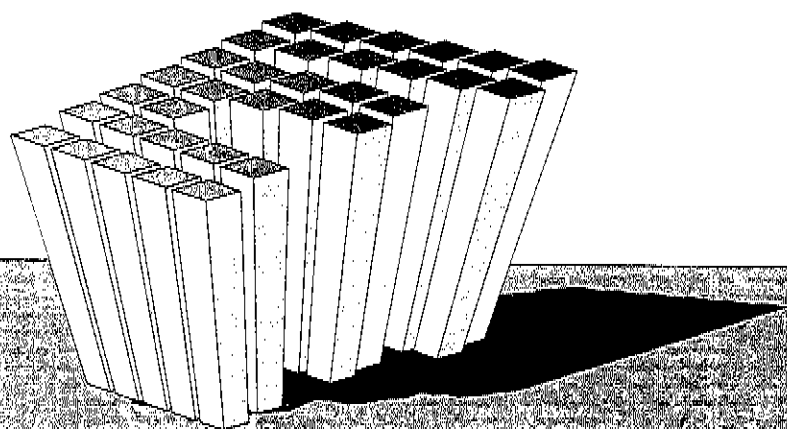


HEALTH ECONOMICS

**ENVIRONMENT, HEALTH AND
SUSTAINABLE DEVELOPMENT:
THE ROLE OF ECONOMIC
INSTRUMENTS AND POLICIES**



WHO TASK FORCE ON HEALTH ECONOMICS

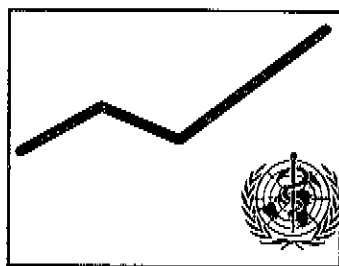
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HEALTH ECONOMICS

**Environment, health and sustainable development :
the role of economic instruments and policies**

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**WHO TASK FORCE ON
HEALTH ECONOMICS**

February 1995

Document of the WHO Task Force on Health Economics

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Foreword

Building upon activities already undertaken in the area of health economics, the Director-General created a Task Force on Health Economics in November 1993 in order to enhance WHO's support to Member States.¹ Its goal is to further the use of health economics in the formulation and implementation of health policies, giving priority to countries in greatest need.

The Task Force aims not only to strengthen the technical content of WHO programmes so that they can better adapt the tools of health economics to country needs, but also to foster cooperation among development agencies in applying health economics at country level.

As a first step, the Task Force is preparing a series of documents. In addition to the present analysis, it has issued a bibliography of recent WHO literature on health economics, a guide to recommended reading, and a case study on hospital cost-containment. A review of ways in which health economics has been used in WHO's work, and an analysis of the process followed to identify and respond to the requirements of countries in greatest need in the area of health economics will appear shortly.

¹Members of the Task Force are : J.-P. Jardel (Chairman), M. Juncloes (Vice-Chairman), G. Carrin (Secretary), S. Bertozzi, A.L. Creese, D.B. Evans, K. Janovsky, J.M. Kasonde, C.M. Kinnon, J.H. Perrot, L. Tillfors, G. Velasquez, A.E. Wasunna.



Summary

In recent years there has been some success in making environmental issues - and the use of economic instruments for environmental objectives - an important part of development planning and policy. While much remains to be done, progress in this area is much more rapid than in the case of health objectives, even though much of the rationale for environmental improvement is ultimately related to human health and well-being. This paper notes recent trends in environmental economics and practice in developing countries, with specific reference to the role of economic instruments. The actual and potential responses of governments to the environmental health consequences of market failure are addressed, as well as the impact of inadequate sectoral and macroeconomic policies. The distinction between market failure and policy failure is illustrated with primary reference to pollution problems, but the approach can readily be extended to natural resource management in general.

The use of economic and regulatory instruments designed explicitly for environmental purposes is briefly reviewed: administrative difficulties associated with emission charges suggest that blunter instruments, referred to as product charges, offer the best prospects, particularly in a developing country context. Shortcomings in existing economic and sector policies also offer many opportunities for reforms that satisfy both economic and environmental objectives. This is illustrated perhaps most clearly with regard to water supply pricing, reform of which in many developing countries can typically be expected to yield economic, social, financial and environmental benefits.

It is now generally accepted that sound environmental policy must address root causes of the problem; integration into macroeconomic and sector policies - which have wide-ranging impacts - is thus required. The relationships between macroeconomic and adjustment policies and environmental health are therefore discussed. While far from sufficient, the adjustment process is typically a necessary condition for sustainable development, given that a central element is invariably the improvement of economic incentives to discourage wasteful resource use. Complementary or compensatory measures may however often be required to address the unanticipated consequences for environmental health of adjustment programs.

Precisely the same argument can be made about health, and environmental health in particular, and some implications of recent developments in environmental economics and policy for health policy and institutions are then suggested. These include the importance of improved resource pricing as long as complementary institutional and social mechanisms are in place; the considerable scope for interventions that meet both economic and social objectives; the need for a general equilibrium, multidisciplinary, approach. It is concluded that health impact assessment should be conducted, not simply of individual development projects, but, more importantly, of economic policies. Such impacts may either be direct, through their influence on the level and distribution of income, but also, and of primary concern in this paper, via their effect on the natural environment.

