Environment – The Engineer's Human Response

Environnement – réponse humaniste de l'ingénieur

Umwelt – des Ingenieurs humane Antwort

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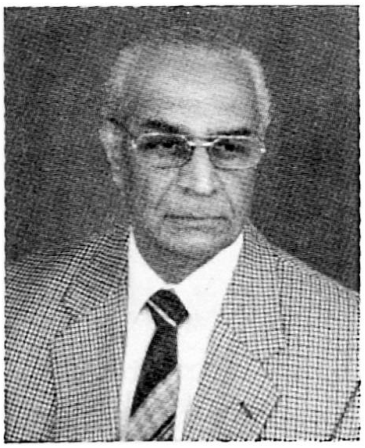

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SUMMARY

The role of the engineer has become more complex today. He is not a mere builder or one who has to accomplish his tasks within the confines of his immediate environment. Now, as never before, his role has expanded and has become global in its responsibility, coverage and application. He is now a part of the Sustainable Development on this planet, he is obliged to keep the needs of the future generations in perspective when applying his professional skills and he must help preserve the global eco-system, without delaying today's pressing needs of Man. We need to examine his new profile.

RESUME

Le rôle de l'ingénieur est devenu plus complexe aujourd'ui. Il n'est plus celui d'un simple constructeur accomplissant son devoir dans les limites strictes de son environnement immédiat. Son rôle s'est accru et est devenu global, dans sa responsabilité et son domaine d'application. Il fait partie d'un plan de développement continu et harmonieux sur cette planète. L'ingénieur doit tenir compte des besoins des générations futures, dans l'application de ses connaissances professionnelles. Il doit contribuer à maintenir l'équilibre de l'écosystème global, sans négliger les besoins de la société actuelle. Il faudrait rechercher un nouveau profil de l'ingénieur.

ZUSAMMENFASSUNG

Die Rolle des Ingenieurs ist heutzutage umfassender geworden. Er ist nicht länger ein blosser Baumeister, der seine Aufgaben im gegebenen Rahmen seiner unmittelbaren Umgebung erfüllt. Wie nie zuvor hat sich seine Rolle erweitert und ist bezüglich Verantwortung und Tragweite der Eingriffe global geworden. Er ist nun einge spannt in die Maxime des dauerhaften Wachstums dieses Planeten. Er hat sich bei der Anwendung seiner beruflichen Fähigkeiten von den Bedürfnissen zukünftiger Generationen leiten zu lassen und das weltweite Ökosystem bewahren zu helfen, ohne dabei die akuten Nöte der Menschheit zu vernachlässigen. Wir müssen dieses neue Berufsbild analysieren.

I. PREAMBLE

We live in a World which for millions of years has supported an awesome variety of plants and animals and has a human population crossing five billion today and reaching eight billion in the next 25 years. We all share and depend upon the same world, with its finite and often non-renewable resources. This implies the need for an **Ethic** common to all humankind to ensure a durable future.

We depend for survival, health and psychological well being on the physical integrity of the biosphere and the cultural continuity of our own local environment. Hence, we have a common interest in shaping an attitude that encourages more responsible use of natural resources. This is a religious imperative, links all men to a global inter-dependence, and demands unified response from individuals, communities, corporations and nations alike.

We are tenants of the World only in our own generation and hence we have no right to exhaust or deplete the finite resources of our planet. Its **'Stewardship'** by Man implies caring management, not selfish exploitation; it involves a concern for the pressent and the future and a conscious recognition that the world we manage revolves around a abiding interest stitched to man's own survival and longterm wellbeing.

Sustainable development and the aim of an acceptable quality of life for all, cannot be separated from responsible environment management-both must be integrated with all facilities of national and international bodies. "Development cannot take place upon a deteriorating environmental resource base as the environment cannot be protected when growth leaves out of account the costs of environmental destruction"(8). Therefore, environmental health has to be an important parameter in planning for economic growth.

In former years, the environment has not been a dominant subject in people's mind. Serious environmental problems are the result of both short term expediency and long term ignorance. The relationship between population, resources and environment is complex and complicated. There is inequity and inefficiency in industrialised and developing countries alike. Poverty, economic stagnation and environmental degradation interact to create tension through mindless competition for non-renewable resources, land or energy.

Some kind of **value system** is therefore inevitable; Environmental quality must ensure a balance between technical, social and economic parameters.

