Environmental resources management

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THE ENVIRONMENT IS composed of living (biotic) and non-living (abiotic) components that, through the cycling of elements and compounds (e.g. the nitrogen and water cycles), create a balance within any particular ecosystem. Globally this balance of environmental resources is driven by solar energy but human activity has become a major biotic factor affecting the balance of environmental resources. (Miller G.T., 1992). The relative influence of these activities on the balance within and between ecosystems tends to increase with growth in human populations and/or the level of human affluence. This is partly attributable to the demand for the resources needed for survival (water, food, shelter, energy) and for comfort and status (additional energy, food and living space plus material goods) and partly to the willingness and capability of humans to manage the use of environmental resources.

Human impact

Although consumption of resources is greatest in the industrialised 'north', increasing environmental impact is evident in the less developed 'south', where it is especially associated with urban water, land and air pollution and export of primary resources to the 'north'. This impact may result from the absence or poor quality of facilities such as sanitary disposal of human excreta and domestic, commercial and industrial wastes, or from the demand for increased food production.

Water resources and pollution management

Successful management of the many uses of water resources (drinking, washing, bathing, cooking, fishing, industry, transport, leisure, amenity ...) requires knowledge of their quality and quantity in an area/country - and how these are changing. Such management inevitably involves pollution control and waste management, particularly of human-derived pollution that is potentially damaging to human health, to biodiversity and to potential future use of the water (environmental or human domestic, agricultural and industrial). Inadequate waste disposal can pollute both surface and ground water sources for local as well as 'downstream' users and cause loss of local amenity and livelihood. For example, reduction in catches by fishing communities around Lagos Lagoon, Nigeria, is reportedly due to deterioration in water quality and to accumulation up the food chain of heavy metals and synthetic organic chemicals, including pesticides (Ince and Ojo, 1993).

To manage pollution it is better to prevent or reduce its occurrence rather than to remove it or treat the impact once it has occurred. For example, human excreta is a potential source of pathogenic microbiological pollution of water (and land) resources. Containment of excreta in pits latrines for up to two years, until pathogens are inactive, or treatment using reed beds can prevent water pollution by excreta. To avoid such pollution, however, requires knowledge of the potential health risks and of the alternative prevention (or treatment) measures.

Environmental awareness and impact

When people are aware of the links between environmental damage and their activities it can lead to changes in behaviour and practice leading to a reduction in negative environmental impact. Traditional practices such as management of irrigation water usually account for such impact already . Environmental knowledge, disseminated in schools and colleges, through local development, health and extension workers and via the mass media, contributes to such awareness and change. Actions instigated (and internalised) within communities can be very effective and far reaching; the South American Indian movement against forest clearance for construction of large dams is a well known example of community action.

In some communities, where survival rather than development is the issue, environmental resource protection (water, soil, wood fuel etc.) is difficult, no matter how high the level of environmental awareness. In these extreme situations, such as those experienced in communities and refugee camps following war or natural disaster, external assistance may be of paramount importance in both short and long term sustainability of the environmental resources. To this end the assistance, as with all 'development assistance', should be planned to maximise the involvement and contribution made by the community or refugees, so that the knowledge and skills gained by them will remain once the situation improves. For this to occur, the technology should be appropriate and affordable (in construction, operation and maintenance) and the training reinforced. National and international commitment to training and to adoption of the technologies is, therefore, essential for development to be sustained.

Environmental planning

The need for national and international measures to ensure that development demands are balanced with resource use and waste treatment and reuse is commonly recognised. Individual and governmental awareness of the environmental effect - locally, regionally and globally - of increasing pressure on environmental resources, particularly those of water, food, shelter, and energy, has grown world-wide in the latter half of this century. This awareness is being translated into legislation aimed at the protection of resources, both non-renewable ones (minerals including metal ores and fossil fuels) and essentially renewable ones (water, soil, air, forests). The establishment and expansion of national Environmental Protection Agencies (EPAs) or their equivalent and the international representation at the Rio Summit in 1992 both indicate an underlying desire for effective environmental resource management, both nationally and globally.

Most governments have identified those environmental issues specific to their country and have developed their own Environmental Action Plans, policies and laws to control environmental damage. However, for all countries, whether in the 'north' or the 'south' implementation of these plans, policies and laws remains problematic. Often the necessary resources - human and financial - are not available and sometimes the direction and motivation for their implementation is inadequate or not sustained when governments change. The political will to enact and implement environmental legislation is crucial.

Environmental resource management

To be successful, therefore, environmental resource management requires careful integration of policy design and implementation with other important issues such as economic growth, sustainability and equity within the constraints of financial, technical and human resources. The relationships between all these factors are given in figure 1: the P surrounding the acronyms illustrates the importance of political will to achieve sustainable resource management.

All countries, whether 'north' or 'south' experience difficulties in drafting and implementing environmental legislation: economic limitations are a major factor. Economists have estimated that only countries with a per capita GNP in excess of US $4000 can 'afford' to implement sufficient adequate, effective environmental legislation to realise environmental sustainability. The estimated cost effectiveness of selected environmental regulations, in terms of cost per premature death averted, can be very high, e.g. US $0.2 million for drinking water quality standards and more than US $4 trillion for banning hazardous waste disposal to land.

The questions which remain are 'How achievable is the integration of these factors?'; 'How affordable are the policies and measures to be implemented?' and 'Which measures such be given priority where economic resources are limiting?' These questions highlight the dilemma experienced by many developing countries - opting for the rigorous or the achievable. An example is the choice between the introduction of rigorous water quality standards in line with those in the in the most developed countries or the introduction of less rigorous, but implementable, standards that are sequentially improved with time/resources. Is it more realistic to adopt standards that are perceived as attainable with the resources currently available and then upgrade as availability improves or to adopt standards that require considerable increases in resources (finance, infrastructure, personnel) and are perceived as 'unattainable' in the foreseeable future and hence discourage efforts to achieve them?

One response to the daunting task of addressing these issues is to promote the 'think globally but act locally' ethic which is aimed at encouraging positive action (and discouraging opting out). Community-managed appropriate technology for water supply and sanitation provision illustrate this approach and are, simultaneously, expected to be more sustainable as well as cost-effective. Extending this approach to management of other environmental resources and impacts of human activities should contribute to sustainable development.

Summary

Management of environmental resources and the impact of human activities are intricately linked to development. Environmental damage, whilst high communities in the richer, industrialised 'north', is both experienced and caused, e.g. by the pressure of food demands on soil fertility, in communities of the poorer, less developed 'south'. Management of environmental resources involves action at individual, community, national and international levels and requires the expertise from many different disciplines. The contribution that individuals and community can make towards this management is both valuable and crucial to sustaining their own development and that of others worldwide.

References

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Figure 1. The multi-disciplinary needs of environmental resource management

ERM	**–**	**Environmental Resource Management**
HAND	**–**	**Health and Development**
FISTE	**–**	**financial; institutional; socio-cultural; technological and economic**
PALM	**–**	**political and legal methods**
5Fs	**–**	**fresh water, fresh air, fertile soil, flora and fauna, and families**