Research needs abound. Above all is the need to better understand the complex routes by which economic policies might impact upon environmental health. This requires empirical, case study research which consists of (a) determination of health priorities



(b) determination of the proximate and underlying causes of the priority problems, and (c) identification of appropriate policy reforms or instruments. To the extent that improved policies utilize economic instruments, there are clear implications for financing the health sector. As frequently argued in the case of alcohol or tobacco taxes, while user charges or pollution taxes generate revenues, they may also, by reducing environmental damage, actually reduce the need for expenditures required as a result of environmental degradation. Reforms aimed at the source of the problem may frequently be cost-effective; indeed, they are often economically and financially justified in their own right. It is noted that the scope for raising domestic revenues dwarfs the magnitudes likely to be available through concessional assistance, as illustrated clearly with respect to pricing of electric power. Such «win-win» policy reforms clearly merit high priority in developing countries.

The foregoing implies that serious utilization of economic analysis by health ministries is required. Consistent with the principle that prevention is better than cure, increased effort should be devoted to better understanding of the direct relationships between economic policies, incomes and health, using standard techniques of economic analysis. In addition, health ministries should develop the capacity to better understand how human health is affected by specific economic and social policies via their impact on the natural environment. This would enable them to better articulate their concerns to ministries of finance and planning, to counter claims of powerful industrial interest groups, and therefore be a more effective voice in the determination of overall government economic policy, which ultimately is a major determinant of health status.

A similar case can be made with respect to the World Health Organization, which has noted recently in a series of reports and statements that progress in this area depends upon recognition of the importance of a variety of disciplines, including engineers, ecologists, economists, financial analysts, and behavioral and other scientists, to complement the skills of the health practitioner and biomedical scientist. It is therefore clear that a major break with traditional staffing patterns, and associated institutional changes, will be required on the part of the World Health Organization if that agency is to take the lead in promoting and implementing its own recommendations.



I. INTRODUCTION

In recent years there has been some success in making environmental issues - and the use of economic instruments for environmental objectives - an important part of development planning and policy. While much remains to be done, progress in this area is much more rapid than in the case of health objectives, even though much of the rationale for environmental improvement is ultimately related to human health and well-being. This paper notes recent trends in environmental economics and practice in developing countries, with specific reference to the role of economic instruments. The response of governments to environmental problems caused by market failure are addressed, as are the environmental consequences of inadequate sectoral and macroeconomic policies. The scope for policies that satisfy both economic and environmental objectives is emphasized. The distinction between market failure and policy failure is illustrated in this paper with primary reference to pollution problems, but the approach can readily be extended to natural resource management in general.

Some possible implications of recent developments in environmental economics and policy for health policy and institutions are then suggested. The paper refers primarily to the relevance of economic policies and instruments outside the health sector per se: pricing policies and other economic instruments (such as insurance) specific to the health sector are not addressed. Health status is heavily influenced by economic policies or instruments (a) through their direct impact upon incomes and (b) indirectly through their effects on the natural environment. While the details of this paper are primarily concerned with the second of these aspects, the recent evolution of thinking about environmental policy suggests that health agencies should develop the capacity to conduct systematic health impact assessments of economic policies - whether or not such impacts result via changes in the environment. This will require a better understanding of the relationships between economic policies and health, so that «win-win» or at least cost-effective policies can be identified. The importance of the latter is illustrated by the potential revenue-raising impact of certain policy reforms, compared to which international financial assistance is relatively small. The suggested approach will call for skills - particularly in the behavioral sciences - that are traditionally under-represented in health ministries and in the World Health Organization.



II. ENVIRONMENTAL ECONOMICS AND HEALTH ECONOMICS

Health economics and environmental economics have tended to consist of two fairly distinct bodies of literature,¹ coming together only where specific issues such as the health impact of air or water pollution, or the impact of water resource development on diseases such as malaria or schistosomiasis arise. While distinct, the two areas of economics evolved in a parallel fashion during the 1970s and 1980s, although some divergence has been apparent in the last few years. Traditionally the main focus has been on micro level resource allocation (cost-benefit and cost-effectiveness analysis), with increasing emphasis in recent years on questions of financing and resource mobilization.

Although health and environmental economists have been important in promoting the use of a systematic way of thinking about resource allocation decisions, their analytical skills have not been very effective in handling specific problems in real world cost-benefit or cost-effectiveness studies. Typically cost-benefit analysis has been interpreted to involve two procedures, the first being prediction of the physical consequences of investments, the second the placing of monetary values upon those consequences in order to arrive at a basis for choice. In practice, the first task is primarily dependent upon judgement and technical expertise in fields such as epidemiology or ecology rather than economics per se. Moreover, in the environmental and health fields, economics as a rigorous discipline has often little to contribute even to the second task. Economic evaluation of projects and policies in these two fields either consists of trivial exercises in which easily identifiable monetary values are assigned to cost or benefit streams, or finds itself irrelevant in establishing criteria for judging the most important issues that arise. Thus, economics has not been entirely adequate in placing values upon human health, welfare of future generations or of endangered species.² To their credit, however, economists have played an important role in stimulating the search for cost-effective approaches to health and environmental problems, although once more they have not possessed the skills required for the actual analysis.

Economists have played a more tangible role in resource mobilization and cost recovery issues in both the environmental and health fields. The literature on alternative pollution control measures that dates from the mid 1960s, and which inter alia considered the case for effluent charges versus regulations, is a case in point. Economists have also been heavily involved in developing new approaches to pollution management such as schemes for marketable permits to discharge effluents. In the forestry area, economists have also been active in developing systems of concessions or stumpage fees designed to encourage conservation. Energy efficiency or conservation has of course also been for many years the subject of economists' attention, the literature on marginal cost pricing for energy having had a major impact on government policies throughout the world.

A parallel literature and history of success in influencing practical decision-making applies to economists' activities in the general area of health financing. Clearly, as indeed with respect to environmental economics, the overlap with the role of financial manage-

¹See Warford J. and El Bindari Hammad A. (1990).

