels can continue upto the small hours of the morning until the parties get exhausted. Loud-speakers also may continue to work their havoc within or outside one's home while vehicles ply their noisy business all hours of the day and night. Amplifiers may blare forth music throughout the night if there happens to be an impending wedding. The perpetrators seem to overlook the fact that their music would disturb the sleep of there neighbours. They also tend to forget that one man's carnatic music may be another man's cacophony : whatever be the quality of the music when it pours out of amplifiers with lethal effect, it is not likely to be regarded as mellifluous or soothening to the ear. It may not be a bad idea if a moratorium for a five-year period is imposed on the use of amplifiers. During this period, however, their use may be permitted to make announcements about the fatal effect of noise and for certain emergency situations by the police, the personnel of the health services or the fire brigade.

When once this awareness of the harmful effects of noise is created in the public, it may be easier to implement the rules and regulations now in force regarding, say, silence zones.

In acoustics any undesired sound would be regarded as noise.[1] In law, however, it is only "excessive, offensive, persistent or startling sound" which may qualify for being considered 'noise' with the result that it may happen to be actionable as a nuisance.[2] By the common law of England which, according to the unthinking complacency of a great many of our lawyers, India has been fortunate in inheriting,

1. See "What the Noise is About", *Democratic World*, 29 Nov. 1973, p. 9.

1a. The Committee on the Problem of Noise defined noise as "sound which is undesired by the recipient" (Cmnd. 2056), quoted in D. A. Bigham, *The Law and Administration Relating to Protection of the Environment*, p. 177.

2. See "Noise Control" in *Encyclopaedia Britannica*. See also *Vander pant* v. *Mayfair Hotel Co. Ltd.* 1930/1 Ch. 138 which laid down that noise is actionable in nuisance provided it is sufficient to cause "substantial interference with health, comfort or convenience".

freedem from noise is essential to the full enjoyment of life in a dwelling house, and noises that undermine that enjoyment will not be legally tolerated. But if no malice is proved and if the noise is not exceptional and unreasonable the perpetrator may escape the rigours of the law. As this appears to be a question of degree it is worth one's while to look around and see, or rather hear, how this degree often transgresses into the realm of the excessive and the unreasonable.

The most pervasive and Vexatious noises are those from vehicular traffic and aircraft.[2] Noise caused by medium and heavy traffic in certain parts of Delhi is between 75 and 100 phons. Though occasionally it can be higher, it is generally between 90 and 95 phons. In bombay, noise caused by traffic ranges between 95 and 105 phons. There is a reduction of about 18 phons by 10 p.m. in Delhi. In Bombay the reduction in noise at night is only 15 phons; unlike in Delhi vehicular traffic continues in Bombay throughout night. But Delhi makes up for this deficiency in making of noise by keeping loudspeakers in full blast. One may be considered discriminatory if one does not give due credit to aircraft for the contribution it makes to the noise in the capital as well as else-where.[3] In evaluating the degree of damage done by all this noise, one has to consider the fact that when the noise is higher than 80 phons, it generally leads to temporary loss of aural perception. A level of about 60 phons is recommended for work requiring concentration of mind.[3] Most of the offices and a number of educational institutions are located in Delhi areas, areas noisy with traffic. A lazy office worker

2a. *The Protection of the Environment : The Fight Against Pollution* (Cmnd. 4373) p. 14.

3. "What the Noise is About", *op. cit.*

3a. It may be of interest to note that the Air Navigation (Noise Certification) Order, 1970, as amended by an amendment order of 1972 (S. I. 1972 No. 455) requires all aircraft landing in the United Kingdom to hold a certificate, from their country of registration, that they comply with certain specified noise maxima requirements in accordance with their weight and size. See D. A. Bigham, *The Law and Administration Relating to Protection of the Environment*, p. 185. Bigham suggests that "The most effective means of control of aircraft noise must lie in an internationol code designed to specify requirements in the construction of new aircraft and, possibly, in a right of individual countries to ground offending machines where a positive breach of noise regulations can be effectively proved" (p. 186).

3b. The permitted noise level in England in 1970 for lorries was 89 dBA, for motor cycles 86 dBA and for cars 84 dBA. Though the standard unit for measurement of sound is the decibel (dB), for traffic noise the use of a special scale called the 'A' weighing scale is generally recommended. This relates to the band of frequencies to which our ear is most sensitive. The dBA is the basic unit on this scale.

or a pretty bad student may therefore justifiably find a scapegoat in noise for not attaining to his maximum efficiency in work or study.

III

In our emulative wisdom, we incline to adopt for our use laws from western countries. This may in the long run help realise the comparatists wild, rosy dream of unification of laws. But in enacting laws relative to noise control, the Indian legislator may have to pay serious attention to certain Indian conditions. It would be ideal to recommend insulation against noise by prescribing methods like the use of nine-inch thick brick walls and double-glazed windows. L.L. Beranck of Massachusetts Institutes of Technology actually prescribes that

> walls between rooms should be as heavy as possible and should be made of two isolated leaves with an intervening air space for maximum sound reduction between rooms. Sound-absorbing materials should be used on the ceiling or walls of a room to prevent the reinforcement of the noise due to room resonance.[4]

But the snag is that we will have to find exceptionally gifted architects to fit all these into mud walls and non-existent windows which are all that the hut dweller can afford. But the picture is certainly different when we come to affluent industrialists. As they are Mammon's darlings they can afford to follow the necessary prescriptions for noise control and they may be glad to do it, if they are made aware that they stand to gain financially by doing so. For instance, sound-absorbing materials in factories would promote efficiency and consequently increase production. This should prove adequate allurement to them. Manu factures of automobiles may be persuaded to see that noise from their products is kept within specified limits. This is not an impossible or even a very difficult feat. Manufacturers may be required to redesign the source of sound for quieter operation, to instal sound-absorbent materials near sources of noise and in areas where silence is desired, to use accoustical lining or baffles in ventilating ducts, to provide workers with sound-reducing car muffs or car plugs.[5] Varying compression ratios and timing appeared to have decreased noise from petrol and diesel engines in the United Kingdom.[6] It is claimed that in the U.S.S.R., careful balancing of engine, gearbox, wheels and tyres had reduced noise to a considerable extent.

4. L. L, Beranek in *Encyclopaedia Britanica* (1968 edition).
5. *Ibid.*
6. See generally *The protection of the Environment : The Fight Against Pollution* (Cmnd. 4373) pp. 15-16. See also "Noise control", *Encyclopaedia Americana.*

Instead of leaving the health of the citizen to the tender mercies of police regulations it would be desirable to enact a piece of legislation relative to noise control in the country. We may not be averse to adopting certain provisions of the Noise Abatement Act, 1960, of the United Kingdom. Section 2 of that statute is of special interest. It provides, inter alia that a loudspeaker in a street shall not be operated

(a) between the hours of nine in the evening and eight in the following morning, for any purposes;

(b) at any other time for the purpose of advertising any entertainment, trade or business.

The section mentions a number of exceptions to this general prohibition, such as operation of a loudspeaker for police, fire brigade or ambulance purposes, for making announcements to passengers or prospective passengers by persons employed in transport undertaking and in case of emergency.

The provision in the British statute relative to the competence of three or more aggrieved persons to make a complaint of the existence of noise or vibration which is a statutory nuisance as contemplated in the Public Health Act, 1936 also may be found worthy of adoption.

In many cities of the United States, local ordinances indicate permissible sound levels in terms of octave band levels and these can be enforced on the basis of instruments. How far such laws are suited to Indian conditions in anybody's guess ? Apart from the expenses involved in providing the guardians of law and order with the necessary instruments, there is bound to be a general apprehension that these might only furnish them an additional opportunity to get their itchy palms well greased. If these ordinances are considered beyond the possibility of enforcement and therefore outside the ambit of adoption, we may less despairingly look at certain pieces of labour legislation in some of the States of the U. S. A. which prescribe standards of maximum noise levels. It is incumbant on the management to see that the industrial employee is not subjected to any higher level of noise. Further, there are individual states where laws have sought to establish means of measuring damage to hearing and schedules of compensation according to the degree of hearing loss. These measures may not be difficult of adoption. Industries are in a position, even in the "developing" world, to co-operate in the implementation of these measures.

