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"INTEGRATING ENVIRONMENTAL TECHNOLOGICAL AWARENESS IN EDUCATION FOR SUSTAINABLE DEVELOPMENT"

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ABSTRACT

During the last few decades, there has been an increasing consciousness and concern that the environment in which we live has deteriorated very fast. We are witnessing a steady decline in the quality and/or quantity of basic life supporting resources like air, water, soil and living organisms. Sustainable development has emerged out of the fears of the depleting natural resources and a subsequent slowing or even closing down of much of the economic activities and production systems. It is the result of rapacious misuse of earth's precious and limited resource base by those few who had a control over production systems. The emergence of the idea of sustainability also strikes at the indispensability of eco-friendly technological transformation towards energy saving devices, alternate and non-conventional systems for providing comfort to citizens without bringing down their quality of life. The dominant patterns of production and consumption are altering climate, degrading the environment, depleting resources, and causing a massive extinction of species. To meet the demands of increasing population, technology has come forward. This paper focuses on the key areas of sustainable developments and technological contributions towards it.

KEYWORDS: Sustainable Development, Eco-friendly Technology, Environmental Awareness, Immediate Technology

INTRODUCTION

Nature provides human societies and economies with a complex life support system, air, water, food, and a suitable climate for survival. It also provides the physical resources that are necessary for the sustenance of economies. Nature has supported and maintained life on earth since times immemorial and should continue to do so in the future. This is known as the sustainability of nature or ecosystems or environment. However, we have been interfering with the sustainability of the natural systems through our avaricious activities and if we continue on the same trajectory, not only the other life forms but also the very existence of mankind is threatened. There are limits to nature's capacity to absorb impacts. Once alteration of nature's initial stat occurs, it cannot quickly revert back to the initial state. Nature has a limited capacity to withstand rapid change. Thus, today, the challenge before mankind is to determine the state in which we wish to live and to continue living within the limits inherent in nature's processes, within nature's carrying capacity

SUSTAINABLE DEVELOPMENT

The concept of **Sustainable development** was envisaged to bring environmental is it ideas into the central theme of economic development policy. It sought to modify the kind of unsustainable development strategies that were being pursued. Sustainable development combines the two terms of 'sustainability' and 'development' to indicate a pattern of

growth, which strengthens both the national capabilities to care for their people in relation to their total relationship with the resources of the earth. The most widely used definition of Sustainable Development was given by the Brundt land Commission in its report *Our Common Future* (1987). It defined Sustainable development as '***development, which meets the needs of the present with out compromising the ability of future generations to meet their own needs***'.

Thus, sustainable development focuses upon a relationship between humans and their environment and indicates a warning that humans cannot push development, which is against nature as in the end it is always the nature, which is going to win. Sustainable development encourages the conservation and preservation of natural resources and of the environment and the management of energy, waste and transportation. Sustainable development is development based on patterns of production and consumption that can be pursued into the future without degrading the human or natural environment. It involves the equitable sharing of the benefits of economic activity across all sections of society, to enhance the well being of humans, protect health and alleviate poverty. If sustainable development is to be successful, the attitudes of individuals as well as governments with regard to our current life styles and the impact they have on the environment will need to be changed.

MAIN OBJECTIVES OF SUSTAINABLE DEVELOPMENT

Sustainable development has some forward looking and broad based objectives, which transcend class, caste, language and regional barriers. These objectives are a charter for liberating one's economy from the clutches of exploitative mindset, which has depraved nations and defied their biomass wealth. These objectives are:

- To maintain the standards of living of the largest number of people with equity and justice. The consideration of Trans-boundary and cumulative impacts indecision-making has to be realised.
- To conserve and protect earth's natural resources from misuse and wasteful consumption. This demands respect for the land and its diversity as the foundation for healthy communities.
- To innovate new technology and scientific techniques, which work in unison with laws of nature and are not opposed to it. There needs to be a consideration of sharing the risks and benefits from developmental policies undertaken by different nations.
- To respect diversity and involve local and indigenous communities for a more grassroots oriented and relevant developmental policies. This would involve consideration of economic viability, culture and environmental values, as policies and programmes are developed.

ORIGINS OF SUSTAINABLE DEVELOPMENT

The origins of the concept of sustainable development can be traced back to the 1960s when, the writer and scientist Rachel Carson published her book *The Silent Spring* (1962). This book drew public attention to the destruction of wildlife by the use of pesticide DDT (dichloro diphenyl trichloroethane). This work was a turning point in the understanding of the interconnections among the environment, the economy and social well being. Gradually, in this period, the fear of global environmental limits began to emerge. Soon after, the animal population biologist Paul Ehrlich published the book *Population Bomb* (1968) on the connection between human population,resource exploitation, and the environment. In 1969, a non-profit organization *Friends of the Earth* was formed which was dedicated to protecting the

environment from degradation and empowering citizens to have a voice in decision-making.