²For a review of methods that have been employed, see Pearce D. and Warford J. (1993).



ment and accounting is considerable, but economics has played a significant role in a range of issues involved in output budgeting, hospital management and cost containment, user charges and insurance policies.

Until recently, macro-level analysis has been somewhat fragmentary. Notable efforts have however been made in the health area, as exemplified by Barlow's early work in Sri Lanka, which involved modelling the interactions between development, health measures and health status at the macroeconomic level.¹ Also, as noted below, country studies of the linkages between economic development and health have also taken place as part of WHO's intersectoral action program. In the environmental area, macro-level analysis was for some years largely undertaken by the «no-growth» school.² However, in recent years, recognition of the potential impacts upon the environment of countrywide economic policies has stimulated a great deal of applied research on the nature of these linkages³, and concern with macro and sector level policy has now become the dominant feature of mainstream environmental economics. Indeed, it has become widely recognized - and not just by the academic community - that economic analysis is essential if environmentally sound policies are to be developed at the national level. Similar progress is yet to be observed in the health area.

It is convenient to distinguish between two routes by which economic policies impact upon human health. The first consists of policies that affect health via changes in the level and distribution of income, and thus the ability of people to purchase adequate food, shelter, nutrition and health services. This is part of mainstream health economics, and is not addressed in the present paper. The second route, which is the main focus of this paper, is via changes in the natural environment. Recent analytical and practical experience in developing economic instruments for environmental management, discussed below, is highly relevant for public health. Essentially two types of economic instruments can be distinguished: (a) those with explicit environmental objectives, such as pollution taxes, and (b) the environmental consequences of sector and macroeconomic policies.

¹Barlow R. (1968).

²For example, Meadows D. M. et al (1972).

³See Pearce D. and Warford J., *op. cit.*



III. ECONOMIC INSTRUMENTS FOR ENVIRONMENTAL MANAGEMENT

There is now widespread acceptance that environmental management should be closely integrated into economic policy-making. Increasing pressure on natural resources and the ability of the planet to absorb waste material has generated growing concern that environmental degradation threatens prospects for continued economic development worldwide. At the same time, evidence is mounting of the significant and pervasive effects on the natural environment of policies at the macroeconomic and sector level. Environment then, is not something that should be seen as distinct from economics; indeed, it is of central importance. This is also implied by the definition of sustainable development introduced in the Brundtland Report, i.e. development which meets the needs of present generations without compromising the ability of future generations to meet their needs.

Elaborating on this theme, in recent years a good deal of analytical and empirical work linking environment and development policies has focussed on valuation issues, including improved cost-benefit methodology and treatment of environment in national income accounts; and on policy issues, with emphasis not only upon explicit environmental incentives, but also, more significantly, upon the impact of macroeconomic and sector policies on the environment. Environment is, in general, being accorded a higher priority in virtually all countries.

As for any other aspect of development, environmental priorities, and therefore financing needs, should be determined by some weighing of the costs and benefits of alternative interventions. This may be illustrated in terms of the contribution that environmental protection makes toward sustainable development, which in turn may be demonstrated by the impact of resource degradation in national income accounting terms. Cost-effective means of achieving environmental objectives should of course be sought. There are in fact ample opportunities for governments to take measures that yield net economic (and financial) benefits, as well as having a positive impact upon the environment. These «win-win» policies include the introduction of efficient pricing and removal of subsidies for energy, water resources, and other agricultural inputs, as well as a wide range of sectoral and macro-level measures to improve technological and management efficiency in industry. Although implementation of such policies should command priority, in practice additional financing for environmental purposes will certainly be required. The funding needs will be particularly high in those cases where the task is not merely to maintain the productivity of environmental assets but to make up for their past degradation. This is clearly evident with respect to the industrial pollution, inadequate sanitation and accumulation of solid waste in most developing country cities. The general relevance of these measures for public health are apparent, although precise understanding of the epidemiological linkages and economic and social consequences still leaves much to be desired.

The role of market based instruments (MBIs) has traditionally been a central part of environmental economics. Generally favored by economists, MBIs may be evaluated in light of their contribution to the achievement of technically efficient, economically efficient, or cost-effective solutions, as well as their fiscal and social consequences and



administrative feasibility. MBIs, which employ economic incentives, can be contrasted to Command and Control (CAC) methods which provide mandatory regulation of the quantity and quality of environmental damage that may be permitted. Traditionally, environmental policy in both developing and industrial countries has relied predominantly on CACs, but MBIs have certain advantages and, as a result, are being increasingly considered. In particular, MBIs are often justified not only in environmental but also in economic terms.



IV. MARKET FAILURE AND POLLUTION

The inherent failure of a free market system to allocate resources efficiently where externalities exist justifies the need for government intervention, either by the use of economic or regulatory instruments.¹ Market based instruments, where the cost of environmental damage is fully reflected in the price the polluter or user of a natural resource has to pay, have several advantages. Prices allocate resources among alternative uses more efficiently than quantity rationing. Subsidized prices produce inefficiency by reducing incentives for conservation; more resources are wasted and more pollution discharged than is socially optimal. The main types of intervention that have been developed as explicit means of addressing environmental issues are briefly summarized below.

Effluent or emission charges. Charges based upon quantity and quality of effluents discharged by enterprises. The «polluter pays principle» has merits on efficiency, equity and fiscal grounds. Economic efficiency would require the charge to equal the economic cost² of damages caused, for example to downstream water consumers or fisheries, or the public health costs of air pollution. Such charges based upon marginal damage costs and levied upon individual dischargers have the potential advantage of ensuring that ambient quality standards are achieved at least cost to society as a whole since it gives each discharger the opportunity to weigh the costs of damage versus the costs of taking remedial abatement measures. Ideally the charges should reflect regional variations in ambient air or water quality objectives. Difficulties arise with regard to the measurement of damage costs, and in particular to their impact upon health, as well as in determining the responsibility of individual waste dischargers for damages caused. An advantage of charges is of course that they raise revenues, which may or may not be used for pollution control purposes by government.