As mentioned before, what is perhaps more important than promulgation of laws is the adoption of educational measures with a view

to making the public realise the general nature of noise pollution, its adverse effects on health and the ways in which members of the public can co-operate in the reduction of this pollution.[7]

IV

Considering India's cultural heritage and its present position among the developing countries of the third world, what can perhaps be adopted by it for its daily use is

A sound so fine there's nothing lives 'Twist it and silence.[8]

Joseph Minattur*

7. See generally, W. H. C., *Air Pollution*, Fifth Report of the Expert Committee on Environmental Sanitation, (Technical Report Series, No. 157) pp. 25-26.
8, J. Sheridan Knowles, *Virginius*, Act V, 2.
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THE IMPACT OF WATER POLLUTION—ITS CONTROL WITH SPECIAL EMPHASIS ON INDIAN LEGISLATION

PROF : K. MADHAVAN PILLAI*,

Introduction

Man can exist with five litres or less of water per day. This varies from country to country. In an industrialized country it is not uncommon for 400 to 500 litres to be needed per head. Such needs are becoming increasingly difficult to meet, as pollution has reduced the quality of many water sources.[1] The alarming situation about the scarcity of water the world may face in the near future, is a matter of concern to all.[2] If one litre of oil is enough to make one million litres of water unfit for consumption,[3] the massive scale of water pollution by the careless attitude of man can be imagined and a total arrest of such pollution need not be overemphasized.

Water being the most indispensable matter for the existence and survival of all living things, a study of the impact and the ramifications of pollution of water and prevention thereof will be most valuable. The problem has assumed gigantic dimension consequent to the application of scientific and technological devices in the industrial and agricultural fronts. International bodies have seized of the matter. The salvation is to be found not in effecting any brake in the scientific and technological advancement in the productive fronts but in utilizing that scientific know-how to minimize, if not prevent the side effects of the factors like noise, air, and water and other environmental pollution.

In 1971, WHO made an extensive review of the problems involved in the environmental hazards and focussed effective action in the following areas :

(1) Basic environmental health and sanitation must be improved in all countries, especially in developing countries.

(2) Special emphasis should be placed on the provision of adequate quantities of potable water and the sanitary disposal waste.

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1. Confer—"Health Hazards of Human Environment"—*WHO* 1972 at p. 47.
2 For more information see Ramesh Chandran's "The World is Running out of water"—*The Illustrated Weekly of India* 17th April, 1977.
3, *ECE* 'Symposium on problems relating to environment' 1972. p. 97.

(3) Inter-governmental agreements should be reached on criteria, guides and codes of practice concerning non-environmental influences on health. In fact, from the very inception of WHO in 1947, it has been evoking much concern on the environmental factors and their effects on human health.

What is Pollution ?

Pollution means the addition or doing of something to water which changes its natural quality, contaminating water by the discharge of sewage or trade wastes, rendering a stream unsuitable for the purposes of another riparian owner such as cattle drinking, polluting a water supply, or fouling a river so as to kill or injure the fish in it.[4]

A still more comprehensive deflntion is envisaged by Section 2 (e) of the water (Prevention and Control of Pollution) Act, 1974.[5]

In order to prove pollution, it must be shown that something has been added to the water which detracts from the purity and quality of the water. "Water is considered polluted when it is altered in composition or condition so that it becomes less suitable for any or all of the functions and purposes for which it would be suitable in its natural state. This includes changes in the physical, chemical and biological properties of water or such discharges of liquid, gaseous or solid substances into water as well or are likely to create nuisances or render such waters harmful to public health, safety or welfare or domestic, commercial, industrial, agricultural or other legitimate uses of water. It also includes changes in temperature due to the discharge of hot water (thermal pollution)."[6]

Pollution Factors :

Water pollution is not a new phenomenon nor merely a man made one. An excursion to the medieval period, convinces that water pollution was a great problem that confronted the medieval European cities. The terror-striken Black Death (Bubonic Plague) of 1348 which wiped

4. A. S. Wisdom, *Water Rights* (1969), 64.
5. "Pollution" means such contamination of water or such alteration of the physical, chemical or biological properties of water or such discharge or any sewage or trade effluent or of any other liquid, gaseous or any sewage or trade effluent or of any other lqiuid, gaseous or solid substance into water (whether directly or indirectly) as may, or is likely to, create a nuisance or render such water harmful or injurious to public health or safety, or to domestic, commercial, industrial, agricultural or other legitimate uses, or to the life and health of animals or plants or of aquatic organisms.
6. Health Hazards of the Human Environment—*WHO*, 1972 p. 47.

out 75 million people in Europe was consequent to water pollution. Streets not maintained nor paved; with no drainage facilities the waste and excreta of pigs and other animals infiltrated with water and formed muddy pools which leaked into wells and private pools causing pollution and the resultant plague. This was not due to industrial waste but out of the neglect of the use of known sanitary engineering methods. The first British Urban Sanitary Act of 1388 for bidding the throwing of any refuse into ditches and rivers was provoked by this catastrophe. Beyond such human neglect, the problem facing modern world on a global scale is the enormous quantity of effluents and wastes flowing out the innumerable industrial plants polluting the water and atmosphere. "The pollutants that are causing concern today are the byproducts of industrialisation which allows a very large population to live reasonably and comfortably. Pollution cannot therefore be avoided, can only be minimized".[7]

Farm Pollution :

Pollution no longer remains a fashionable disease of merely industrial and urban societies. Rural areas have also not been left untouched by this hazard any more. A research study conducted in certain villages of Punjab and Haryana highlights the impact of fertilizers on environment. It is found that the underground water resources which are commonly used as the main sources of drinking water in villages have become considerably polluted due to massive application of nitrogen fertilizers. The percentage of nitrate in the ground water has alarmingly increased during the last few years. Such a high nitrate infiltration has spread urinary troubles, kidney malfunctions and jaundice in those villages.

Punjab, which is agriculturally the most productive state uses maximum quantity of fertilizers. Unfortunately, the enthusiastic farmers tend to use more of fertilizers than actually needed. The study reveals that from 35% to 60% of nitrogen in the fertilizer is recovered by the crops and another 10% to 20% goes into atmosphere. The rest is soaked by the soil and gets mixed in the undergound water reserves. Since the underground water level rises high in the rainy season, it takes only a few days for nitrate particles to reach its level and mix with it during the months of July to September.

The percentage of nitrogen in drinking water thus increases rapidly during these months. Hence the study team suggests for a cautious use of fertilizers between July and October.

7. P. Abraham, quoted in Indian Association for Water Pollution Control, *News letter*, August 1970.

A survey conducted in certain villages in Punjab shows that 90% of the water samples contained more nitrate than the upper safe limit. Another notable observation was that the nitrate content was much higher near villages and residential areas than in the cultivated land. Disposal of animal and human waste around the villages creates a source of nitrate pollution of ground water around village habitation. This problem of nitrate infiltration in drinking water is found in other states like U. P., Haryana, and also where increasing quantity of nitrogen fertilizers are used.[8] It is suggested to limit the application rate of nitrogen fertilizers strictly to the need of the crops and to include those crops in rotation which need very little nitrogen. In this connection, the field officers and other responsible authorities committed to the green revolution should take adequate steps to enlighten the agriculturists regarding the required quantum of nitrogen fertilizers and the repercusion of surplus use thoreof.

Pesticide Residues and Industrial Chemicals :

Synthetic pollutant P, P'DDE is a degradation product of P, P'DDT. These produce much impact upon plants and animals. Similarly, industrial chemicals release their volatiles to the atmosphere or as discharges to rivers these find their way to the marine environment. About 2.5% of the total production of gasoline is lost by evaporisation through transfer processes from production site to storage tanks and vehicles and through evaporisation from automobile gas tanks and carburetors. In U. S. alone, this comes to 10 million tons per year.[9]

Domestic wastes :

In United States, the per capita solid waste to domestic sewers is 15 Kg. About 3 crores of people living in the sea coastal areas of the United States, thus give out 5 lakh tons of waste per year which enter the marine environment. In other words, U. S. inhabitants are responsible for 20% of the worlds domestic coastal effluents.[10] In the U. S. the regulation of dredging and disposal of dredged waste is handled by the U. S. Army Corps of Engineers. There are more than 145 waste disposal sites in esturine and coastal ocean waters of the U. S.[11] The Council on Environmental Quality (1970) make necessary regulations in the waste disposal matter.

8. In Punjab alone the use of nitrogen fertilizers went up from 2.92 thousand tons in 1976.
9. "*Mans Impact on Terrestrial and Oceanic Ecosystems*" (1971) p. 267.
10. *Ibid* p. 269.
11. See for the Table *ibid* p. 254.

Other Chemical invasion of Ocean by man :

About 5,000 tons of Mercury transfer from the rivers to the oceans. About half of the world mercury production, i. e. 9,200 tons per year is used for agriculture and industry. Out of this, about 4,000 to 5,000 tons enters ocean as a result of release of man utilized compounds. This creates the formation of poison, methyl mercury chloride, causing illness, blindness and death to man and other animals.[12]

Man is responsible for the input of lead to the oceans equal to that of natural process. About 2,50,000 metric tons of lead is annually washed out over the oceans in the northern hemisphere. This results in the rise of lead content from about 0.01-0.02 to 0 07 Pg/Kg of sea water, since the last 45 years.[13]

Petroleum :

It is estimated that there is immense loss of petroleum to the seas as a result of man's utilization creating wide repercussions. About 10,000 million tonnes is transported across the world oceans annually. There is an increase of 4% to this each year. This comes to half the world's production of petroleum. In this process, the estimated loss to marine environment by leakage, spillage etc. is about 0.1% of the total transport i. e. 10 million tonnes per year.[14]

Radio-active Species :

The Radio-active species released from recent nuclear device testing programmes of U. S., Soviet Union, England, China, and France are the discharges from the nuclear re-actors which may be found in all oceans and in all members of the marine hemisphere. These actvities have introduced such novel nuclides as radio-active into the world seas and also have increased cosmic ray-produced nuclear species in the surface layers of oceans and in the atmosphere.[15]

The data mentioned above examplifies the dimension of the problem caused by the environmental pollution.

