

Integrating environment, education, and employment for a sustainable society: An HRD agenda for developing countries

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Ecological necessities are beginning to drive economic activity. In the developed world, ecological rationality and notions of sustainability have started to prevail over their economic counterparts. One of the outcomes of this realization is the growth of an environmental job market. While identifying some opportunities to meet such a challenge in the new millennium in developing countries, we propose the need to enforce a major shift in the tertiary educational process, emphasizing the progress towards a sustainable society. We argue for an environment-based higher educational effort in developing countries, working towards global solutions taking the regional realities into account and the regional initiatives reflecting global realities.

HISTORICALLY the labour movement perceived the environmental movement as a threat. In a world that is guided purely by economic rationalism, such sentiments from the working class are understandable. However, since the Tblisi Declaration¹ and the Earth Summit² in Rio de Janeiro, the following statement has gained significance: 'In the long term what is ecologically unreasonable cannot be economical as well as rational. Ecological necessities are beginning to drive economic activity. If we set about ecological modernization in time, we shall improve our chances of conquering tomorrow's markets and improve competitiveness of our economy'³. Ecological rationality and notions of sustainability have started to prevail over their economic counterparts. One of the outcomes of this realization is the recognition of an environmental job market. Nowadays careers based on environment have increased substantially, from an amateur, voluntary-body employment sector to a highly-professional area of expertise. The need for professional advice and assistance to business, industry and government has grown immensely. Industry-specific environmental expertise and knowledge have become more relevant and critical in the interpretation of statutes and appropriate application of regulatory information in both private and public sector undertakings in areas such as pollution control and sustainable resource management, with greater demand for appropriately-trained personnel. Better energy utilization,

recycling, material procurement and management are becoming increasingly relevant today. Clever and sound management skills and good perception of the available state-of-the-art environmental technology also result in efficiency, better budget management, and greater economic benefits.

Career opportunities have grown due to the increased importance and relevance of environmental issues in all sectors of developmental activity. For example, based on the 1992 statistics⁴, in UK alone the number of personnel employed in environment-based sectors was nearly 500,000. Each country needs to set up its own initiatives to identify the progress and evolution of professional capability especially in the areas of environmental employment and sustainable development.

Sustainable society is a satisfactory society

Mahatma Gandhi referred to a satisfactory society, long before we ever perceived the present meaning of environment, by saying that the earth can provide for all the needs of humans, but not for their greeds^{5,6}. Today we understand what is a sustained practice and how a society needs to function to become sustainable. We also know that a satisfactory society cannot be driven primarily by a profit motive or market forces alone. If these were to dominate our lifestyles, then the inevitable results would be increasing inequality and further deprivation of the afflicted and marginalized. A satisfactory society can have a place for market forces and free enterprise, but some rational and collective decisions need to be made by that society with regard to basic production, distribution, and developmental issues. All of these need to relate to

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morality, justice, quality of life, the social fabric, and environmental sustainability.

Trainer⁷ proposed the following dicta: (a) A satisfactory society cannot have a growth economy, and (b) a satisfactory society cannot have per capita rates of non-renewable resource use in rich countries. From these negative principles, he derived the following positive ideals: (a) Our material living standards must be simple and frugal, and (b) we must develop small, highly self-sufficient settlements and economies. A sustainable society therefore generates out of a co-operative and participatory social movement. Such a social movement dovetails sharing materials and servicing the marginalized, aged, invalid, and disabled. Presently we need a 'new order' of a sustainable economy-driven society that will have a much reduced role for market forces and recognize the need for a zero-growth or steady-state economy. We need to develop systems that will enable us to achieve this goal. The key process that could influence this is education. Educational systems, now more than ever, face the challenge of attending to the needs of a world that is growing in environmental consciousness. We, therefore, exist under desperate pressure to assess the structure of our educational systems and evaluate their suitability towards employment to facilitate the development of a sustainable society.

Environmental education or re-education towards environmental management?

Why education and why environmental education? Since fundamental disparities exist in the levels of knowledge between the developing and the developed world, at least one answer would be: to enable people to discuss and debate the connections between critical issues and concerns of the times in which they live. Emotional environmental debates vis-à-vis human developmental concerns are presently going on in various parts of the world. Knowledge and clarity imply power. We need to address the question: How to empower people?

