2.15 The Changing Political and Economic Climate: The Need for New Initiatives

Erik Arrhenius
Institute for Natural Resource Management, Stockholm, Sweden

The present rapid changes in the economic and political climate, the emergence of environmental considerations and the search for more efficient natural resource management are prompting changes in development activities, as evidenced by the Brundtland report 'Our Common Future', the establishment of an environment department in the World Bank, and the discussions within OECD's Development Assistance Committee on 'The Role of Science and Technology in Development Cooperation with the Less-Advanced Developing Countries in the 1990s' (see section 2.2). There are, however, severe constraints on incorporating scientific knowledge into appropriate development policies and operations. This adds to the economic problems of development and reduces our ability to tackle the poverty and debt crisis afflicting large groups around the world.

These constraints are well illustrated in present global environmental issues such as: the transboundary transport of chemical wastes generated by chemical industries; the emission of 'green-house gases' from energy production, as well as industrial and agricultural activities, threatening to disrupt the infrastructure of human societies by possible rapid climate change; the threat to the protective ozone shield imposed by the stratospheric breakdown of long-lived chloroflurocarbons; the loss of organic material from agricultural soils leading to decreased soil fertility, and at the same time emission of greenhouse gases; the wasteful destruction of tropical forests which are a source of biodiversity and could be used as a source of material for industrial manufacture of valuable chemical products. A closer look at some of the issues surrounding the 'greenhouse' effect is illustrative.

The major part of the radiation absorption increase is caused by carbon dioxide emissions from the combustion of fossil fuels in transport and other energy production. There is abundant knowledge on increased efficiency in the production, transfer and end-use of fossil fuel generated energy as well as their substitution by other fuels such as biofuels or hydrogen, with no net CO_2 production. Also non-fuel techniques have risen to high technical sophistication and high efficiency. The policy support for these solutions and the inclusion of known 'greenhouse-low' technology in development operation has, however, been extremely weak and development activities have been dominated by conventional fossil fuel technology in plants with lower efficiency than in most industrialised countries. It has been calculated that in order to supply the energy needed to support the expected development activities for the next decade, an investment of 100 billion dollars per year in energy production is needed, compared with the World Bank's present yearly lending for energy investment of less than 5 billion dollars. The additional emission of carbon dioxide, if this programme could be financed, is 80%. This highlights the urgent need to overcome the constraints on Science and Technology utilisation for economic reasons as well as for achieving sustainable development.

The increase of carbon dioxide in the atmosphere is the result of a shift in balance between emission and elimination, but attention has largely been focused on emission (fossil fuel for combustion and destruction of tropical forests) and the processes of elimination (as carbonaceous matter in soils, marine organisms, etc.) has been largely ignored. Important factors here are the biochemical processes in agricultural soils. Present agricultural practices have led to a decrease of carbonaceous material in soil and to a serious loss of agricultural fertility in large areas of the world, notably in Africa. A doubling of the present average carbon content of such agricultural soils to reach the average grassland level would counterbalance 50-100 years oversupply to the atmosphere at the present rate. Since counteracting this critical loss of agricultural fertility now under way in several tropical countries would also counteract unwanted increases in the atmospheric content of greenhouse gases, such action should be stimulated. Much of the scientific and technological knowledge needed to implement these changes in agricultural practice is available but has not been incorporated into development policies and operational activities.

Chloroflurocarbons have been considered as a threat to the stratospheric ozone layer which protects the earth against deleterious shortwave UV irradiation. This effect is due to the stability of these molecules, which allows them to reach the stratosphere where they give rise to active chlorine species which catalyse the breakdown of ozone. This has led to political decisions in the so-called Montreal process favouring less stable chlorofluorocarbon species which will not reach the stratosphere. CFCs are also extremely powerful greenhouse gases, at present responsible for 25% of the marginal increase in the total greenhouse effect, but the new less stable CFCs are almost as powerful greenhouse gases as the old ones. Thus, by neglecting this scientific information in a political decision, we are throwing away an excellent opportunity for further action against the 'greenhouse' effect.

These are some examples of constraints in receiving and utilising scientific and technical information for efficient development and welfare. Some of these constraints reside in the conventional economic evaluation systems, which exclude technical developments that do not appear as directly economically feasible and which do not properly consider so-called 'externalities' such as threats to the sustainability of ecosystems or to human health, welfare and survival. Bilateral and multilateral development organisations consider the commercial availability of techniques as a prerequisite in economic development work and do not have functional mechanisms for bringing new more natural resource efficient techniques to commercial availability. The present rapid changes in goals and intentions imply that present commercially available technology does not meet our requirements. Mechanisms for removing constraints in the process leading from basic knowledge of needs to commercial availability of natural resource efficient technology are thus urgently needed. The main constraint on achieving efficient and environmentally sound technology in development work is neither the lack of scientific understanding of biogeochemical systems and processes, nor the absence of appropriate technical solutions, but poor utilisation of existing scientific and technical knowledge.

What is then needed in order to stimulate this implementation process? I should like to stress the need for some clearing house for structuring scientific and technical information into forms in which it could be more efficiently utilised in the development process. This process should comprise mechanisms for bringing scientists, technologists, entrepreneurs and venture capital holders into closer contact and could counteract the present imbalance between economic and scientific-technical capacity which is now manifesting itself within the multilateral development system. New conditionalities need to be designed for evaluation systems based on efficiency criteria in energy systems, as well as in agriculture, forestry, construction etc. The competence of the emitters (scientists and technologists) and the receptors (politicians, administrators and decision makers including the general public) to manage an efficient transfer of scientific and technological information is of crucial importance. Above all, scientists need to learn the language of economics and politics, to understand the aims and pressures of economists and politicians, and to gain credibility by working and writing at the interface between science and policy.

The Author

Professor Erik Arrhenius is a biochemist-biologist, Professor of Environmental Toxicology at Stockholm University 1971-1985, Professor of Natural Resources Management and Director of the Institute of Natural Resources Management at Stockholm University since 1985, spending 1988-1991 on leave as Principal Science and Technology Advisor at the World Bank.

Institute for Natural Resource Management
Stockholm University
10691 Stockholm
Sweden

Tel: + (46) 8-164214
Fax: + (46) 8-159522