Jaundice Epidemic of Delhi Colonies

Many of the inhabitants of South Delhi colonies had the bitter sufferings of jaundice in an epidemic form during 1956 consequent to the water pollution caused by the mixing of the Najafgarh nullah with the Jamuna waters which was used for supplying drinking water in the

12. *Ibid* p. 262
13. For more data *ibid* p. 265.
14. *Ibid* p 266.
15. For more details vide *ibid* p. 269.

area. This was the worst epidemic owing to the infectious virus in the whole world. Following a public outcry, and an official enquiry, a weir was put up to separate the water works from Najafgarh effluent in order to remove the danger of enterie pollution.

Given no proper vigilance, pollution can not be ruled out even in in water supply reservoirs, storage places and tanks. The foregoing discussion leads to the inference that human neglect, natural calamities, industrial and technological advancement, increased use of fertilizers, pesticides and insecticides and similar other variety of factors contribute to the environmental pollution. However, in modern times, environmental pollution mainly is concomitant of industrialization.

Brake to industrial expansion is no solution

We cannot have a totally undisturbed environment if mankind is to raise itself above poverty and drudgery. The solution to the problem of changing the environment is not to put a stop to the change, but to make adequate change. It is only through the proper application of science and technology that the environmental problems can be solved. If we are careful engough, willing to apply necessary time, effort and resources, science and technology can provide us healthy and affluent society through the development of inventions such as electric or steam automobiles, cleaner power and industrial processes and safer insecticides.

The Control of pollution is best achieved by controlling the releases at the point of origin because, once released the pollutants cannot be retrieved. Vast sums are now being spent on research in order to develop cleaner fuels, and to treat industrial wastes so as to render them harmless before discharging them. The new challenge posed by industry can be solved by industry itself, once the minds of scientists and engineers are bent of devising clean processes of production and proper means of waste disposal.

Pollution—a global Problem :

Under the auspices of the U. N., a conference on human environment was held at Stockholm during 1972 with a view to attention focus to explore global solutions of the dangers that threaten man's environment. Technocrats and experts in the allied areas made frequent conferences time and again, suggesting valuable recommendations to meet the challenge of environmental pollution.[16]

16. vide, papers presented by Pike and Gameson, "Effects of Marine sewage Disposal". *Journal of the Institute of Water Pollution Control*, Vol. (69) 1970.

Also see, Pollution of Water Supplies, Farm Wastes *Ibid*, p. 428.

"Chemical aspects of some waste disposal problems" *Ibid*, Vol. (70), 1971 p. 419.

Opening a symposium, the President of the Institute of Water Pollution Control, Mr. Clarence Lumb commented on the huge volume of liquid wastes that are now being produced by industry and on the problem of disposing of them without detriment to natural water resources. According to him, both on technical and on economical grounds, the most satisfactory method of disposing of such waste was by a discharge to the public sewer for treatment at the sewage works of a local authority. It was estimated that about 70% of the industrial waste produced in England and Wales was now being disposed off in this way.[17]

Consistent with the world organizations exhortations, comprehensive legislations have been passed in many countries to control water pollution.[18]

Pollution Control Laws in India

Maharashtra was the 1st State in India to legislate for prevention of water pollution[19]. The Maharashtra Prevention of Water Pollution Board (1970) was set up under the chairmanship of the devoted public

17. For a detailed appreciation refer *Journal of the Institute of water pollution control*, vol, (70), 1971.

18. *Laws in England and Wales Relating to Water Pollution* Public Health Act, 1872, 1875, 1936, 1961.
Rivers Pollution Prevention Act, 1876, 1951, 1961.
P. H. (Drainage of Trade premises) Act, 1937.
Rural water supplies and sewerage Acts, 1944-1965.
River Boards Act, 1948.
Water Acts 1945 and 1948.
Water Resources Act, 1963.

Laws in other countries

Sweden
Environmental Protection Law, 1969.
Japan
Basic Low for Environmental Pollution Control, 1971.
Singapore Environmental Public Health Act, 1968.
The Sewerage (Scotland) Act, 1968.
Belgium
Control over water pollution Law, 1974.
An Environmental Protection Agency and a Council on Environmental Quality have been established in United States.
A Department of the Environment is set up in U. K.

19. Prevention of Water Pollution Act, 1969 (16 of 1970). It provides for the abatement, prevention, pollution and control of streams in the state. Provisions of this Act are roughly analogus to the 1974 Act. Tamil Nadu passed the Water Supply and Drainage ... ... Board Act 1970 (4 of 1971) which mainly projected the prevention and control of water pollution.

Health Engineer G. B. Modak who was the guiding force and architect of the State Act.

Since water pollution assumed such wide proportion and feeling that it remained no more a local, state or national problem but one of global nature and that international organisations have highlighted the repercussions if it is not arrested effectively, a good number of states in our country requested the Parliament by passing resolution under Art. 255 of the Constitution to make a comprehensive legislation for the prevention and control of water pollution and the maintaining or restoring of whole someness of water and to set up Boards for the prevention and control of water pollution. Thus the Water (Prevention and Control of Pollution) Act 1974 (Act 6 of 1974) with comprehenslve provisions was enacted by the Parliament and was accepted by almost all states.

The term 'Pollution' is defined so as to cover all conceivable contaminations[20]. The Act authorises the installation of Central[21] board, State boards[22] and Joint boards[23] by appropriate governments armed with necessary powers.

Composition of the Boards

The successful implementation of the objectives set forth by the Act, to a large extent depends upon the calibre and perseverance of the Board concerned. The problems that crop up before the board, though substantially technical in character may often involve legal aspects as well. In addition to handle such legal questions mixed with the technical problems the services of legally trained persons should also be available. Otherwise the legal flaws dormant in the handling of technical matters might defeat the project however beneficial it might be. Therefore, it must be made clear by the rules or otherwise that among the flvc officials nominated by the Government to the Board atleast one should be a person with sufficient legal training.

Powers and functions of the Board

Chap. V of the Act dealing with prevention and control of water pollution empowers the Board or its authorised persons to obtain information, to prepare service, to take samples of effluence, conduct analysis, enter any premises and inspect records etc; probibit the use of stream or well for disposal of pollution matters, and a variety of other matters. The provisions of the Cr. PC. and the related laws are made

20. S. 2 (e)
21. SS. 3, 16.
22. SS. 4, 17.
23. SS. 13.

applicable in the discharge of above funtions. The appellate and revisional powers against the orders of the Board confided to the Govt.

Chap. VII of the Act prescribes the penalties against contravening the provisions of the Act and directions and orders issued by the Board or the person authorised. The Cr. PC and the IPC provisions are also made by it applicable in this regard.

Enforcement Problems

A perusal of the Act makes it clear that the Board and its authorised personnel are invested with ample powers to prevent and control pollution. Effluents and wastes from newly-started industries and trades can be given pretreatment so as to reduce the BOD (Biochemical Oxygen demand) and COD (Chemical Oxygen demand) by strictly enforcing the provisions of S. 25 of the Act read with S. 12[24] of the Factories Act, 1948. The cumulative effect of the above provisions can be that the Board should be convinced about the arrangements of the safe discharge of wastes and effluents not causing pollution before starting any new industries. But this does not solve the problem posed by the major pollution contributors viz. the existing trades and industries. The Board is empowered to direct the manufacturer to comply with the standard prescribed by the former in the discharge of effluents and wastes. The manufacturer or the concerned person should conform to the standard within three months from the date of setting of the standard[25]. The manufacturers may have their own practical difficulties such as factors beyond their control, like nonavailability of raw materials or of installation and plant machineries, and things like that. Consequently, the Board might be constrained to concede more time or renew the ultimatum and thus adopt all persuasive devices. If a strictly legal attitude is adopted it may lead to ill-consequences, like cancellation of licenses, stoppage of production which in turn may have repercussions in the industrial growth of the nation. Combating such a menace as pollution should not be treated as merely a duty pinpointed exclusively on the manufacturers, but it should be treated more as a human problem obliging the state to extend all kinds of co-operation for the prevention of environmental pollution.

24. S. 12 (1) Effective arrangements shall be made in any factory for the disposal of wastes and effluents due to manufacturing process carried on therein :
S. 12 (2). State Govt, may make rules prescribing that such arrangement shall be approved by such authority as may be prescribed.
25. See S. 26, 1974 Act.