Product charges. In practice, effluent or emission charges reflecting damage costs are rarely used in industrial or developing countries. One reason for this is the difficulty of monitoring large numbers of waste dischargers. There is however a growing recognition of the potential importance of economic instruments as a means of controlling environmental pollution, and one answer to the monitoring problem is to use blunter instruments, such as taxes on inputs, as proxy for the polluting outputs. Such indirect methods of levying pollution fees are becoming common in industrialized countries. Examples include taxes on gasoline, pesticides, fertilizers, lubricating oils, or on the sulfur content of coal. While not as efficient as effluent taxes, in that they do not encourage improvement in the quality of discharges, they clearly do have some incentive effects, and are relatively easy to administer. At the municipal level, a water charge incorporating the waste disposal costs expected to result is an example of such an indirect instrument. The relative administrative ease of implementing product charges suggests that they should be of particular interest to developing countries, in which institutional capacity to enforce either regulatory or economic instruments at the emission level is typically even less adequate than in the case of the industrialized countries.

¹These may include measures for re-assigning property rights.

²Ideally, the marginal social cost (MSC), as defined below, under heading «Water supply pricing, an example of Win-Win policy reform» (paragraph 3)



Standards. Standards for effluent discharges are often set for specific industries, with a distinction usually being made between old and new plants. Performance standards specify the amount of pollutants that can be discharged, but leave it to firms to find ways of meeting the standard. The objective of influencing ambient air or water quality ideally requires the standards to vary according to location. Monitoring problems are similar to those required by an effluent charge system. While performance standards based upon quantity and quality of effluents are feasible for the largest waste dischargers, smaller firms might be subject to an alternative approach, which would ease the monitoring problem, namely use of technology standards required for individual industrial processes. This constrains firms' freedom of choice, and is therefore less efficient, but may be the best alternative for small scale industry, where the large number of firms may preclude effective monitoring of actual discharges.

Compared with a system of emission charges, performance standards have the advantage of greater predictability in their environmental effects. The impact of introducing or raising effluent fees is uncertain, and an iterative solution (experimenting with different fee levels) would be required to arrive at a determined emission or ambient quality target. The administrative and political difficulties inherent in such an approach clearly offsets, to a greater or lesser degree, the potential cost-effectiveness of emission charges.

Subsidies. Clearly contrary to the «polluter pays principle», governments, for political reasons, frequently find subsidization of industrial expenditures on pollution control a necessary complement to pollution taxes or regulatory instruments. While inefficiencies in capital markets and considerations of equity may justify such subsidies, this should be the exception rather than the rule. Explicit subsidization of pollution control equipment may distort investment decisions, e.g. by favoring end-of-pipe treatment rather than (often cheaper) industrial process changes, and of course they impose a fiscal burden on government. Subsidies from national to provincial or municipal agencies may however be justified, even beyond the transition period, on grounds of equity or where cross-jurisdictional benefits may result from environmental improvements.

Other instruments. A variety of other instruments which make use of economic incentives may also be employed. These include tradeable permits, in which licenses to pollute are allocated among various enterprises, which can then sell those rights to other enterprises. In principle, this, in common with the emission tax, can also result in the least cost means of achieving ambient targets. Certainty in the attainment of environmental targets is also achieved, and the initial issuance of permits can yield revenues. This system, little used even in industrialized countries, is probably inappropriate for most developing countries. Use of performance bonds and deposit refund schemes on the other hand, could be introduced relatively easily.

In practice, economic instruments still tend to be under-utilized in both industrialized and developing countries. A general explanation for this probably lies in the prevailing incentive systems: for example, those responsible for pollution control are typically judged in terms of the achievement of environmental objectives alone - considerations of social costs rarely enter their decision criteria. The greater certainty in achieving environmental objectives associated with regulatory rather than most types of economic



instrument tends to be the dominant consideration. As an OECD survey shows¹, even where they are employed, the objective of MBIs is rarely to influence consumer behavior (which economists would often argue is the single most important aspect). Charge levels are usually low, and so they have a minor fiscal role, although may be used to defray the costs of implementing regulatory and monitoring systems. However, recent years have seen a growing reliance upon MBIs such as pollution taxes, and in particular those on inputs (product taxes) rather than on emissions.² In practice, some combination of the wide array of economic and regulatory instruments should be employed in environmental management.

¹Opschoor J. B. and Vos H. (1988).

²OECD (1993).



V. ECONOMIC AND SECTOR POLICY REFORM AND THE ENVIRONMENT

It is now generally recognized that most environmental problems are less the result of individual large scale development projects that have gone wrong than the combined consequences of many relatively small scale activities, such as unsustainable agricultural practices, pollution caused by large numbers of small, inefficient factories, and decisions made by individuals to enter and destroy tropical rainforests.¹ Subjecting each such decision to social cost-benefit analysis, environmental impact assessment or regulation, or indeed to a system of environmental taxes that requires monitoring of individual actions, is rarely administratively feasible. This implies the need to search for the underlying causes of such activities, and identify policy interventions (which will often have to be somewhat blunt instruments) aimed at the source, rather than the symptom of the problems. Priority should be given to amending government interventions in the market that are economically and environmentally perverse, and introducing interventions (such as pollution taxes) when market forces are inadequate. These actions should be accompanied by efforts to address underlying causes of natural resource degradation and to improve understanding of what affects the environment and how.