The paradox is the enormous level of divergence that exists between knowledge and education and between the developed and the developing countries. This conflict in understanding and translating the seriousness of issues stems from the procedures employed in (a) identification of environmental crises, (b) validation of values placed on environmental issues, and (c) empiricization of the means that are necessary to deal with such issues. An understanding of the bases for environmental issues in developing countries is the first step towards effective action. This is critical because it is the poor, and the powerless who are generally held responsible for environmental problems⁸. Seldom do we realize and acknowledge that the international capital, trade relations and agreements, and technology-intensive activities play fierce roles in

affecting the environment. Unfortunately, through the process of reductionism, the wealthier people manipulate the process to indicate that the rural poor of the developing countries are responsible for the decline of the environment^{9,10}. Such a process points to (a) a disinterested examination of the methods used for planning to manage the environment in developing countries and how 'environment' is understood in developing countries, and (b) recognition of the need for a much better understanding of the relationship between environmental problems in the developing and the developed countries¹¹.

Adoption of discarded technologies by the developing countries contribute significantly to environmental issues. For example, the introduced technologies lacked a clear 'fit' with the environment and the people of the humid, tropical Amazonian ecosystems. Amazonian ecosystems are vibrant with (a) staggering biological diversity, (b) highly-specialized processes of nutrient cycling, (c) uncertain succession patterns, and (d) rapid build-up in organic biomass. An environmentally-friendly developmental alternative in such a 'stable' ecosystem would ensure the implementation of one or more of the following alternatives: (a) production of commodity meant for the local/regional market, (b) validation and implementation of the indigenous knowledge, (c) utilization of local, indigenous technologies, (d) facilitation of easier and informal modes of quick communication, and (e) decision-making power resting with the people belonging to that ecosystem¹². The experience gained through trial and error over several years enabled these people to achieve an extraordinary level of parsimony with Nature. In most of the regions of historically-established civilizations, agricultural practice acts as a rigorous pre-condition to environmental sustainability, although much of it has never been articulated in scientific and measurable terms.

In several parts of the developing world, a significant proportion of knowledge is obtained existentially and experientially, which the developed world labels as traditional knowledge. We prefer to refer to it as *traditional wisdom* because of the rich experience and collective intelligence that remains buried in them. Very often ideas from traditional wisdom conflict with the scientifically-derived knowledge of the developed world; the former, invariably, is more environmentally friendly and reliable. The pure logic that rationalizes such a notion is that the so-called 'uncivilized', tribal societies have always remained sustainable societies. However, because we remain profoundly conditioned by technological advantages, we need to think that a sustainable society would be unattainable if both these forms of knowledge do not function in tandem. Global solutions need to take regional realities into account, and regional actions must reflect global implications.

Why is a global perspective on the environment not integrated into today's educational system? The barriers to such integration and resultant action are many. The

most fundamental barrier is that our educational models are based on reductionism. Therefore, we tend to focus more on parts rather than the whole. Consequently, we suffer from the inability to recognize holism and its fundamental importance. The other barriers include lack of excitement and consciousness of local issues among the students, lack of global perspective among teachers, and lack of realistic coverage of world issues by the news media. A general obstacle lies in the tendency of educational efforts to emphasize differences rather than similarities – scarcely conducive to fostering an interdependent one-world ethic¹³. The goals of the International Geosphere–Biosphere Programme (IGBP) highlight such a global perspective by (a) documenting and predicting global changes, (b) observing and improving our understanding of dominant forcing functions, (c) improving our understanding of transient phenomena, and (d) assessing the effects of global changes that would cause large-scale modifications affecting the availability of renewable and non-renewable resources¹⁴.

The International Global and Atmosphere Chemistry (IGAC) outlines the need for education of tertiary-level students and their educators. We emphasize the urgent need to build a community of scientists required to characterize and examine programmes on global changes. This would attract practising scientists into the general area of global studies and educating researchers in the multidisciplinary framework within which disciplinary studies exist. IGAC strongly recommends this approach and recognizes an immediate need for education of researchers who can work in multi-disciplinary modes. Such an approach will especially be crucial for the developing countries. The goals would be to (a) encourage practising scientists to participate and contribute thoughts and solutions to global issues and (b) train students in multidisciplinary aspects of global changes. These require strong motivation in the field of environmental education and more people must be willing to take up environmental management as a profession.

The human species is solely responsible for the overall environmental and ecological uncertainties owing to avaricious technology, and the hastened events of global environmental change. Those that help in sustaining human life – agriculture, manufacturing, transportation – ultimately contribute to one or many of the major environmental issues, such as global warming¹⁵. We need to realize that much of the splendid science currently underway depends not only on the relative maturity of the physical and biological sciences but also on interdisciplinary scientific activities. The latter is the quintessence of heterogeneous expertise on critical environmental problems at a global scale and contributes to a strong conceptual framework. Without such an institutionalization scientific progress on global environmental change would be substantially slow. There are, of course, established interdisciplinary fields in the social sciences some espe-

cially relevant to global environmental changes. Demography is one example, and Urban Planning and Management is another.