Need of Enforcement machinery :

Prevention Is better than cure. This is emphatically so in the matter of environmental pollution. It is true that the Law under discussion focusses the importance the preventive methods [26] However, it is said that such emergency or preventive measures are seldom feasible in practice inspite of the powers conferred on the Board under S.30. the Board personnel may have to seek the aid of a Court of law or the police force. By this time the act which was sought to be restrained might have occursed causing immense and irreparablo damage to several lives and properties. In order to minimise such eventualities suitable changes may be introduced with a view to setting up an enforcement machinery analogous to the excise or the tax enforcement force that, when ever physical force is indispensable to avort a catastrophe due to the reckless attitude of any one, it can be availed of on the spot of nuisauce.

Pollution control : consciousness and public opinion

It seems that consciousness to prevent p llution is lacking in India, both among the offender as well as among those entrusted with responinility and authority to take action In the U.S A. under pressure from public opinion and as result of prompt legal action, many industries have already devised methods to treat liquid and gaseous effiuents before letting them out We, in India, also should mobilise public opinion against water pollution at all levels and that the people and the governmetns at the centre as well as in the states must utilize all the resources with a concerted move for giving priority to combat the menace of pollution of water.

The declaration of the U N Conference on Human Euvironment, held in June, 1972, proclaimed the basic right of man to avail of opportunity for intellectual, moral, social and spiritual growth. Improvement and protection of human environment is also declared an essentiality. In developing countries, most environment problems are caused by under development Millions live far below minimum levels, and are deprived of adequate food, clothing, shelter, education, health etc. The world body impressed upon the industrialized countries to render material serviees so as to reduce the gap between the developed and developing countries. The conference evolved 109 recommendations and an action plan for the creation of better environmental conditions.

In England and Wales, recent studies by expert committees unfold the gaps in the laws and administration of waste management. In the opinion as of the committee, penal sanctions for those who break the

26. vide SS. 24, 30, 32, 33. *ibid.*

pollution control law must be sufficiently stringent so as to act as a deterrent. It has been pointed out that new laws must be capable of being enforced, otherwise they will fall into disrepute. One expert committee concluded that legislation and regulation cannot provide the whole answer it Is also important to provide more suitable and safe facilities for waste disposal and not to grudge over the cost.[27]

Waste cannot be eliminated, it must be disposed of. It's composition can be changed; but eventually it must be returned either to land. air or water. The task of waste management is to see that those natural resources are not abused. the best solutions will not be found by leaving decisions to a few experts. There must be a genuine participation of all the disciplines and interests involved. Because, then only will it be possible to foster the spirit of mutual co-operation and understanding that is essential if future decisions are to be determined rationally, accepted freely and implemented willingly; only then will clean water, pure air and wholesome land be secured for the next generation.

27. *ECE* Symposium on problems relating to Environment—p. 106.

THE LAW AND ENVIRONMENT COURSE : A BANARAS SCHEME

Until very recently, the Law Schools in India did not adapt themselves with the changing requirements and conditions of the society. They adopted static courses of studies which raised demands for complete reforms in the existing Indian legal education. Friedmann had rightly pointed out that it would be tragic if the laws were una le to respond to the changing conditions.[1] Thc developing societies, in particular, are going through a transformation through legislative enactments. India also is bringing about socio-economic changes through the instrument of law. If the Law Schools are to play an important role in modern India, they have to orient themselves in such a way that legal education satisfies the changing socio-politico-economic needs of the society. Today, in consequence of rapid industrialization and urbanization, the environmental pollution is spreading fast and poses serious danger to the survival of the living species throughout the world. Attention is being drawn by the environmentalists that how hazardous pollution is to the life and development of human beings animals, plants, aquatic organisms and what not. India is no exception to such an experience. But the problem in India is that not too many people know about environmental pollution and, even if some of those in the industries know about the hazard, they are more concerned with earning more and more profits than with the danger to the health of the society. The public at large at the moment is only too engrossed in meeting both the ends together. They are more involed in their struggle for their bread and butter rather than the luxury of a wholesome environment. But the ignorance of pollution hazard could eventually endanger the human survival. The dangers and consequences of pollution could be minimised by educating the society as well as all those who being aware of the dangers are interested in protecting and controlling environmental pollution. The Law Schools can play an important role by imparting education in Environmental Jurisprudence.

The Banaras Law School has taken a lead in India in this direction. The goal of excellence suggested by Professor Anandjee, the then Dean and a leading contributor to the modern legal education in India, pointed out that the function of the Banaras Law School will be not merely to confine to a systematic presentation of extant laws or even to their critical evaluation but it will also be a laboratory for

1. Law in Changing Society (1972) p. 503.

training students to study human motivation (in a complex society) and ever changing socio-politic-economic needs of the community, and for assessing and recommending a body of laws which, while canalizing human behaviour in a manner best subserving the interests of the community; would continually augment the preferred values of the society and will raise it over to ever increasing heights [2] In order to fulfil this goal, in 1960, the law school decided to reorient its existing courses of study to keep pace with the modern trends. And, in July, 1964, the first phase was put into operation. In the year 1973 the second stage came into operation when some more new ventures were introduced. At this stage 'Law and Environment' was also listed as a course of study. It was only since January, 1977, when under the Deanship of Professor Dhokalia the Banaras Law School for the first time in India started imparting instruction in 'Law and Environment' at the LL. B. level.[3] The following is a resume' of the Banaras Scheme.

1 Placement :

The Prospectus of Studies for the Law School provides that the course on Law and Environment could be conducted in either the Fifth or the Sixth Semester of the third year of the three year LL. B. course. However, this course has been currently introduced in the Sixth Semester. This is done so at the end of the three year course as the students are exposed to the need and problems of the emerging law of pollution only after they have acquired sufficient knowledge of different branches of law. Once the critical faculty is developed then it will not be difficult for them to grasp the newly developing subject. For a fruitful study of a course on 'Law and Environment', it is necessary that students have the basic knowledge of Criminal Law, Constitutional Law, Administrative Law, Law of Contracts, Law of Torts, International Law, etc., as it would enable them to better appreciate and comprehend the problems and intricacies involved in this subject.

The course on Law and Environment is an optioal course in the third year of the three year LL. B. Course and as only such students, who have an interest and some awareness of the pollution problems. like to join it. At the moment, there is scarcity of literature in the form of text and reference books and cases and materials book on Law and Environment. The course on 'Law and Enviranment' finds place in the syllabus under the main title of 'Seminar Course on Law and Society'. This course directs the attention of students to current social

2. Dean's Report, 1965 *Ban L. J.* p 15.
3. The author of this note is conducting the above course at the Banaras Law School Wherever the Banaras Scheme is mentioned hereafter the author has reference to his own experience in running the said course.

problems confronting the society of which environmental pollution is one which is a result of population explosion, rapid industrialization, unplanned urbanization and other developments in science and technology.

II. Contents[4] :

There could be two approaches in delineating a course on Law and Environment : firstly, all the causative factors and resultant problems of pollution and attempts at regulation by law may be included for comprehensive study so that the students may get a general understanding of the subject; or secondly, only special attention may be paid for depth analysis of pollution in specific areas and the response of law to prevent and penallze the acts so that specialized knowledge may be imparted. So far as the Environmental Jurisprudence in India is concerned, except the control of water pollution, the Legislatures have not paid any serious attention to varities of environmental pollution. In the context of inactive legislative approach, the judiciary also has taken no initiative of its own to make any significant contribution, Thus, thoughtfully, the first approach seemed to be more useful and practicable in rendering the course fruitful. If, initially, at the LL B level the students are imparted with a general knowledge of the subject as to the pollutants, sources, problems and the impending need of law in specific areas then, at a later stage, for the post-graduate studies an advanced course on pollution control in specific areas at national, regional and international levels can be provided for phenomanological study and depth analysis. Therefore, the Banaras Scheme does not concentrate at the LL.B. level on an intensive study of the environmental law in specific areas and attempts to give an orientation programme on general topics of pollution and emerging environmental law.

The Course on Law and Environment has been planned with a view to giving a general perspective of the problems relating to environmental pollution and the amen ing need of the response of law not only to prevent but also to punish ecocide. The course, *inter-alia*, comprises :

(i) The *introductory study* giving the meaning and contents of a pure, healthful and decent environment, the factors affecting adversely the environment, and last but not the least the importance of the study and justification for its preservation, development and protection.

4. There are no detailed contents prescribed in the Prospectus of the Banaras Law School, however, the author has on his own initiative prepared a synopsis of the course a resume' of which is given here.