It follows from the foregoing that the traditional project-by-project approach, while important and deserving of more effort, must be supplemented by the integration of environmental management into economic policy-making at all levels of government. Policies with a wide ranging impact - i.e. those of a sector-wide or macroeconomic nature - are specially relevant. A variety of government policies may have a profound impact - for good or ill - on the environment. Fiscal, exchange rate, energy and agricultural pricing, or land tenure policies might be expected to have major environmental implications, but in practice environmental consequences have traditionally not been considered in the formulation of environmental policy. Special attention should be given to the design of economic incentives to induce environmentally sound behavior, so not only individual investment projects, but also economic policies should be subjected to environmental evaluation.

Environmental management should therefore be based upon a number of steps, namely:

- (a) identification of priority environmental problems (possibly assisted by cost-benefit analysis and analysis of the impact of resource degradation and control measures in national income accounting terms);
- (b) identification of proximate and underlying causes of those problems;
- (c) in light of (b), determination of investment programs and policy reforms, giving high priority to those interventions which are in the «win-win» category.

Understanding the chain of causality leading to environmental degradation is the analytical heart of such an action plan. Proximate causes are relatively easy to identify; much more difficult, but of primary importance, is the analysis of underlying causes. Typically

¹World Bank (1987).



these will be found in economic incentives, often combined with a complex mix of social and political factors. For example, it may be easy to identify the source of air pollution as the inefficient productive processes of certain industrial enterprises. It is however more difficult to understand the forces that bring this about, and to determine the policy reforms that will not simply affect individual plants, but have pervasive effects, impacting on a wide variety of industrial operations. Similarly, while population growth may clearly be related to pressure on marginal lands and soil erosion, ascertaining the impact of economic policies on fertility rates is much more complex.

In practice there are many opportunities for policy reform, in both developing and industrialized countries.¹ Environmental degradation often stems from market distortions, which may be explained by externalities or the existence of common resources, and which may be addressed by the kinds of measures referred to (on pages 6 and 7) above. However, other problems are actually induced by government policies. Thus, while taxation of environmentally damaging activities through pollution charges or product charges is a sensible course of action in many cases, in practice quite the reverse often occurs. Policy failure occurs when governments create incentives for environmentally damaging behavior by intervening through implicit or explicit subsidies i.e. when those who demand environmental goods are not required to pay for the latter's true social cost. This is particularly common among developing countries, where irrigation and municipal water, electricity, and agricultural chemicals are typically subsidized. Governments also sometimes lower the cost of environmentally damaging activities by providing de facto incentives for destroying forests or mangroves.

In the case of public utilities such as water supply and electricity, artificially low prices encourage wasteful use, and generate inadequate revenues for system operation and expansion. Decline in service quality is accompanied by greater difficulty in raising prices, resulting in a vicious circle of underfunding and shortages. The cost to consumers of a service not being available is often more than the cost of expanding the service, even when costs are rising. Underpricing - or subsidization - of resource use is therefore typically unjustified in economic and financial terms. It frequently has perverse income distributional consequences, places a fiscal burden on government, and is often environmentally unsound as it encourages wasteful use. In such cases, the scope for policy reform with multiple advantages - «win-win» action - is therefore considerable.

¹World Bank (1992).



VI. WATER SUPPLY PRICING: AN EXAMPLE OF «WIN-WIN» POLICY REFORM

Water supply pricing is used here to illustrate the kind of policy reform that satisfies both environmental and economic criteria, the example also being directly relevant for public health. The rationale for improved water pricing and the impediments to reform are of generic relevance in considering the use of economic instruments in environmental management. Pricing of water, as of other resources, is not simply a matter of raising revenues to ensure the operational efficiency of the enterprise, although this is of course a major objective of price reform. Pricing has another role too, namely to assist in ensuring that the expansion of capacity and consumption is at the correct level. Pricing is therefore closely related to the investment decision. Given water shortages, a decision to invest or not must be made; one way to approach this is to carry out an analysis of project costs and benefits. However, while the costs of water supply are relatively easy to measure (although as noted below, there are difficulties even here), the economic benefits of water actually supplied are notoriously difficult to measure.

The pricing approach in effect places the burden on consumers to reveal their willingness to pay - and therefore their valuation - of water consumed. If the price paid is at least equal to the costs of providing additional supplies, investment in additional capacity is warranted; if not, existing capacity should be rationed. To illustrate, it would be desirable if an industrial consumer based a decision to invest in recycling equipment by comparing the cost thereby incurred with the cost to society of investing in additional water supply capacity. This will only be done if the water price faced by the industrial enterprise actually equals the cost to the water utility of expanding output. Incremental or marginal costs, rather than historic or sunk costs are therefore relevant for investment decision-making. This forward-looking approach to pricing can provide a rigorous test of project justification if various other conditions are met with regard to the functioning of the market mechanism in general.

Ideally, the price charged for water should equal its economic and environmental costs of supply, plus the cost of disposing of wastewater, and should therefore vary from location to location. Where actual shortages occur, prices should be even higher than actual system cost, at a level sufficient to ration existing capacity. Where private abstraction of water depletes existing sources, necessitating additional investment either by other firms or public water authorities, a similar charging principle should be used. More generally, resource prices should ideally equal their marginal social costs (MSC), defined as the sum of marginal production costs (MPC), marginal user (or depletion) costs (MUC), and marginal environmental costs (MEC) (or, for tradeable commodities the international price of the resource, if this is greater).¹

The MSC provides a benchmark by which actual pricing policy may be evaluated. In practice, there are always obstacles to the introduction of a pricing policy based strictly upon MSC. Typical obstacles to immediate price reform include such things as institutional weaknesses; measurement and monitoring problems; fairness; uncertainty; unclear

¹Note that MSC is often referred to in the environmental economics literature as marginal opportunity cost (MOC). For further details, see Pearce D. and Warford J., *op. cit.*



property rights; lack of consumer knowledge; financial and fiscal objectives and constraints; political constraints; the need to introduce improved pricing in line with the overall pace of price reform in the economy; and other strategic economic objectives of government. Some of the specific issues encountered with regard to reform of water pricing are noted below.