II. DEVELOPMENT AND GROWTH

The economists believe that to meet the basic needs of global population, without sacrificing security and stability, a five to ten fold economic expansion must take place soonest. They

point out that security in an environmentally hostile world is almost an impossible task.

"Political realities in every country influence national, and hence global priorities. The affluent nations of the North, with sufficient capital to address environmental problems, now ask or cajole the struggling nations of the South to follow their lead. Yet, these nations burdened with debt and barely able to sustain the most basic needs, have a far different set of priorities. Their focus is grounded in the present rather than responding to the needs of the future. Both the ability and willingness to act on long range problems become a function of affluence"(1). Accordingly, national priorities are set within the framework of the political environment.

"Another challenge encountered on the path to a sustainable future is market economics. This type of economics historically rewards production and consumption, gauging growth-success by output of goods and services and harvesting or extraction of scarce dwindling resources. Engineers and economists would doubtless agree, that the true costs of depleting our capital of natural resources and polluting the environment are not reflected in the economic decisions that are made. The fact remains that economics and environment have been disconnected, both in our decision making process and in our institutions, and they must be merged into a new science of **'Ecological Economics'**,if sustainability is to become a reality"(1).

"Development, which is essentially change, does not necessarily involve degradation of the environment. Hence, **"Sustainable Development" may be described as a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development and institutional change, are all in harmony and enhance both current and future potential to meet human needs and aspirations"**(2). There can be no question of sacrificing the environment for the sake of development. What is needed is a new era of growth, forceful and yet socially and environmentally sustainable. The ideal for developing nations would be to improve their economic growth and for the developed nations to maintain theirs. "In trying to meet the needs of the present, let us not compromise the ability of future generations to meet their own needs"(8).

Strategies for sustainable economic growth mainly concerns energy, efficiency, conservation of non-renewable resources, development of alternative energy supplies and environmental conservation. It will involve new policies of urban development, eco-layouts, housing design, transportation systems and choice of appropriate technology among others. It must not endanger the natural eco-systems that support life on earth, the atmosphere, water, soil and living beings.

It is truly stated that development is responsible for environmental stress, a result of the growing demand on scarce resources and the pollution generated by the rising living standards of the affluent. Poverty too pollutes the environment, again creating stress. The poor will often destroy their immediate environment in order to survive. They will cut down

forests and allow their livestock to overgraze grasslands. The potential effect of these changes makes poverty a major global scourge. "Thus more than development, it is the lack of it, which is seriously detrimental to the environment"(8).
Earth was created by God for man and not vice-versa. People are the ultimate resource. We must think of preserving them, today and tomorrow.

III THE ENGINEER'S NEW ROLE

"It is a known fact that an engineer solves problems and delivers solutions within the constraints of time, money and available knowledge. Yet to be agents of change, engineers must be **'proactive and creative'** and must seek to bring in environmental concerns in order to evolve and mould new options" (1). To achieve this there is a need for a professional ethic. The Engineer's orientation should change, from a **'confined thinking'** to one with a **'global mission'**, to enhance the quality of life for all humans and to preserve the quality of their environment. "Engineers thus become **'facilitators'** of sustainable development through the information that they provide, the decisions that they make and those that they influence"(1).

Once engineers were at the forefront of societal change and were looked upon as **'Leaders'**. Where the engineers have gone wrong is in the manner they have set out to improve the human lot and have assumed that this just means the greater exploitation of natural resources for the benefit of humanity. It is very necessary for the engineer to maintain a balance with ecology in the decision making process. For this reason, a human approach and the use of social science should be incorporated into the engineers skills.

The engineer as a project team leader or as a member of a team bears much of the responsibility for recommending technological alternatives. The choices that are made have a crucial impact on whether the project ends up creating problems instead of offering solutions. "Environmental aspects of all actions must have equal standing with economics and engineering as part of the project's **'go-no-go'** test"(1).

"Engineers must begin to refine existing technology options and focus on improving the resource use and minimising waste generation. Wherever possible, renewable resources should be substituted for non-renewable ones. Processes, products and technology that yield detrimental impacts must be replaced by those that do not"(1). Engineers must research new and better options for the future, through improved waste recovery processes, and must substitute environmentally safe products and processes for harmful ones, including cost-effective and timely environmental restoration technologies.