(ii) The study of *historical background* of the problem of pollution which has been a matter of concern to man since earliest times. In ancient times also pollution problems existed for example, Hippocrates in the Fifth Century B.C. worte a treatise 'On Airs, Waters and Places' which dealt with environmentalist doctrine. The ancient Indian and Roman laws are full of illustrations dealing with atmospheric pollution. Certain Indian customs and ceremonies have direct connection with the control of environmental pollution. For example performing *Homa* or *Havana*[5] to purify the air and environment, extolling the river waters as sacred waters, and regarding the pollution of river water as a sin, the practice of transendental maditation,[6] etc., are some of the many illustrations where one gets support of the theory that even in the ancient times there was some awareness about environmental pollution and importance of purification of the environment. The types of pollution affecting the human beings in earlist times of human civilization and the measures adopted by them can be of historical interest Later on during the Middle Ages the individualstic society was transformed into a Feudal Society which become group organized and power conscious. And from that time onwards human society began identifying the problems of environmental pollution. But, the probiems were not so alarming and, therefore no serious attention was paid to such problems during the Middle Ages. However, it is during the modern age that the problems of pollution were aggravated by a rapid industrial development and population explosion and continuing distruction of the earth's ecology.

(iii) There can be no uniformity in respect of degree and sources of pollution, and remedies throught the world community. The problems of developing, developed and under-developed countries cannot be put at par. The appoaches as to enviromental protection also differ in case of capitalists and the socialist states and in the dictatorial and the democratic countries. The students could thus be exposed to the *comparative approach* of the Environmental Jurisprudence.

(iv) Another important aspect of study is related to the impovement of environment and its adverse effects on the most basic human rights as codified in the Universal Declaration of Human Rights and

5. These terms represent *sacred fire* which is belived to purity the atmosphere so that the gods propitiated may come to earth from there heavenly abode in responce to the prayers.

6. In the Yoga a person performing the meditation acquires powers, spiritual as well as physical, ensure perfect health.

recognized in the Constitutions of several countries as fundamental right to life includes the right to preservation of all life and right to a pure, clean and healthful, or decent or sound environment. This has reference to other branches of law, in particular the *Constitutional Law.* This topic becomes more important in the light of the Constitution (Forty-Second Amendment) Act, 1976, which is the first in the world constitutions to provide in detail for the protection against environmental pollution While discussing the Constitutional Law of India and the environmental pollution, attention of the students is drawn, *inter-alia,* to the Chapters on the Fundamental Rights, the Fundamental Duties, the Directive Principles of the State Policy, and the distribution of the legislative powers relating to the subjects connected with environm nt. Before the Constitution (Forty-Second Amendment) Act, 1976, the attention of the judiciary was not drawn towards the protection of environment; and therefore, the courts did not bring in the discussion of balancing social interests against the social injury caused by environmental pollution. The cases dealing with ban on use of loudspeaker[7]; shouting of slogans[8]; other noise pollution nuisances[9]; etc., are some of the many cases which indirectly deal with only one or the other aspect of the problems of environmental pollution. These cases are referred to in explaining the approach of the judiciary in this direction.

(v) Further, the discussion of some of the important principles of the *Administrative Law* are also relevant, as it is an important law controlling the administration. And, therefore, topics like the administrative process; the delegated legislation; the concept of tribunal; the natural justice; are of importance while examining a law relating to environmental pollution. The Water (Prevention And Control of Pollution) Act, 1974 authorises the Central and the State Governments to make rules[10] which will attract the principles of delegated legislation the Central Government is given power to resolve disputes, or the State Government may make revision of the order of the State Water Board[11] which will attract the principles of natural justice; the Water Boards at

7. *State of Raj v. Chawla,* A. I. R. 1959 S. C. 544. See also *Ragni v. State,* A. I. R. 1958 Allh. 360; *Indulal v. State,* A. I. R. 1963 Guj. 259. See also *Kovacs v. Cooper* (1949) 336 U. S. 77; *Public Utilities Comm. v. Pollak,* (1952) 343 U. S. 451.
8. *Babulal Parate v. State of Mah.* A. I. R. 1961 S. C. 884; *Shaik Piru v. Kalandi.* A. I. R. 1964 Ori. 18.
9. *Kameshwar v. Stote of Bih.* A. I. R. 1962 S. C. 1166; *Datta Mal v. L. L. Prasad,* A. I. R. 1960 Allh. 632; *Ansuli v. Asst. Reg. Cont,* A. I. R. 1953 Cal. 187.
10. Secs. 63 and 64.
11. Secs. 16 (2) (b) & 29.

their discretion are given power to lay down standards for substances polluting water or grant consent for new outlets or new discharges.[12] How for these water Boards can exercise their discretionary power is a question which finds solution in the Administrative Law. These are some of the problems which a student of Environmental law may not comprehend without a background of Adminstrative Law.

(vi) Pollution of the environment is a social offence of a new variety. The ordinary *Criminal Law* also deals with certain aspects of environmental pollution. For example, the water pollution,[13] the atmospheric pollution;[14] the noise pollution;[15] public nuisance and negligence resulting in environmental pollution;[16] etc. are the areas covered by the Indian Penal Code. Some of the relevant questions which require to be dealt with in the Environmental Law course are : Has the State successfully protected the wholesomeness of environment through the Criminal Law? If not, what are the reasons for the failure of the State? What has been the response of the Judiciary to the challenges of pollution ?

(vii) Mere penalising the offender of the environmental pollution is not enough. There has been cases where pollution owing to negligent act or nuisance has resulted In deafness, mental disorder, cancer, jaundice, typhoid, and even in certain cases eventual death. These injuries may demand compensation from the offender. This brings in the discussion to the *Law of Torts.*

(viii) Lastly, the environmental pollution, deliberate or accidental, is a social offence not merely confind to the municipal limits. It has transnational character affecting entire planet and thus has potentialities of being indentified as an international crime under the *Law of Nations.* There have been significant developments at regional and international levels where as a result of multinational agreements certain steps have been taken to combat the danger of pollution and to protect the community from ill effects of environmental pollution.[17]

12. Secs. 16 (2) (G), 17 (1) (g).
13. Sec. 277.
14. Sec. 278.
15. Secs. 279; 287; 290.
16. Sec. 268.
17. Take for example, international legal control of Marine Pollution : International Convention for the Prevention of Pollution of the Sea by Oil (1954). The Convention Relating to Intervention on the High Seas in case of Oil Pollution Casualities, 1969; The International Convention on the establishment of an International Fund for Compensation for Oil Pollution Damages, 1971; International Convention for the Prevention of Pollution from Ships, 1973.

What is the response of the world community ? How far the international organisations, tribunals, and judiciary have succeeded in this direction ? Are there any other pollutions left out of the international control ? These are the relevant questions to which also some attention is drawn in order to highlight the importance of international cooperation in order to deal effectively with ecocide.

(ix) After the general background is given the attention of the students is drawn to some of the specific types of pollutions and the attempts made toward their legal control. The Banaras Scheme has currently confined to only three specific environmental pollutions : Firstly; the water pollution which includes causes and solutions of water pollution and the legal control thereof. In the legal control attention is drawn to the Water (Prevention And Control of Pollution) Act, 1974. Secondly, to the attempts so far made toward finding safeguards against air pollution (at the moment there is no legislation, though a Bill is pending in the Lok Sabha since long) And lastly, noise pollution.

(x) Finally, in the syllabus there is a provision for the *field survey* by the students. The students are required to take up field work in either one of the areas of pollution mentioned above or in all the three. They are required to prepare a detailed report of their survey suggesting either reforms, if any, in the existing legal measures or their own ideas about legal control Apart from the above report the students are also required to collect adequate material and data from any source on law and pollution[18].

III. Select Student Body :

The course on 'Law and Environment' is open to a limited number of students This has been offered to those students who have had a good scholastic record and have demonstrated genuine interest in this course. Further, this subject requires general background of science and technical subjects. The students with this background can easily comprehend the problems involved in the environmental pollution as compared to other students. During the current year the course was offered by students who had not only a good scholastic record but also (majority of them) had the background of Science, and especially of Botany. This made the task of the teacher concerned somewhat easy to enable him to do justice with such a developing course, and to pay personal attention to individual student. The students also got ample opportunities for class discussions and participation in seminars on the subject.

18. A Select Bibliography annexed in the end may be of important help in this connection.

IV. Teaching Method:

The course on 'Law and Environment' is a seminar course. Because of non-availability of adequate material on this subject, the case-method system could not be adopted. Hence the lecture-method was relied upon and the concerned teacher delivered formal lectures on the subject so that the students could acquire sufficient interest and comprehension of the subject under study. In the lectures also the inter disciplinary approach has been adopted. In this approach experts in Botany, Environmental Technology and Preventive and Social Medicines have been associated with the teaching on the course. These arc some of the branches of learning which are directly connected with the problems of environmental pollution In this way the students have also been exposed to other relevant branches of knowledge. The Banaras Hindu University, being a residential university has the advantage of the location of different Faculties and Departments within one harmonious campus and it has been very convenient to obtain the needed assistance of experts in different fields.