Estimation of marginal social costs. For both water supply and waste disposal, which are often characterized by capital indivisibility, MPC may be approximated by AIC (average incremental cost), which is the present worth of the stream of incremental system costs divided by the «present worth» of incremental supply. When existing sources of water are fully utilized, MUC would be the price necessary to ration capacity, but in most cases MUC will be based upon the cost of a technical alternative, such as desalination, and is therefore conceptually the same as MPC. The MSC calculation, where MPC is the dominant element, is obviously much easier for water supply than for the disposal of wastewater, where MEC, and the valuation issues implied, is dominant. As noted below, however, there may be both environmental costs and environmental benefits associated with water supply and its disposal (MEC may be positive or negative), their estimation being highly complex.

Water for basic needs. Resistance to price increases for water is often based on the argument that the poor must have access to an adequate supply for their basic health needs. However, the real economic cost of water is usually a very small fraction of household disposable income, so this argument rarely has merit. On the contrary, if prices fail to reflect supply costs, expansion of systems to meet growing demands may not be financially feasible. Nevertheless, there may on occasion be social reasons requiring water supply for smaller consumers to be subsidized. This should rarely pose a serious financial problem; typically the bulk of the consumption is by a relatively small number of consumers (large residential, commercial and industrial users). The economic (marginal) costs of water supply are rising virtually everywhere. Marginal costs are thus by definition in excess of average financial costs incurred by water utilities. MSC pricing for all water consumed over and above the relatively small quantity required to meet basic health needs would therefore typically generate sufficient revenues for the utility to operate, and indeed to permit expansion of supply to areas as yet unserved.

External effects. Willingness to pay for water supply by actual consumers may underestimate its total value if others benefit, for example, from the improved health of the consumer. In principle, the MSC of water would be reduced accordingly (i.e. this component of MEC would be negative), this estimate requiring epidemiological analysis as well as valuation in economic terms. On the other hand, production of water may itself impose environmental costs e.g. ecological damage and human resettlement associated with large dam construction (MEC being positive). Further, consumption of water involves disposal costs. Where sewers exist, or are planned, AIC can also be used, on the assumption that such expenditures are in fact economically justified. Where sewerage does not exist, there is no escape from some estimation of MEC, which again requires estimation of the epidemiological impact and quantification of that effect in economic terms.

The metering problem. A traditional obstacle to improved pricing for water supply and its disposal - and one which is highly relevant for pricing environmental services in general - is the accurate measurement of the quantity of water consumed and the quantity



and quality of wastewater discharged. In some cases, metering (volumetric pricing) may be more expensive than allowing water to be free at the margin. In principle, the decision should be to compare the present worth of the costs of the metering program with the present worth of the savings in production costs thereby achieved (plus in principle the loss of consumer surplus resulting from reduced consumption). « Switching values » can be used here; i.e. the percentage reduction in per capita consumption necessary to achieve savings sufficient to offset metering costs is estimated, and a judgement then made as to its likelihood. One aspect of the measurement issue arises where industrial water consumers and farmers abstract water privately, using their own tubewells. In principle, they should be charged a price that covers the marginal costs of depletion to their neighbors, or the marginal capacity cost (an element of AIC) to the public authority, plus any environmental damage caused by the discharge of waste water.

While there are a number of complications, there is clearly considerable scope for water pricing reform in most countries. While some will gain and others lose from such reform, adjustment of tariff structures can protect deserving cases. However, from a societal point of view, price reform can be expected to be a « win-win » policy. Experience in developing countries suggests a price elasticity of demand of between -0.3 and -0.5 for municipal water supply. Water price increases are therefore likely to have a significant impact upon water consumption, reducing wasteful and inefficient use and costs of supply, and improving resource allocation. Such a policy will also raise revenues and be environmentally benign.



VII. ADJUSTMENT AND THE ENVIRONMENT

Around the mid-1980s it started to become generally recognized that environmental quality depends heavily upon country-wide economic policies. The leverage exerted by sectoral and macro level economic policies as well as other institutional, legal and social policies is of fundamental significance in determining environmentally related behavior. Economy-wide policy reform, and specifically the adjustment process, should therefore be carefully assessed in light of its environmental consequences. However, due to the large number of physical, social, and economic variables involved, these linkages remain imperfectly understood. In the last few years, efforts have continued to improve understanding of the ways in which economic incentives impinge upon environmentally-related behavior, with attention increasingly focussing on the impact of macroeconomic and sectoral policies. The adjustment process has come under particularly close scrutiny.

The adjustment process, worldwide, has taken the form of a growing reliance upon market mechanisms and privatization, with a corresponding diminution of government intervention in commodity and financial markets, reductions in government bureaucracies and specific subsidy programs, and reform of public sector pricing. Although activities of development agencies, notably the World Bank and the International Monetary Fund, have always been at the forefront in discussions about adjustment and the environment, it is important to distinguish adjustment lending from the actual adjustment process, which, with or without the assistance of international agencies, has been proceeding rapidly throughout the world in recent years. Actual adjustment lending operations have specific, fairly short-run objectives in mind, and the loans are intended for rapid disbursement. While environmental objectives can, and increasingly are, built into loan conditions, there are many other environmental objectives that require long-term institutional and capacity reform and for which adjustment lending is not an appropriate instrument.