Thus as facilitators of sustainable developments, engineers must amass the skills, knowledge and information which create the path to a sustainable future. Before engineers can seriously assume such a role, it is evident, deficiencies in their environmental educatior must be remedied. "Whatever their

discipline, the promotion of sustainable development demands that engineers cultivate an understanding of the issues, problems and especially risks and potential impacts associated with their decisions"(1). The importance of this primary need is as clear as daylight.

Paul Hofseth named us **"Pathfinders in the world of environmental technology"**. There must be fundamental changes in our approach to future global development and these changes must be initiated soon. From the Engineer's standpoint such a change requires movement towards a set of realistic, concrete steps that can be implemented at the microlevel. "The ultimate technological challenge to sustainable development represents the revolutionary leap that will be required, if the technologists are to help open the doors to a future, where all individuals can truly share in the bounties of the earth; where each society and nation can achieve more and more with less and less; where humanity can flourish in perpetuity on our planet"(1).

IV SOCIETY AND ENGINEERING

Every society practices engineering to some degree. But it is only in the last 100 - 150 years that society has really become mechanised on a large scale. A considerable degree of civilization can be secured with a minimum of engineering and though we could admiit that without engineering, civilization is impossible, it is not always of first importance.

"The Chinese who led the World in the invention of printing, the mariner's compass and gunpowder did not advance from their auspicious beginnings but evolved a civilization in which engineering had almost no place. Even their buildings, though graceful and charming, were modelled on tents and called for no great skill in their erection"(5). The Emperors used Jesuit missionaries to make fountains and clocks, but there they stopped. In due course, they paid heavily for this when a mechanised Europe attacked them and imposed its will on them.

An even more notable example of this neglect can be seen in the Greco-Roman World. The Greeks were in some respects pioneers of engineering, and the many buildings which still bear witness to Roman competence belong to the same tradition. Archimedes not only was a mathematician of incomparable genius but at times turned it to practical use, as when he invented hydro-static servomechanisms or devised engines of war to confound the Roman besiegers. Yet, despite these promising beginnings, the Greeks stopped and did no more for engineering. "The trouble with a society that does not believe in engineering or see its possibilities, is not that it is not civilized but that it is not likely to survive"(5).

In the past, the Engineer was somehow thought to be sordid and engaged in tasks below the dignity of a civilized man. "The contempt for applied mechanics displayed by Archimedes was a product of a society in which there was no shortage of cheap human labour"(5). It did not motivate the men to seek labour saving devices. This is a social fact of first importance and

it is not irrelevant to modern times. The prodigious growth of engineering since the end of the 18th Century, has indeed been rendered possible by the epoch making developments like the internal combustion engine, electricity, nuclear energy, computers, etc., but this itself would never have happened, if there was no attitudinal change towards the part played by engineers in society.

"The final challenge on the path towards a sustainable future is the engineering field itself. The Engineer has always been viewed as the leading instrument in the process of social adaptation and growth. The future, therefore, will demand more of the engineering profession than has been asked in the past - demands that will require perspectives to be changed and horizons broadened"(1).

V. WHY ENGINEERING?

If China and Russia were more mechanised, they might not haye experienced the revolution or it could have occured in a less virulent form. "Now, engineering tends to suggest that there is a cure for most evils and that the age old troubles of man such as starvation, disease, floods and the like can be surmounted by a proper use of machines"(5).

It is indeed significant that the classic case of growth without revolution should be in the USA, which has used **'Engineering'** on the greatest possible scale.

Man's struggle for existence cannot merely be maintained by exploiting natural resources but when such wealth is put to responsible use, it can certainly be made more agreeable. I would confidently assert, that life is more comfortable now for the mass of mankind than it has ever been and that this is almost due to man's increasing conquest of nature through purposely engineered machines. "A society which has become accustomed to seeing its own life improved by many engineering actions will develop a rational approach to its problems, realise that stability is something almost beyond price and be very cautious of losing it"(5). The advance of science and its practical application through engineering and chemical technology, has shown that mankind has the potential ability to achieve any standard of material wellbeing that may be desired.

"In the last few years, we have begun to ratchet our environmental concern up a few more notches to seek out opportunities to directly attack environmental problems as a purpose of the engineering effort itself and to exploit our talents in the solution of the nations present environmental problems and the prevention of future ones"(1).

In this context, can our society afford an environmentally conscious engineering technology? I believe it can and must. Contemporary shortterm thinking stands in direct contradiction to continuous sustainable development; The prodigious effort required today to correct the damage already done to our eco-system, should remind us of the consequences of our future

actions.