International environmental education and experience

The key understanding here will be to accept international need and dependence, since environmental problems are either multinational or global, and they can be resolved by only determined international collaboration¹⁶. In the European tertiary educational institutions, environmental education is undergoing expansion and change. A project at the University of Reading provides a means for producing modular INSET (in-service training) materials to meet the needs of teachers for their professional development in environmental education, whatever be their subject expertise¹⁷. This model considers biological science is more important than other sciences in environmental education. In Austria, vocational schools and Advanced Academics of Agriculture impart countryside management knowledge to young farmers. An analysis of curricula and teaching–learning programmes using a specially-developed standardized text evaluation method and additional interviews with specialized instructors shows far-reaching defects. One of the solutions proposed is a more landscape-oriented syllabus¹⁸.

Science education in the US is undergoing reform, providing an excellent opportunity to use sustainable agriculture as the basic theme in teaching science¹⁹. The following questions are gaining high priority: When is the right time to start imparting environmental education, and at what level? Should the world have a common environmental education framework apart from education on local issues? An understanding of human population growth, consumption patterns, and their effects on the environment, is essential for proper conservation efforts²⁰. Education on population and environmental issues will improve if the linkages among population size, consumption, and environmental quality are examined and discussed within classrooms.

Awareness education programmes should be encouraged, especially in the developing countries which still control great portions of the earth's biodiversity. Environmental education programmes trailed in Brazil have been evaluated. The programmes contributed informally to the conservation of the Black Lion National Park. Experience from the Tamarin Environmental Education Programme suggests that similar programmes in Nature Parks and Reserves can be effective and should be established more widely²¹. Should the awareness programmes aim at developing countries alone? If yes, would it not again be a *Catch-22* situation in the problem of North–South divide?

Environmental management – Integrating society and education

Environmental management practice in most of the developing countries, in general, has been an unrefined adoption of models from the developed nations. This is undesirable because the economic situation in developed countries is very different from that existing in the developing countries. For example, the developed countries invariably have a food grain surplus rather than any deficit. Eventually, their plans and environment management models keep agriculture contracting rather than increasing productivity. Hence, it would be more appropriate for the developing countries to relate to the identified objectives of the World Conservation Strategy²² – (a) maintenance of essential ecological processes, (b) preservation of genetic diversity, and (c) sustainable utilization. This also implies that the participants in these efforts have clear and definite roles to perform in order to achieve a sustainable society. The general public should be able to freely and effectively obtain technical information on local or national concerns. The media should publicize ‘constructive and healthy’ stories, appropriately time the communication, and present technical information in simple and effective modes. Political leaders must have excellent briefing skills, ability to appeal to self-interest, and target those with influence. Industry should be able to instill an ‘environmental culture’ within management structures and encourage a totalitarian approach to environmental management. The non-governmental interest groups (NGOs) should play a supportive and positive role by forming focus groups.

Given that no universal model of education for employment refers to achieving a sustainable society in clear terms, we offer a framework (Figure 1) that addresses the educational approach needed to realize such a demand. This framework, of course, is neither absolute nor definitive, but it provides details of how each trainee/participant can/will perform, and thus enable the society to become sustainable, following a disciplined work ethic. The framework includes levels that explain the title, role, academic qualification (a relative correlate of the attained education), and examples. We now deal with examples from levels 1 and 2 and explain our view. We are aware that a potential overlap exists in some of the roles we have identified and some of the functions described could be idealistic. Nonetheless, our perception is that only such a division of labour will enable the achievement of a sustainable society.

Environmental educators

The pedagogy for Environmental science is an art in itself. Educators delving in environmental science need (a) to possess an up-to-date knowledge, and (b) be able to

evaluate critically the notion(s) of development in the context of a sustainable society²³. A critical component of learning and imparting environmental education is the acknowledgement of indigenous wisdom. The imminent skill of an environmental educator lies in his/her ability to synthesize scientifically-derived knowledge and existentially-derived indigenous knowledge. He/she must have excellent communication skills and be able to minimize (or eliminate) personal bias consciously while communicating with target audience. Learning needs could necessarily vary with the origins and backgrounds of the learners, and therefore, the educators must be quick enough to pick on such specific needs and cater to those learners in the most effective way.