The United Nations Conference on Human Environment (UNCHE) was organised in Stockholm (1972). For the first time, the idea that the environment was a critical development issue was placed on the international agenda. It led to the establishment of United Nations Environment Programme (UNEP). The first director of UNEP, Maurice Strong coined the term 'eco development' which integrated development with environment protection. Since then, many milestones have marked the journey towards sustainable development.

The concept of 'Sustainable Society' emerged at a study conference on Science and Technology for Human Development, convened by the World Council of Churches (1974). Interestingly, the concept did not deal with environmental conditions but started with the principle of equitable distribution, which subsequently became the cornerstone of the Brunet land Report in 1987. 'Sustainable Society' also involved the concept of democratic participation, which became important nearly twenty years later at the Rio Earth Summit (1992).

By 2000, the concept of sustainable development became firmly settled as a guiding document in all international organisations. Since then the UN member states have been publishing reports on the national status of sustainable development programmes and strategies and submitting them to the specially created UN body called UN Commission for Sustainable Development (CSD). The term is modified for different user groups as 'sustainable human development', 'sustainable economic growth', 'sustainable socio-economic development' and 'sustainable local governance' and very recently in 2004 'Information Communication Technology' (ICT) for sustainable development.

Parameters of Sustainable Development

Parameters of sustainable development refer to the guiding principles that, (i) help in understanding the concept of sustainable development, ii) point out the problems associated with it and iii) help to take active policy measures based on them. The parameters include **carrying capacity**, **inter and intra-generational equity**, **gender disparity** and **diversity**.

CONCEPT OF CARRYING CAPACITY

In ecology, the thumb rule is that of conserving interrelationships. Human activity that threatens the future existence of other species may be an ecological disaster since it would in turn affect other species also. These interrelationships are taken care of within the concept of carrying capacity. **Carrying capacity** is a concept which limits the potential ability of natural resources and species to withstand human intervention. It may be described as a test of the ability of land, water and air to keep itself usable and toxin-free despite pollution and effluent discharges and harmful developments over it.

The famous American wildlife conservation ecologist Aldo Leopold described **'carrying capacity'** in 1933 as a saturation point at which the numbers of a particular species of grazing animals approached the point where grasslands could support no more individuals without a general and continuing decline in the quality of the pasture land. While chemical fertilizers, insecticides and pesticides increase crop yield, their use beyond the carrying capacity of land may destroy crops. This is equally true for the effluent discharges into rivers, ponds and other wetlands. The wetlands sustain life forms and complete ecosystems which in turn support larger ecosystems.

Earth's carrying capacity is threatened by monoculture (cultivation of a single crop variety), pollution,

overpopulation, overgrazing, deforestation and urbanization. These activities may not be unsustainable in themselves but the thin line that separates them from being beneficial to mankind and becoming harmful is the environmental recognition of the concept of carrying capacity. If taken beyond carrying capacity, the activities may prove disastrous.

INTER-GENERATIONAL EQUITY AND JUSTICE

Intergenerational equity refers to the use of earth's resources between generations in a manner that the present generation does not consume it completely to its exhaustion. Equity is the foundation of sustainability which means fairness and justice to all. It explores whether all people have similar rights, opportunities and access to all forms of community capital. Inter-generational equity has to do with fairness between current and future members of a community. It does not mean that we neglect our current needs, but that we try to achieve a reasonable balance between satisfying our needs now and setting aside enough to provide for needs of the future. The consumerist world generates unsustainable lifestyles. People and nations are not careful about the use of natural resources and disposal of waste. Thus our future generations are likely to have a poorer and more polluted world to live in. Aiming for inter-generational equity means that the policies have to give equal consideration to our immediate needs, our future needs, and the needs of those who would inhabit the world after us

Intra-generational Equity and Justice

Another concept of equity in resource use is referred to as 'intra-generational equity', which is fairness in utilisation of resources among human members of present generations, both domestically and globally

Natural resources are now exploited in unprecedented quantities and rates of consumption are continuing to increase. A great deal of environmental debate on issues of global scale damage like ozone depletion, global warming, biodiversity, forests and biotechnology has taken on a North-South polarization

Gender Disparity

To achieve environmental sustainability, policies have to reduce gender gaps politically, economically and socially so that their access to resources is protected. The Human Development Report (2003) acknowledges that *'gender equality is at the core of whether the goals will be achieved- from improving health and fighting disease to reducing poverty and mitigating hunger, to expanding education and lowering child mortality, to increasing access to safe water, to ensuring environmental sustainability'*.