V Assessment :

In a seminar course, wherein the material on the subject with reference to India is very limited, it is not advisable to provide for a traditional type of written examination for the evaluation of the performance of the students. The assessment is made on the basis of their performance in the class room discussions, the collection of relevant data and literature, and, finally, the report submitted by them This system serves two purposes : Firstly it judges the overall performance of the students and saves the students from the ill-effects of the traditional written examination system in a developing subject.[19] Secondly, the data and literature so collected by the students help in a cumulative building up of a compendium on cases and materials on 'Law and Environment.' Once such a monograph is published it will provide

19. There were in all 13 reports submitted by the students. All these reports were based on the field study carried out at different places in Varanasi and the Indrapratha Estate Power station and Chandni Chowk of Delhi 7 reports concentrated on Problems of water pollution and gave suggestions, *inter alia*, education of public disconrging cremation of dead body on the bank of river Ganga; habitnal easting on the bank of the river; restriction on sewage to join the river; the polluters must pay the cost for pollution. 2 Reports dealt with noise pollution and the suggestions there of which included compulsory use of mufflers; periodic chacking of the labourers; a central policy for the sound of horn of heavy vehicle. 3 Reports dealt with all the three types of pollution. One Report made an attempt to draft a code for air pollution.

ready available matter to the students as well as the teachers of the subject.

Conclusion :

The goal of excellence of the Banaras law School is not only to satisfy the changing socio-politico-economic needs of the community but also continually to augment the preferred values of the society and raise the society to ever increasing heights.[20] The present course will fit in the processs of achieving the said goal and attempts to keep pace with the modern trends. The environmental pollution is a great hazard to the human beings and educating the people about such a social menace can contribute greatly to the welfare of the society. Law Schools cannot remain in ivory towers, they have to adopt inter disciplinary approach in the legal studies and the present course is a modest effort tow rd broadbasing the structure of legal education. Last but not the least, today, when the statistics show that only 25% of the law graduates go to practice in the courts of law, diverse courses of this kind will open up larger and more varied employment opportunities to them and will avoid rising furstration amongst them.

C. M. Jariwala*

20. Dean's Report, 1965 *Ban. L. J.* p. 14.

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BOOK REVIEW

POLLUTION, SOCIAL INTEREST AND T E LAW. By Neil Gunningham, Martin Robertson, London, 1974, pp. 96 £ 1·45.*

Though in the year 1977 we are celebrating the International year of Natural Environment, yet except some of the developed countries, the rest of the world is either ignorant of the pollution problem or helplessly watching the development in this field. Even in the developed countries they might have adopted some means to control pollution problem but the vested interests have created inroads in controlling environmental pollution. It is a serious problem which took even human life in certain cases. Now the time has come to pay serious attention to the problem. No doubt the lawyers have very recently started debating on the formulation and implementation of the policy of pollution control but mere discussing these aspects will not solve the problem unless and until we go beyond an apriori method and identify the forces which frustrate the control of the problem. The legislature may enact a law to deal effectively with a problem but there may be some forces which may not either allow the law to operate strictly or fulfil its objectives.

Neil Gunningham, mainly focusses attention on the sociology of the Environmental Law. The Book under review is one of the important series of the Law in Society which publishes texts and papers in the field of sociology of law. The series concentrates on law in action and forces behind its working. Gunningham's work falls in the line of the objective of the series. It attempts to identify the forces, interests and processes which adversely affect pollution control. According to him there are some extra-legal forces which determine the scope and force of law. Such a study makes the state organs, the vested interests and the public more conscious about the pollution problems. A social evil cannot be eradicated by just providing for preventive measures. If one wants to get rid of it he will have to go to the root cause of it and forces allowing it to flourish.

Gunningham mainly confined his attention to the British experience of the working of the pollution control. But the pollution problem did not cause so much serious concern in Britain as in America, and therefore, he has also made a comperative study with the American

*. Neil Gunningham, *Pollution, Social interest and the Law*, (hereinafter referred to as *Gunningham*).

experiences as well. A country may not be acutely facing any problem in recent times, but it cannot afford to sit leisurely and watch the drama. It has to learn lessons from the experience of others. The above approach only highlights the problem of the developed capitalist society where the vested interests are trying to evade controls. It could be an interesting study if one also looks to the experiences of the developing state and also the socialist states.

The body of the work consists of Introductory Note, Introduction and seven other chapters.

The Editors of the Law in Society Series—C. M. Campbell, W. G. Carson and P. N P. Wiles—in the Introductory Note discussed the scope and importance of sociology of law. They emphasised that to understand the law in action one cannot do away with the study of relationship between law making and fundamental characteristics of the society in which the law operates. The legal proscription, according to the Editors, frequently becomes invested with a quality of moral authority either qua law itself or as the assumed crystallisation of values which transcend sectional interests and temporal concern.

The Introduction Chapter defines the scope of the study. It deals with the social forces which bring about the change in the law controlling environmental pollution The Criminal Law relating to atmospheric pollution is in the developing stage but there are certain interests which have not allowed it to function effectively. Gunningham has examined the interests, processes and dynamics that have resulted in the present state of legislation controlling environment. In America and Britain pollution has been defined as a crime but there are certain forms of polluting behaviour which still remain outside the scope of the Criminal Jurisprudence. And thus Gunningham concludes that the pollution problem is a white collar, largely unlegislated, unapprehended, social problem, causing a considerable amount of social injury.[1]

Gunningham starts with the theories of law creation. According to him there are mainly two theories : order and conflict models of society. The order theory represents consensus view of society where the society is regarded as one unified whole with a common culture, a collective conscience, agreed values and aims. Power represents legitimate authority, upholding commonly held beliefs and sentiments Under this theory law is seen as an expression of the common consciousness or spirit of the people. In case of conflict theory society is seen as an

1. *Gunningham*, p. 10.

unstable system involving a continuous political struggle between conflicting hostile groups with different goals and values If this theory is accepted then law becomes an instrument of repression perpetuating the interests of the powerful at the cost of alternative interests, norms and values. But the reality is that the theory of the vested interests and specialised associations play the leading role in shaping regulating legal control of environmental pollution.[2] The Indian experience with respect to the control of water pollution also bears the testimony. It took a long time to enact the legislation and still no fruitful results are forthcoming. The same is case with the air pollution ; though nearly eight years have been passed, yet the draft of the legal control of air pollution is in the drafting stage only. The problem in India is that it is in a developing stage and if rigid controls are imposed it could upset the development process. Therefore, while providing any legal control on environmental pollution one must start identifying the vested interests which may shape not only the law itself but also the effectiveness of legal control.

Chapter two deals with the factor responsible for emergence of environmental consciousness. The public awareness, starts when they are educated The 'Silent pring' written by Rachel Carson and 'the Population Bomb' were the first series of publications which arose for the first time public consciousness of the pollution problems. The voluntary groups of environmentalists also started educating the public of the hazards of environmental pollution. At the same time the expertees in this field also started identifying polluting substances and their effects on human beings, animals, plants etc. But Gunningham rightly points out that mere educating people is not enough because still the vested interest could make efforts not to allow problems of environmetal pollution to come on surface.[3] This is what is happening in the capitalists countries where the attention of the public is diverted by the slong of massive growth of modern technology. Take for instance the maiden flight of Concorde or launching space craft was greeted by cheers and craickers and now we are lodging serious agitations against the sonic boom. However, once public is educated then the capitalists cannot go no exploiting them otherwise a time may come when the process of development could be frustrated. And therefore it is in the benefit of the vested interests to gear up the massive technological growth in such a way that the interests of general public is not neglected.

The Third Chapter identifies the major pressure groups who are struggling for legal control of environmental pollution. The leftist group

2. *Gunningham*, pp. 20, 27.
3. *Gunningham*, p. 33.

is of the opinion that if no action is taken to control environmental pollution it will result in eco-catastrophe. They advocate the view that the present policies should be drastically amended and that the law should impose rigid controls on polluters. But the moderators have adopted the balancing view which requires that the development of capitalist industrial society must be balanced with the undesirable consequences. If this is adopted then according to the moderates there is no need of any change in the prevailing policies and the law will only maintain the balance. On the other hand the capitalist groups favours maintaining the status quo. Since the stricter legal control of pollution would attack the very root of capitalism they have opposed any pollution control. But in the conflict of the above groups, the working class on which the ill affects of pollution fall, have not taken any part in this dilemma. The reasons are : the cost involved and its indirect effect on them; and the most powerful, the loss of job due to rigid pollution controls on industry. When too much water has already flown underneath a major surgical operation cannot be an appropriate remedy. The legislature will have to allow the growth of industrial development in such a manner that the whole society is benefitted instead of a group of society. This can be achieved once the governmental agencies becomes responsive to the social interests For example, in India though the Central and the State Water Boards are constituted under the Water (Prevention and Control of Pollution) Act., 1974, yet no fruitful results have achieved in controlling pollution. In Australia also the extra-legal means have tried to avoid pollution because of general unresponsiveness of the governmental authorities. The Pravda announced in 1968 that unresponsive attitude of the government would result in seven times pollution of the national water by 1980.