Ofcourse, to build now in accordance with environmental considerations is more expensive than was previous construction. Nevertheless, as environmental leaders, we must invest our efforts at all levels, so that the price paid for our resources corresponds to their limited availability. This is a long term task. We must first fully learn how to build environmentally before the market forces us to do so.

Until recently, buildings were demolished and the waste thrown into landfills. Today, another approach is beginning. Instead of demolition, buildings are disassembled, materials are carefully separated and most of those recycled.

VI. ENVIRONMENT AND CIVIL ENGINEERING INDUSTRY

Each Sector within the civil engineering industry has differing environmental goals. The challenge is to establish a unified approach to provide a consistent programme for implementation. In addition to developing a state of the art approach with a view to the long term, the civil engineering industry must first acknowledge the increasing public awareness of environmental issues and must be seen to respond to environmental concerns.

The industry needs to be aware of emerging scientific findings and policy issues and to anticipate long term implications. The present approach is fragmented and not at all co-ordinated. It does not anticipate the needs for applied research or testing at a sufficiently early stage when environmental scientists have identified emerging problems.

The environmental impact of building congestion is only beginning to be understood. The need for research and testing is obvious to architects and engineers, but I also believe that manufacturers, contractors and developers have an essential role, namely how their methods and approaches may need to be adapted with an environmental emphasis.

It is, therefore, in the civil engineering industry's interest as well as its imperative care for the environment, that the industry's response should not be entirely reactive, nor solely and passively confined to satisfy statutory regulations. There is clearly a role for the industry to undertake its own initiative to provide sound information and incentive for change.

Major industrial cities often have special difficulties with slum clearances, which can result in the breakdown of communities. In new housing developments, the initial lack of both social facilities and landscaping can leave unseen many visible scars on the human habitat. New road networks, however necessary, can cause further disruption.

In smaller towns, expansion can destroy the established character and charm when supermarkets, petrol stations or office blocks of inappropriate scale replace existing historic buildings and road widening schemes out off corners and encourage traffic.

Yet our towns and cities must be prosperous to survive. All these problems and contradictions can only be resolved by engineering planners who have sensitivity, courage, vision and common sense.

The engineering profession has recognised that in the management of the environment, preventive strategies and policies are more effective and less costly than corrective measures. The application of recycling technologies and systems for utilising industrial residues are examples of the encouraging trends that are emerging.

VII EVALUATION OF ENVIRONMENTAL PARAMETERS

It is appropriate that we should start off by focussing on **'Environmental Impact Assessments'** of major engineering projects for human settlements, deforestation, land degradation, water resource depletion, flooding, mining and industrial activities; The list is not exhaustive. The use of such assessments as a process to incorporate environmental considerations is gaining increasing acceptance. Many, if not most countries, now have legislation requiring the use of EIA process before approval is given for construction and operation of large scale engineering projects.

This is very necessary, as environmental pollution caused by high population density and over development, destroys the basic safety and sanitation of the urban environment and threatens residents' lives and property.

Development generates wastes, air and noise pollution which all continuously change and damage the environment. Rapid urbanization and economic growth overshadows many historical and cultural values. Traditional structures, historical streets and cultural relics are encroached upon by tall modern buildings and noisy highways. On the other hand, rapid economic growth can also change and damage the social fabric and culture of society. In a lifestyle that stresses consumption of goods, pursuit of material gain and rapid social change, it is not easy to create an artistic, cultural environment. Preservation of cultural values in urban areas is vital to the larger urban qualilty of gracious and good living.

Space in a city is limited and property values are high. This makes urban open areas expensive. However, despite their high price tag, many residential areas have poor sunlight, inadequate air circulation and are too small to provide basic facilities like parks, green areas and walkways. Running water and sewage systems are lacking and there is often no way to build them now. In search for comparatively cheaper land, unplanned development around urban areas begin. This shifting from the city center not only hastens destruction of forests and farmlands but also makes long distance commuting a necessity and leads to traffic congestion. Often mountain slopes and swamplands are developed in such a way that rainstorms and earthquakes create landslides and floods in urban areas.

Structures must be integrated into the environment, landscape or cityscape. Heavy and brutal forms are simply offensive as they lack scale and proportion. The structure must have an effect on people and this will depend on the purpose, the situation, the type of society and on sociological relationships and initiations. People want to meet with joy in their man made environment and hence structures must bring out the qualities of buoyancy and relaxation. Now, as never before, there is need for a realisation of the holy linkage between **Man and Nature**, for his material, social and religious well-being. My ancestors adopted this as a religious doctrine and worshipped the Elements. How enlightened they were!