Gender discrimination is accompanied by biases against other personal characteristics, including location (rural areas), ethnic background (indigenous minorities) and socioeconomic status (poor households). Gender gaps in health and education push them backwards and entrench a patriarchal regime which works against the demands of a sustainable order; although several World Bank studies and research undertaken by independent organisations found that women were perfect agents of change at the grassroots level and are also the carriers of indigenous wisdom

Diversity (Social, Cultural, Bio)

The social and cultural diversity of the world can be judged from the fact that there are around 820 ethnic groups in 160 countries. Around four percent of the indigenous people live in areas that are highly diverse in the composition of their flora and fauna. A community is the custodian of local values in the use of local resources because it knows best the

value and the life span of that resource**.** Once they are displaced, the outsiders bring in their technology for extraction and ruthlessly overuse the precious and limited earth resources. **Preserving indigenous territorial rights thus protects biodiversity and the local culture, including knowledge and resource management skills with potentially wide application**.

INTEGRATION OF ENVIRONMENTAL TECHNOLOGY

The concept of sustainable development is a human invention, or a formulated rediscovery of the 20th century. Nature itself has always been sustainable, *i.e*. it has been self-regulating and balance-oriented. Humans have increasingly intervened in this self-regulation, largely through the technological advances equated with progress. The result is an absolutely unnatural, exponential expansion of the human species (exponential growth, longer lifespan, etc,). In the future attempts at sustainable development, one is likely to reduce the human effects on natural systems and interactions while at the same time strive to make the western standard of life available to people. How realistic and wise this approach is needs to be examined.

When referring to environmental technology, one usually talks about the natural sciences – the basis of many discoveries and realizations that has led to the steady downfall of the environment. Natural sciences have guided us down a path through the industrial revolution to where we now stand with our all-governing economy and no sense of direction. At this point, we depend on this pathway – the natural sciences – again to undo the damage. We believe in the modern, environmentally-just technologies, sustainable standards of life, i.e. satisfy needs of growth-oriented population only through the renewable resources. Environmental technology founded on science and engineering plays an integral role in the necessary change to a so called sustainable, human balance. Questioning the conditions of our technological progress would have unthinkable effects on our current way of life, associated with complex economic and material interconnections.

A critical question that needs to be addressed is whether following this path narrow-mindedly is sufficient and whether it makes sense to continue such un adapted ways of life. Even if we make use of the currently known environmental and resource saving techniques with the greatest possible financial stake, it would at best be enough to control increasing growth. However, the most important question in this context deals with the social readiness to invest all available powers and funds in a technological revolution. A look at our daily political and economic happenings reveals an incapability to think beyond the constraints of the system and act – instead of just react on what environmentalists know and can do today. How reliable is it then to bet on the technological and scientific path in solving our problems? Is it not just an illusion when we speak of improving our own standard of life thanks to these techniques, while at the same time – due to an inner uneasiness – proclaiming that all people in the future will not only be provided for, but will also be taking part in the so-defined wealth?

Is there only one path to the technological revolution or are there plausible alternatives? Where do the social sciences remain in this discourse on the future? Where are the voices of philosophy, ethics, and theology in the planning of the sustainable society? Was it not these areas that influenced the evolution of humans over centuries and that actually acted as the higher authorities over the natural sciences and life in general? How do we reconcile technocracy with democracy and rationality with emotional aspects? How do we reconcile the rapidly increasing dependence on technological systems and constraints with ideals of freedom, independence, happiness, and joy?

EDUCATION, TRAINING AND AWARENESS GENERATION

Safeguarding the environment and achieving sustainable development depend not only on technical and economic matters, but also on changes in ideas, attitudes and behaviours. The direct participation of individuals and communities is essential. All citizens of the world must become fully aware of their environment, know its demands and limits and alter their habits and behaviours accordingly. To this end, countries must develop strategies to better educate, inform and sensitisetheir populations on environmental matters and actions towards achieving sustainable development.

For example, ecological and environmental concerns can be integrated into school programmes; the awareness of the general public can be raised through extensive information campaigns, particularly through the media; green projects can been couraged in local communities, and training programmes can be developed to promote more informed resource management and the use of environmentally compatible technologies.

Sustainable is a virtue and, like any virtue, it has to be encouraged, perhaps taught, and assimilated at all levels, Hence, education is the key. Thus the government, the universities, industry, and the society at large, including families, play a role. Information technology can play a key, but not an exclusive role, in education. It is often stated that the developing world needs technology and not science. It is also assumed that the developed part of the world knows what is good technology. Some aspects of these assumptions are dubious, given the complexity and the diverse levels of economic development. The decision needs to be taken on what and how a technology has to be developed by the local community, city, country, or a continent. This scientific and technological information leads to knowledge and perhaps to wisdom to make the right decision.

CONCLUSIONS

The challenge of sustainable development is the challenge of achieving environmental conservation and resource management without compromising the targets of growth and development. It is therefore a process of making human and environmental regeneration not only an end of economic growth but also a means. It redefines wealth and restructures qualitative development in economic growth policies. Sustainable development is in itself revolutionary since it replaces exchange value by intrinsic value, market regulation by self-regulation and capital accumulation with deaccumulation. It is an effort and a design to raise poor countries of the world from social decadence, exploitation, global inequity and waste and technology plays vital role in promoting sustainable development.

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