Indeed, the adjustment process is facilitated not merely by actual adjustment lending operations, but also by the whole range of sector and project activities in which the countries themselves are engaged. In fact, many of the policy reforms contained in the adjustment process - particularly with regard to sector adjustment - are far from new. Reforms such as rationalization of energy pricing and reduction in farm input subsidies have been standard elements of sectoral reforms carried out within developing countries for many years. Whether or not they have been related to adjustment lending, macroeconomic strategies as well as policy reforms in a variety of sectors - ranging from energy to population - may have major consequences for the environment. Some aspects of the market liberalization process are likely to be environmentally beneficial; the market system, in bringing about closer relationships between prices and the real economic costs of supply can in general be expected to yield environmental benefits by encouraging efficient (non-wasteful) resource use. Reform in energy pricing, and greater trade openness which facilitates technological innovation, are good examples.

However, the environmental consequences of adjustment may not always be favorable. Considerable public concern has been expressed in recent years about the environmental impact of the adjustment process, but it is only quite recently that serious efforts have been made to consider the empirical evidence. Some of the impacts are too diverse to



be traced with any degree of precision; for example, the net environmental effect of currency devaluation may be impossible to determine. However, many economy-wide reforms have specific, identifiable, sectoral effects, some of which may be intuitively obvious, and most of which, with some effort, may be traceable. In view of the leverage exerted by countrywide policies, improved understanding of these relationships continues to be a high priority. Such information is required both for high level policy makers, who should be aware of the environmental consequences of their actions, as well as for those with responsibility for environmental management, who should be aware of the potential role of economic policy reform in achieving environmental objectives.

Research efforts under way in the World Bank and elsewhere suggest a number of conclusions about the relationships between adjustment and the environment.¹ First, it is clear that «getting prices right», a key element of the adjustment process, is a necessary but not sufficient condition for sustainable development. For example, at the sector level, electricity price reform may not be effective if consumers lack adequate information about energy-saving devices, if industrial management structures do not contain incentives to use resources efficiently, or if in general there are distortions in the prices of substitutes or complements to electricity. Adverse environmental consequences due to inefficiencies or inequities elsewhere in the system (possibly compounded by the scale effects induced by successful economic growth policies), may therefore result. For example, in China and some Eastern European countries, systems of pollution taxes have been nominally in place for a number of years. However since, in general, price and profit incentives were not working, they had little effect. Adoption of «second best» solutions will therefore frequently be required; introduction of price incentives in situations where prices in general do not reflect real resource costs, are likely to have perverse results, and a gradual replacement of command and control by price incentives will often be the correct approach. Considerations of social equity reinforce this conclusion. The unevenness in the pace of development often means that price reforms will unduly harm the poor. During the transition period from command and control to market economies, the economic efficiency and growth objectives must certainly be modified to consider distributional issues.

Although reforms might be complicated by the presence of such inefficiencies elsewhere in the system, environmental considerations typically provide additional reason for policy reforms that are justified in their own right. Energy and water pricing reforms are perhaps the clearest examples. Subject to «second best» complications, improved pricing for electricity and water supply would in most countries be justified on environmental and economic efficiency grounds. It also has potentially major fiscal implications, and would be a central element of any policy of «green taxation» aimed at shifting the tax burden from productive activities such as labor and enterprise toward unproductive activities such as depletion of resources and generation of waste. The search for such policy reforms should continue to command high priority both by governments and international development agencies, particularly as the costs of environmental degradation are borne disproportionately by the poor.

The foregoing assessment of the evolution of adjustment is at odds with the criticism, articulated by some environmental NGOs, that adjustment operations are generally bad

¹See Munasinghe M., Cruz W., and Warford J. (1993).



for the environment. On the contrary, adjustment is a necessary, if not sufficient, condition for sound environmental management. The advantages of macro-economic stability are self-evident. Better fiscal balances make the public costs of implementing environmental policies more affordable; lower inflation rates imply clearer pricing signals; reduction in uncertainty encourages decision makers to take a longer term view. In general, «getting prices right» and public sector reform have virtually unambiguous - and beneficial - impacts on the environment in the long term.

In the short term, however, adjustment reforms may have unanticipated effects which require complementary or compensatory interventions. The very success of the adjustment process in stimulating industrial growth has itself been the cause of environmental problems where pollution control measures have been inadequate.¹ Trade reforms may be of special concern: encouraging exports, if not accompanied by adequate pricing policies in the country concerned, could lead to over-exploitation of underpriced natural resources, such as forests. In such cases, freer trade itself would not be the culprit, but failure to address inefficient conditions prevailing elsewhere in the economy would be. Compensatory intervention may also be required to remedy legal and institutional deficiencies. Such constraints to the success of economic policy reform are a pervasive problem, and they take many forms. One of them refers to the allocation of property rights, upon which the effectiveness of price reform ultimately depends. Whether in relation to the security of land tenure of peasant farmers, or to the right to extract timber by logging companies, uncertainty normally results in environmental degradation. Price reform, if unaccompanied by adequate legal and institutional frameworks, including regulatory capacity, may have perverse results in both economic and environmental terms.

There is now widespread acceptance that conventional national accounting methods need to be changed in order to reflect environmental concerns more adequately. For example, expenditures on pollution clean-up programs are treated as additions to GNP; depletion of natural resources is typically not reflected as an offset to income. In recognition of this, many countries are now experimenting with «green» national income accounting, either by adjusting national income accounts themselves, or by introducing various forms of satellite accounts. It should however be noted that national accounts are inadequate in many ways as indicators of human welfare, and will remain so even after such adjustments have been made. In particular, many of the most important environmental impacts are not quantifiable in economic terms, and therefore can never be fully commensurate with traditional components of GNP.