The discussion of the response of industry to the environment finds place in the next Chapter. The industry is the main contributor or culprit to the environmental pollution; and therefore, it needs a separate treatment of all the other polluters. Today the industrialisation has posed a great threat to the existence of human beings, animals, plants, aquatic organisms and what not. At some quarters it is doubted whether today we need industrialisation at all. In this connection Gunningham divided industry into three : the small scale industry; the large scale industry; and the state owned industry. His distinction between the small scale and the large scale industries is important beeause no uniform approach can be adopted in their cases. A control in one case could put out off gear a small scale industry. A big industry could afford to install a purifying plant but it may exhaust the capi al of more than one small industries. The Legislature will have to bear in mind that such an

industry must not go scot-free. It must make reasonable contribution towards compensation against damage caused by environmental pollution. These industries have aggravated the pollution problem because of their attitude to concentrate more on profit. But this is not the case with the state owned industry where the concept of commercialised institution is transformed into a social institution. It may be pointed out that in actual practice the state owned industry works under the pressure of the governmental machinery and gets favourable treatment as compared to the private industries; and they are also responsible for aggravating pollution problem. Unless self-controls are imposed by the industries themselves, the problem of pollution will remain untackled.

The legislative response and its implementation in America and Britain is considered in the Fifth Chapter. Gunningham concludes that in absence of powerful interests group and public response the governmental machinery did not make any improvement in the existing condition. Even if some start is made the enforcement machinery develops a tendency to grow rubber teeth. These observations are also applicable to other countries as well. For example, in Australia the Report of the committee of Inquiry into the National Environment 1974 suggested that the governmental machinery is slow in protecting national environment. The Japanese experience also support the above conclusion where though the Constitution of Japan in article 25 guarantees a right to enjoy minimum standard of living, yet it is one of the most badly affected countries due to environmental pollution.

Now coming to the enforcing machinery, the administrative authority under the pressure from the capitalist group did not lay down any specific standard to control the action of the industry in this area. As regards the courts, they are not experts on pollution and if they are allowed to encroach on this field, the outcome of court cases will always be somewhat unpredictable. In connection with the inefficiency of the administrative machinery, it may be suggested that checks may be established through the judicial control and also by establishing a watch dog to take stock of their achievements. So far as the question of laying down standard is concerned, no hard and fast rule can be framed in this direction. There are varieties of polluters who will require different treatments. Now coming to the court. once we say that the proper form in this matter is not the law courts, then there will be no check on them. We may provide a scheme of training in this regard for the judicial personels. And they will try to maintain a balance between the commercial interests and the interests of general public. In regard to the local authorities Gunningham has rightly pointed out that they are

not so seriously considering the pollution problem, as they are afraid that the capitalists might go elsewhere. But once the selfish attitude is given up and the social interest is considered as the basic norm then all the localities by following uniform approach, may not allow a polluter to flourish in their localities.

In the last chapter he draws the conclusion that the State of pollution legislation in America reflects inadequacy of pluarism. It is only a small number of unequally powerful interests successfully dominate the legislative struggle. In Britain the predominant power of private capital has been challenged by the labour movements. Although the rise of labour movement has clearly imposed restraints upon the vested interests groups, the scene of political conflict still favours capitalist interests. This will continue until changes are experienced in the political system and its means of control. It may be submitted that the minority even though powerful cannot exploit the majority for all times to come. If this continues for an indefinite period it will lead towards a revolution and so the governmental machinery cannot afford to neglect the balancing of the private and the social interests.

In conclusion Gunningham deserve congratulations in bringing out such an excellent study on a subject of growing social interest which until very recently did not attract the attention of the academics in Law. Gunningham's inter-disciplinary approach of including in the arena of Criminal Jurisprudence the discussion of sociological approach is of great appreciation. He has brought to the light factors which have frustrated the control of environmental pollution. The state authorities while controlling such a social injury will take into consideration these factors and avoid the measure to become inactive. The criminal lawyers and all those who are interested in controlling environmental pollution may find the present study a major contribution in the area of Environmental Law The book has been produced quite well including the bibliography and the subject index which find place in the end.

Last but not the least the Editors of the Law in Society may be congratulated for bringing out a study of such a kind. Let us hope that the process does not end there. More comparative studies may be undertaken in this field for the benefit of the world community.

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HUMAN RIGHTS AND ENVIRONMENT: THE NEED FOR INTERNATIONAL CO-OPERATION—W. Paul Gormely, Ph. D. (Denver), D, Jur (Brussels), LL D. (Manc), Member of the District of Columbia and United States Supreme Court Bars, 1976, pp. 274 Cloth, Dfl 58/U. S S. 23-25.

The inexorable and frightening growth of human population, the rapid and enormous aceleration in urbanization, and the growth of industrial complexes in and near the cities as a result of the industrial revolution that has overtaken the world today, have had such a multi-faceted effect on the degradation and devastation of the environment that it threatens to disintegrate the very life support system of the earth. The sphere of pollution and ecology is an outstanding example where the law at national as well as international levels seems to have lagged behind scientific and technological advances, and this state of affairs can be productive of the gravest consequences. Whilst the revolution, in the scale of industrial production and consequently of the wastes to be disposed of, tends to render life unsafe for all the living beings, the failure of law to keep pace with the developments in the scientific and technical spheres has in fact endangered the fundamental human rights.

The simple fact that pollutants may travel hundreds of miles and affect several countries demonstrates that environmental pollution does not stop short at international frontiers. This underlines the need for neighbourly international co-operation to control the constantly increasing pollution of the environment [1] Under the impact of the universal and ever increasing threat to the environment, more than mere bilateral cooperation between neighbouring states is called for. In the present study Professor Gormley poses a number of possible solutions viz, class actions by recognized groups of environmentalists, inter-state complaints, individual petitions, annual reporting techniques, methods of conflict resolution, and the mobilization of global public opinion to secure the desired modification of domestic legislation and aspects of international cooperation. He also gives indication of philosophical bases of such legal solutions, expecially in terms of requirements of development of mankind without violating the notion of social justice.

1. OECD (Ed): *Problems of Transfrontier Pollution* (1972), p 296; Williams (Ed), *New Concepts in Air Pollution Research*, 1974, p 109 M. C. Caffrey: *Private Remedies For Transfrontier Environmental Disturbances*, 1974, pp. 198-210.

Professor Gormley as savant, teacher, author and researcher draws attention of the reader in this well studied fully-documented and a comprehensive work in the field of environmental law to a new crime of ecocide, which exposes the living beings on this planet not only to the danger from accidental pollution and over exploitation of limited national resources but also, to the gravest deliberate ecological damage. Emphasizing the need for man to survive and, simultaneously, to develop, the author asserts that the primary objective of the human rights and environmental law and the fundamental goals of human society, philosophy, law and jurisprudence, are the human survival from impoverished environment and development of mankind in a pure, clean, healthful and decent environment The author recognizes the need of the developing countries for maintaining life and preserving health and refers to the emphasis given to the relationship between human rights and fresh water (as an essential factor in preserving life) as pointed out by Prof. R. L. Singh in his welcome address delivered in the Silver Jubilee Celebrations of the Universal Declaration of Human Rights at Banaras Hindu University in 1973. There is no denying the fact that not only must the peoples in the Third world be assured an adequate or minimum supply of "*bread and water*" to feed the exploding populations causing permanent damage to the ecology, but also the developing nations must ensure preservation of the relatively few non-renewable natural resources and prevention of further environmental deterioration caused as a result of the cumulative effect of over exploitation of scarce and living resources and uncontrolled contamination of the air and the water surfaces by industrial pollutants and nuclear fall-out.

There are several unique features of Professor Gormley's monograph which the reviewer will like to enumerate as follows : Firstly, one of the main theses advanced in the present study is that individual human beings, groups, and other non-governmental entities have a right of pure, clean, and healthful environment and that they are subjects of the emerging *corpus* of environmental law in much the same manner as they are presently recognized as subjects of the international law of human rights. This emanates from the premise that the collective effect of ecological damage is that man has become the *endangered species* and it follows logically from this that man and his institutions may also vanish like several hundreds of species of animals and plants if legal protection is not guaranteed against sustained damage to mankind caused by pollution of the air and water. In the author's view, though the right of individuals, groups, and non-governmental entities to a pure and clean environment falls within the scope of the right to

life or mere physical existence, which has been recognized in the great human rights conventions of the post-World War Two period, yet international (and regional) law has not so far evolved to the level where injured individuals and environmental associations or legal entities under the *environmental* law have the necessary *locus standi* to defend their environmental rights or those of the international community. However, in the view of the author the important factor is that the rights of these entities are recognized and some implementing machinery is placed at their disposal.