It is not always easy to evaluate the EIA of all the above parameters for a project's **'PASS-FAIL'** test. We have still to compile data but qualitative judgement must be exercised and engineering options proposed to the decision makers.

VIII. IMPACT OF SOME PROJECTS ON THE ENVIRONMENT

The following few cases, among many others in the world, illustrate the pragmatic and progressive interest shown by engineers, economists, politicians and a caring public, in directing the course of engineering projects.

- **Nam Chon Dam - Thailand**

The dam, a $400 m project proposed in 1982 and located in Thungyal wild life sanctuary, would have led to large scale forest destruction through submergence and poaching, extinction of rare and endangered species, illegal settlement and other harmful effects, and all for a 2% contribution to Thailand's energy needs. The intense debate on the need or otherwise for the dam has resulted in the project being delayed indefinitely, in effect cancelled.

- **Narmada Sagar Dam - India**

The Narmada river basin programme comprises of four large and several smaller dams plus a huge canal network. They are designed to bring irrigation, electricity and drinking water to large parched areas of Gujarat.

The development has been widely criticised by both local and NGO's alike, primarily because of environmental and resettlement concerns. The Japanese decision in May 1990 to suspend financial support underscored the issues. These events helped focus attention on the problems, and several programmes for resettlement backed by legislation, specific studies and work programmes on fisheries, catchment treatment and wildlife are underway. A wary and informed public, together with the support of crusading environmentalists and engineers, has ensured protection.

- **Balem - Brazilia Highway**

This is a classic case of the impact of locating a 1900 km highway to open up the hinterland in the Amazon basin, without

adequate prior legislation on the deforestation of the dense Amazon jungle on either side of the highway and now even farther inland. Large numbers of migrants hence encroached the area in search of land and employment. Cleared area in one sector of the highway increased 300 times in 25 years, secondary and feeder roads surfaced and the population increased from 100,000 to 2m in the zone of influence. "One traveller described this land degeneration as a 'Ghost landscape"(4). The use, or rather misuse or overuse, of the forest resource generates a backlash on other natural resources too, such as soil, water, hydropower potential, fish stocks and other natural resources. Shortcomings spill over to the Agri-sector, Public health etc. This shortsighted policy affects not only the present but future generations as well. In this context, the Engineer's immense responsibility in providing advice to the administrators is self evident. The project has now become a global concern and corrective measures are on.

- **The Upper Pampanga Project**

This is the first large scale multipurpose water resources development project in the Phillipines, and centres around the Pantabangan dam completed in 1977, to impound 3 billion cu.metres of water, and costing $ 120 million.

The project was conceived to provide irrigation facilities, power and control flood damage. Unfortunately, due to sudden population migration to the area plus improper land development leading to erosion and reservoir siltation, the objective of the project has been defeated. Soil erosion has led to loss of organic matter and nutrients, reservoir sedimentation and loss of hydropower, irrigation water etc. Inadequate government control, rural poverty, ineffective planning of land use are some of the reasons attributed to this malady. The case reflects basically lack of political will and a multilevel approach to resource management.

One should, however, not be misled to the conclusion that no environmental planning is being done despite the concerned persons being aware of its short and longterm consequences.

Take for example the case of:

The Carajas Iron-ore Project

Started in 1983 and costing USD 5 billion, it involves mine site development, 900 km railroad, port facilities at Sao Luis for 35 m. tons of ore export and urban infrastructure. The project was developed with close attention to the environmental impacts; these covered climatology, ecology, botany and related disciplines. The company in charge established policies in relation to forest clearing, topsoil stock piling, erosion control, vegetation regeneration, fauna protection, creation of protected reserves, related manpower training, land reclamation etc. A permanent cadre of engineers, scientists and ecologists monitor the performance and advise the management. What a responsible beginning.

Apart from this project, a great deal of thought and follow up action has been given to the construction of the Oesterschelde Storm-Surge Barrier (Netherlands), the Carlisle Bypass (U.K.), The Eurotunnel Project, the Storebelt Crossing (Denmark), The Savern Barrage (U.K.), the proposed Danube and Ganga river basin cleanup, to mention a few. Today **Environmental Studies** have become part of a major project's evaluation criteria. Still many gaps remain. Many decisions in the absence of data, are purely based on judgement and qualitative appreciation. But we have to move on, pressed by national and political compulsions.