Environmental scientists

The primary role of the scientists will be to develop the theory relative to any one or more environmental issues. While they can work in their own specific interest area, they must be conscious of the fact that their work integrates with the objective of contributing to a *bigger picture*, by facilitating the development of a sustainable society. Another critical role the scientists must play will be to test and try to validate beliefs and practices of indigenous people, since much knowledge has been accumulated over several centuries through simple processes of trial and error.

Environmental engineers

The role of human resource is to translate the theory developed by the scientists into practical work through plans and programmes. It is critical that these engineers (*sensu lato*) too never lose sight of the *bigger picture*. Application of the sustainability theory, in conjunction with the creative skills of engineers will enable the achievement of a sustainable society. When we examine engineering education in the context of environment, we find that it is at crossroads: will it continue in the existing paradigm or will it change direction along the path marked ‘the liberated and civilized engineer’? People do matter, but their attitudes to the natural world and to each other matter most of all²⁴.

Environmental managers

A vast majority of the nations located in the wet tropics of the earth are essentially developing countries with very large populations. For survival, people here extract the already-exhausted natural-resource reserves. Environmental managers perform a vital role in balancing such conflicts and resolving them. They should possess the

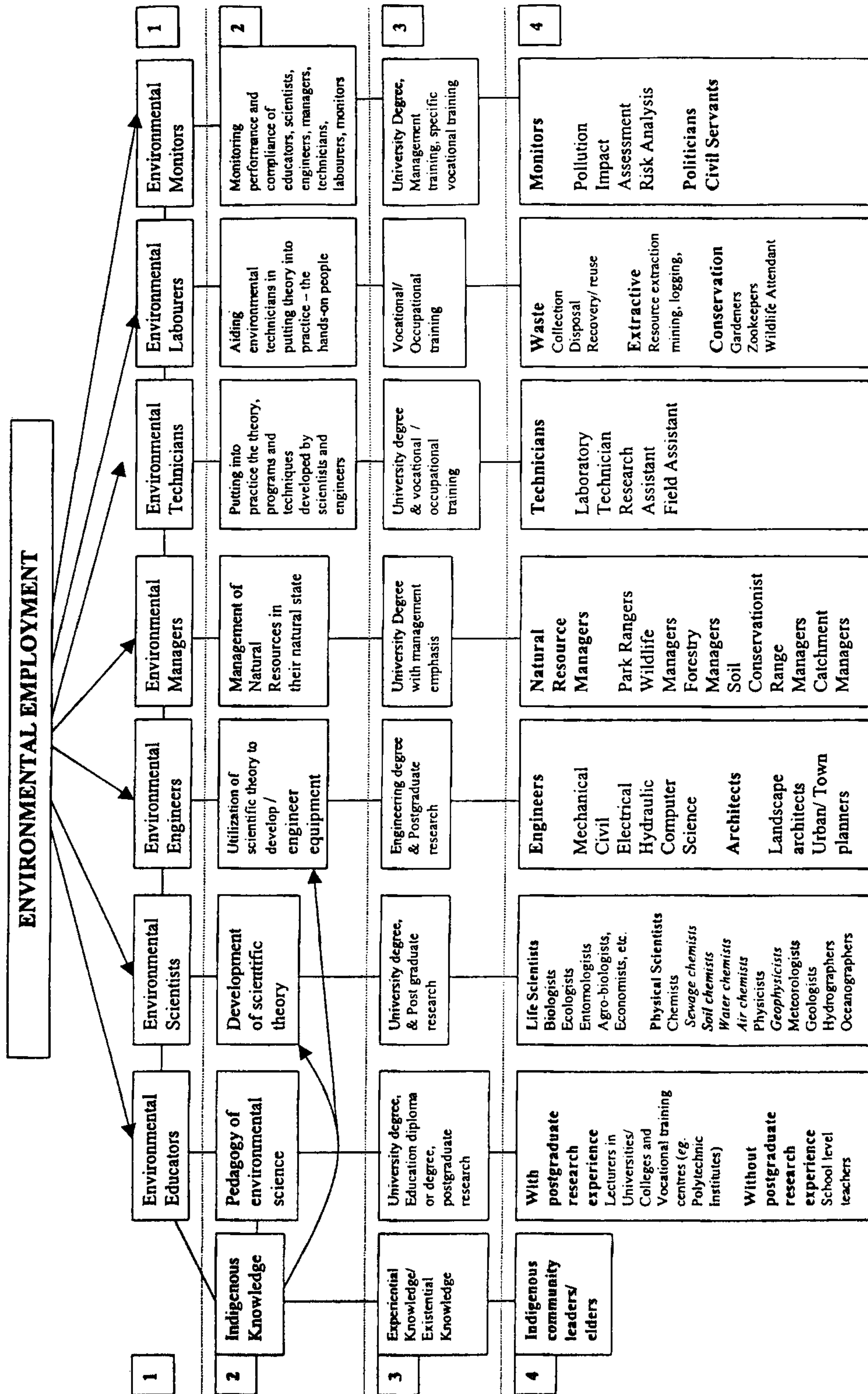


Figure 1. Environmental employment framework – Roles and qualifications.