Secondly, since the human rights and environmental law must safeguard the most basic human right to life, in response to the need for greater recognition of the new human right to minimum decent environment, the author lays emphasis on the development of new legal philosophy during the formative period of the evolution of environmental and ecological protection and the emergence of a *corpus* of case law. In his view, whilst an enlightened public opinion has helped to motivate moral standards of environmental protection, which, in turn, has served as the foundation for municipal legislation and international conventions, this process has led from legal philosophy to jurisprudence and to legal science indicating the trends of the future course of environmental law. In considering the philosophy and jurisprudence of environmental protection, the author is aware that it is not practical to produce a complete conceptual framework of an environmental legal order, or even a model of environmental and ecological protection, because of the retarding effect of the attitude of government under the influence of the doctrines of absolute state sovereignty, or even current doctrines of relative state sovereignty. Yet the one inescapable conclusion of this study is that substantive environmental law is developing at a much more rapid pace than the counterpart procedural remedies. Even though recognizing that the primary objective of human rights and environmental law is the human survival from environmental deterioration and the continued existence of mankind, and that implementation of these goals of philosophy, law, and jurisprudence must be conceived to constitute a long-range objective, the gravest deprivations of human rights are being perpetrated by governments. Not onl that many of them subjugated their own peoples to the extent of even denying them the most fundamental rights, impoverished environment, and uncontrolled industrial pollution, but also account for nuclear contamination of the oceans. The cumulative effect of over exploitation of scarce and living resources on their part, plus pollution, jeopardizes the continued existence of mankind. Unless

international conventions receive more than passive support from states parties, and regional and international organizations have the concurrence of member states, the goal of application of social justice to to environmental law cannot be accomplished Yet, Professor Gormley asserts that some of the phases of environmental law, as they become merged with human protection will be deemed to be *jus cogens*. In his view the deliberate destruction of the environment endangering life, such as by nuclear testing, violates the peremptory right to life and the right to a healthful existence similar to the cases of institution of slavery, the practice of genocide, or the infringement of higher norms of humanitarian law. From the stand point of philosophy and jurisprudence the real value is that *jus cogens* is emerging as a superior norm of law as greater proliferation of environmental treaties takes place contributing to the evolution of transnational environmental law and, finally, to the application of the concept of social justice. However, the reviewer will like to reiterate his view expressed in his earlier paper[2] that "the quality of *jus cogens* norms in fact can be attributed only to those legal provisions which are firmly rooted in the legal conviction of the community of states, which are indispensable for the very existence of international law as an international legal order, and the observance of which can be demanded by all members of the community of states. Such norms cannot spring from the fertile imaginaton of scholars and jurists". The concept *jus cogens* in the Treaty Law recognizes conflict between autonomy of the contracting parties and the imperative rules of International legal order which is just a pale reflection of the age-old conflict between state sovereignty and social control of the international community.

Whilst the common interests of man in social justice and of all mankind in the preservation of the ecology and the environment may lead to the initiation and acceptance of many environmental measures, no legal obligations have yet been imposed on states which are not willing to accept an interference with their freedom of action. Only in a philosophical sense all idealists will go whole hog with the thesis of Professor Gormley regardless of the hesitancy of governments to accept environmental protection as truely peremptory. One may also support his thesis that the pressing need to safeguard the continued existence of mankind demands codification of a new *corpus* of international environmental law. This can be done on the same lines as in case of the International Labour Code and the I. L. O. Common

2. R. P. Dhokalia, "Problems relating to Jus Cogens in the Law of Treaties", in *Essays on the Law of Treaties* (ed) S. K. Agrawal, 1972 p. 155.

Law which have been evolved on the basis of a number of conventions each dealing with a selected area, because it seems impracticable to foresee the adoption of a comprehensive environmental code comparable in scope to such major conventions as the U. N. Human Rights Covenants. The goal of application of social justice to environmental law can also be realized in the similar way by safeguarding the interests of the developing states (the exporters of the raw materials) and the industrialized states the importers of fish products, oil, timber etc).

Thirdly, Professor Gormley draws attention to the action programmes of many of the organizations, exclusively European, or multinational and international institutions headquartered in Europe which are engaged in protecting the ecology and the right of man to be guaranteed a pure healthful, and decent environment. Whilst appreciating the unique contributions of the EC, NATO/CCMS, OECD, ILO, WHO and the UNESCO, it acknowledges that assertions of national sovereignty have to a considerable extent retarded regional and international cooperation in undertaking overly ambitious experiments of environmental protection. The efforts of the UNEP and its Secretariat at Nairobi have been analogized with those of the ILC in its earlier stage of working. The proliferation in the number of sovereign states in the past half century and conflicting national interests have proved to be great obstruction in the development of international law and its effectiveness, but this study advances the contention that, in comparision to international institutions much greater progress and success can be achieved by the regional institutions and regional groups of homogeneous states, possessing common interests, traditions and heritage. This is illustrated by the success of the Council of Europe which has developed the most advanced system of environmental protection of any multinational or international organization. Its mature programmes of environmental protection, its institutional structure and sophisticated machinery of implementing the protection of human rights and economic guarantees, pursuant to the European Social Charter, and the European Treaty Series containing a major part of European Environmental law, provide a unique experience which may not only aid the experiments of other regional and international institutions but may also contribute toward the International Environmental Code However, the author rightly cautions that though inspiration can be gained from the European experience by other regional groups such as OAS and OAU and the countries of the Third world, they need not attempt duplication of the highly complex institutional structure of the Council of Europe in resolving their special needs, in particular, the preservation of the mere existence of their populations. His practical suggestion is

that the practice of the ILO be applied to environmental conventions by these countries in that minimum obligations would be assumed at the time of ratification of treaties but, subsequently, additional articles could be accepted. Besides, the escalation devices contained in the ILO Conventions can also be used for environmental protection for the purpose of giving temporary relief to states parties until they are in a position to assume higher obligations. There is no doubt that the various efforts of pollution control, purification of air, preservation of nature, conservation of living resourcess etc., at national, regional, and international levels through national, multinational, regional and international institutions, are bound to have a collective impact on meeting the gravest danger confronting the mankind. whilst the UNEP may function as a co-rodinating agency in order to avoid dup ication of work between regional and international bodies, the writer's valuble proposal to estabilsh a U N. High Commissioner for Human Rights and the Environment (Protection), in the view of the present reviewer, deserves serious consideration provided that within the scope of such office is also included, along with the existing Earth watch Program, the proposed international referral Service, and the suggested Global Environmental Monitoring Service, the functions of an *Ombudsman* in respect of the new crime of ecocide.

Fourthly, in regard to seeking procedural remedies that may be used to protect the environment, the new solution offered by this study is the recognition of class actions by which non-governmental environmental groups and conservation agencies could instigate actions to prevent ecological and environmental damage. This proposal, extending before the courts, arbitral tribunals and administrative agencies *Locus standi* to groups of conservationists and environmentalists, would accord individuals "indirect procedural status", as has been successfully introduced in the ILO system of labour protection. Alternately, in the author's view reporting and supervisory techniques can also be used simultaneously to safeguard the environment, particularly within a regional organization. In view of the fact that not even states can always be certain of being in a position to protect their own nationals or the interests of the world community, before international judicial tribunals, he favours greater utilization of the agencies of the U.N.O Referring to the 1974 decisions of the ICJ in the Nuclear Test cases and the Fishery cases which involved states invironmental controversy, he shows that states experience considerable difficulty in meeting the stringent jurisdictional requirements when they attempt to extend protection to their nationals and companies because the ICJ is not willing to make use of fact-finding commissions, on the spot inspections or to set-up special chambers in

order to resolve scientific and ecolgical controversies. In the present reviewer's opinion no international or regional agreement on environmental protection should leave to chance the question of jurisdiction in case of environmental disturbances or damage and of the law to be aplied. Rather it should include provisions for whatever dispute adjustment procedures promise to be the most effective. Until ecocide is recognized as an international crime, like genocide, and an International Criminal Court sometime in future is established to exercise effective jurisdiction on international crimes and crimes against humanity, nothing, except protection in the offending state is truly effective which is preferable to "protection" in the victim or polluted state, because a decision in favour of the jurisdiction of the Courts of the offending or polluting state will in the last analysis be found to be in the true interest of the victims or potential victims also. This presupposes that the organs concerned with the administration of justice in the offending State grant free access to the nationals of the victim state on the same conditions that apply to the nationals of the offending state itself, and that activities prejudicial to the interests of the nationals of a neighbouring country produce the same legal consequences in the offending state as would an activity causing damage to the offending state. The reviewer wishes that Professor Gormley could pay more attention to the legal problems of remedies and jurisdiction and, as a thinker and humanist, expand his ideas on ecocide to equate the offence with the crimes against humanity, war crimes and genocide. Here lies the weakness of the present book. The style of the book is exemplary, and everywhere clear and comprehensible and, as a whole, the volume can be regarded as a scholarly contribution to environmental law in particular and international law in general. The author is to be thanked for his interesting work, which shows total involvement, and for his efforts and contribution to the contined discussion on the need for international cooperation in the area of human rights and environment.

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