IX. SOME GLOBAL PHENOMENA AFFECTING ENGINEERING THINKING

- The Greenhouse Effect

Carbon dioxide in the atmosphere acts like a shield trapping just sufficient quantum of solar radiation for keeping the temperature balance on earth. Fossil fuels and other man induced processes and actions are increasing the carbon dioxide content and causing the temperature on earth to increase rapidly. It is modelwise predicted that the likely doubling of carbon dioxide content **within** the next century will increase the earth's temperature in the range of 1.5° C - 4.5° C"(7). This will no doubt cause melting of ice and expansion of the sea both of which will affect sea level, tidal effects and ocean currents; What are the consequential effects? Submergence of estuaries, atolls and flat land areas like Bangladesh, coastal erosion, obsolesence of coastal defences and harbour structures, increased salt water penetration, change of beach life etc. Current estimates predict upto 0.65m rise in sea level at some places within the next fifty years. Engineers designing thermal, industrial, hydraulic and similar projects cannot overlook this aspect, nor the impact of pollutants caused by their design processes.

- The Ozone Phenomena

Man has been protected from high ultra violet radiation from the sun by the presence of Ozone layer. Chlorofluorocarbons (CFC) released by industry through Aerosol sprays, air conditioners, cleaning agents, refrigeration and foam, exceeding 750,000 tons by present estimate, are breaking the ozone layer and a **hole in the sky as large as Alaska** is observed recently, through satellite imagery. Ninety percent of the release arises from affluent nations and the Russian States plus China. The impact is more above 50° latitude and will certainly affect whether patterns, wind velocity and direction, bird movements, besides causing acute diseases in living beings. Already citizens in some countries like Chile are warned not to go out beteen 10 AM & 3 PM, and in general people are advised to wear large hats, protect eyes with special UV absorbent glasses and cover themselves adequately from the sun during the day. Unless CFC's are checked by using alternative solutions, the outcome will be eventually catastrophic. The engineer cannot overlook this factor in his concept of structures, particularly external cladding, covered passages, etc. if solution is delayed.

- Acid Rain

The pollutants in the atmosphere mainly caused by thermal stations and industries, eg. So_x, No_x, Hydrocarbons etc., are absorbed and deposited on earth by high humidity and rain in the form of acids and cause widespread destruction to foliage, structures and human health. Winds carry the chemicals long distances and this is not a confined local phenomenon. Engineers must provide the basis for evaluating this pollution when citing new power stations and the like. In the U.K., the Government has decided to locate thermal power stations far away from cities and disperse So_x above 300 m.

- The Japanese Scenario

Japan, a nation with hardly any natural resources and rich in industry has shown the path for energy conservation and pollution control.

- Since the oil crisis in 1973, the energy consumption has been down by 30%.
- Pollution levels of So_x and No_x is the lowest among OECD countries and less than 10% of that in USA.
- Despite tripling of automobiles in the last 30 years, the concentration of No_x has remained steady during the last decade.
- 30% of the total cost of thermal power industry is invested in pollution control investment and this industry has grown phenomenally.
- Generally, the industry has become conscious of the need to control pollution and save energy in every way as a result of legislation and educational awareness.

Inspite of the additional costs to install pollution control measures, Japan's GDP **has grown eight times during the last thirty years, thus dismissing the oft-felt fear that such expenditure is counter productive.** Perhaps survival is the key motivator.

The **Montreal protocol** and the **General Environmental facility (GEF)** are movements in the right direction to control global pollution.

CONCLUSION

The Greenhouse effect, depletion of the ozone layer and perennial acid rain are all man made. Add to this the problems and consequences associated with deforestation, decreasing aquifer recharge, soil erosion and the like and we are presented with a 'Doomsday' scenario. The degradation of the planet's eco-system has enhanced the engineer's role as a 'facilitator' of change. He is no more a mere local builder. **His professional mission has indeed shifted from 'environmental concerns' to 'sustainable development'.**

Yes, our perception of what is an **'ENGINEER'** itself needs redefinition. He is now a unique and important **'citizen of the world'.** He supplements my ancestors profound vedic dictum

'Vasudaiva Kutumbakam' - 'The world is one family'. This gathering of ours from all over the world beautifully symbolises this philosophy.

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