necessary knowledge and ability to translate and apply principles of validated indigenous knowledge since much of the tested behaviour of the indigenous people underscores their wisdom of managing the environment and prudent utilization and not exploitation of natural resources²⁵.

Environmental technicians/labourers

These are the people who operate at the implementation levels. Although they essentially work at the psychomotor domain, they perform a significant function by translating the principles into action. They too need to have a clear understanding of the *bigger picture*, to ultimately achieve their goal. Besides offering appropriate help and guidance, respect for their significant role needs to be acknowledged. University courses must integrate environmental education which will emphasize cleaner production taking the current and future environmental problems into consideration²⁶.

Environmental monitors

These hold custody of the notion of development of a sustainable society. They cautiously monitor performance and compliance of the other participants as well as their own, in achieving their goal. Politicians and civil servants, for example, fall under this category. They must possess the ability to think clearly while integrating several issues and acquaint themselves with both success and failure and be able to look into the future with a clear vision. They need to understand in very clear terms that their role is not superior to any other participant in the project. They need to bear in mind that they remain answerable and accountable to the people who elected/nominated them for the positions they hold.

We wish to clarify here that the prefix 'environmental' is not used as a superfluous term, simply embellishing the existing professions. That prefix is the call for a fundamental environmental ethic to guide and govern our actions. It is the realization of this ethic and the sense of commitment that links the definitive roles we need to play within a proposed framework to achieve a satisfactory and sustainable society.

Role of tertiary educational institutions

All university students should be environmentally educated and leaders in all walks of life, be made environmentally aware. The issue here is how to fit in the environment into the curriculum. The eclectic nature of environmental problems demands that environmental specialists also need to be broadly educated²⁷.

The need for a new order of professionalism with deep commitment to environmental matters is imperative.

Qualities of such a professionalism generate out of the thinking that reflects social equity. New initiatives in environmental education are necessary in the form of graduate and professional academic programmes clearly emphasizing the practice and the growing necessity of a multidisciplinary focus. We present here an academic degree model:

- The model generates out of Fritjof Capra's 'ecological world view' which fundamentally enables the linking of the individual with the whole. It will enliven at least the following two tenets of Capra^{28,29}.
 - (i) shift from the part to the whole,
 - (ii) shift from truth to approximate descriptions.
- The other critical requirement is scientific competence. By this we refer to the capability of rationalizing and evaluating one's own thinking and work as against those of others.
- The proposed undergraduate curriculum will build itself on three core constituents
 - (i) Environmental Science and Engineering,
 - (ii) Principles and Ethics of Business and Management,
 - (iii) National and International Public Policy.

In addition to these, a definite focus towards some of the more-immediate critical issues, such as environmental audit, sustainable development, mass media, occupational environmentalism, medical and engineering professionals needs to be perceived with greater emphasis. We also believe that a periodic environmental round-table, as proposed by Lynch and Hutchinson³⁰, will be critical, involving academics, industrialists, government officials, and representatives of the general public, to discuss environmental issues. Such a round-table will provide the necessary overview for professional approach, clarity of purpose, and vision.

Conclusion

Sustainability is the bedrock for a better future of human existence. Hence, it is vital to integrate concepts and practice of environmentalism to facilitate a sustainable society. Our ideas, described earlier are an urgent plea for an integrated and designed approach, linking human resources and their potentials. Towards that end, we propose here the need to identify a major shift in the tertiary educational processes underscoring the importance of environmental management towards a sustainable society. Because the job market always pre-conditions the players, we have attempted to integrate environment-related educational efforts with job opportunities. Nevertheless, the key issue is to offer a conceptual framework. This outline we think, is critical for educational planners and administrators in developing countries to align on two critical dimensions (a) efficiency in education and (b) efficiency

in resource use. Each nation will have its own characteristics and planning needs to be developed based on such a blueprint. Some aspects of this blueprint may appear idealistic and may not truly reflect true situations in every possible circumstance; but we earnestly hope that it will stimulate new thoughts, foreshadowing new debates and new plans, and realizations to achieve sustainable societies in developing nations.

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