Recent studies also confirm that a general equilibrium viewpoint is required if we are to be able to develop the capability to manage economic policy in a sustainable way. Ideally, comprehensive general equilibrium models which include environmental, as well as strictly economic variables, should be employed, but for the foreseeable future, data limitations are likely to preclude reliance upon this approach. However, a comprehensive analysis of economic-environmental linkages is possible with an approach which focusses on key linkages within a selective partial equilibrium framework. This is equally challenging; the presence of a wide range of variables of an economic, geographical, physical, institutional or cultural nature, implies that seriously multidisciplinary efforts are inescapable if we are to understand the complex forces that lead to environmental degradation.

¹As in Thailand, for example. See Panayotou T. and Sussangkarn C. in Reed D., ed. (1992).



However, as experience shows, organization of multidisciplinary work itself raises formidable problems.

Although data problems remain, and more research is needed, it is already possible to make rough assessments, not simply of the environmental impact of projects, but also of economic policies and adjustment operations. In general, economic techniques exist - and for most countries, so does natural resource information - to improve the way environmental issues are addressed by policies at the sector and macro levels. Where the environmental impact of the adjustment process is potentially adverse, such assessments would form the basis for identifying measures to counteract these effects; where on the other hand they are likely to be positive, complementary measures might be devised to maximize this impact. A conclusion from the foregoing is that, while environmental impact assessments are now conducted routinely for large scale development projects, it is now even more important to develop institutional capacity to conduct environmental assessment of economic policy reform.

While key elements of the adjustment process, which are aimed at improving efficiency in resource allocation and avoidance of waste, appear to be a necessary condition for sustainable development, it is by no means certain that this will be sufficient. Indeed, much controversy remains over whether economic growth itself is sustainable.¹ Ultimately everything depends upon technical and socio-political capacity to substitute man-made for natural capital sufficient to accommodate economic and population growth. It is safe to say that we do not know if this will be so, but human resource development, stressing health, education, and equality of opportunity, are clearly essential ingredients of any strategy to effect the necessary changes.

¹See for example, Daly H. and Cobb J.B. (1989).



VIII. HEALTH, ENVIRONMENT AND DEVELOPMENT LINKAGES

Precisely parallel arguments to those made earlier about environment can also be made about the importance of integrating health issues into national economic planning. The fundamental importance of human health as a determinant as well as an objective of economic development warrants its inclusion in any list of explicit objectives of macroeconomic policy. As in the case of environment, the potential impact of economic policy - particularly at the macro or sector level - is considerable. National development strategies - their impact on income distribution, population, and poverty, their biases between and within urban and rural areas, their outcome in relation to regional disparities and vulnerable groups - have far-reaching consequences for the health situation, and sectoral programs and projects outside the health sector can have major implications for health.

Under the auspices of WHO's intersectoral action program for health,¹ several studies have been undertaken to illustrate the linkages between health and development activities. Among these were the ones carried out in India (Kerala State), Jamaica, Sri Lanka, Thailand and Costa Rica which demonstrated the nature of the interrelationships between development outside the health sector and health status. These studies examined ways in which national health strategies could have an impact on these interrelationships, making them more explicit and using them to improve the health status of the population. They also examined health status as it has evolved at different levels of per capita income and different stages of development, and provided general information on the intersectoral processes that underpinned the transition in health from conditions of poverty and underdevelopment to those of affluence.

While cross-country comparisons and long term time series analyses show that higher per capita income is indeed associated with better health, considerable concern has been expressed in recent years about the impacts of economic development, and in particular the adjustment process, on both the environment and on social progress in general, especially education and health. There are strong linkages between environmental and social aspects of development: environmental degradation primarily affects the poor, and reduces their ability to increase their incomes. As a cause as well as consequence of environmental degradation, poverty is part of a vicious circle from which it is difficult to escape. Poverty alleviation may therefore be a «win-win» strategy, although there may be cases where increased incomes actually result in greater environmental degradation.

Health status is affected heavily not only directly by economic development, e.g. by policies influencing per capita income and its distribution, but also indirectly, through changes in the natural environment. These effects may be immediate or longer term and may be direct or indirect: for example, air and water pollution, and ozone depletion can be expected to have direct health implications; soil erosion, by reducing agricultural productivity, and therefore incomes, may have an indirect, but possibly profound impact upon health. The developing countries are in a particularly vulnerable position: while still facing traditional public health problems that have been eliminated many years ago in

¹See WHO (1986).



the industrialized countries, they simultaneously face major health problems due to changes in the natural environment as well as the newer problems associated with economic development. This is illustrated in a recent report on Indonesia, issued by the World Bank, which finds that 6,000 lives per year would be saved in Jakarta alone if air and water quality were significantly improved.¹

¹World Bank (1994).



IX. RELEVANCE OF DEVELOPMENTS IN ENVIRONMENTAL POLICY FOR THE HEALTH SECTOR

Ultimately, the rationale for the present worldwide concern for the environment is based upon the perceived threats to human health, particularly if the latter is broadly defined - as by WHO - to refer to a state, not only of physical, but also of mental and social well-being. Nevertheless, compared to health, environment has attracted greater public attention, greater increases in funding, and greater efforts to integrate it into high level policy, often without careful assessment of actual environment-health linkages, or therefore prioritization on health grounds. Indeed, there have been many cases¹ in which proposed environmental reforms or projects have been in direct conflict with human health objectives.

Recent developments in environmental economics and policy are relevant for health policy and planning in a number of ways. First, as noted earlier, environmental experience suggests that as a long term policy, «getting prices right», so that they reflect real resource costs, is in general a requirement for sustainable development. Methods of achieving this are exemplified by the various approaches to remedy market failure, in which pollution taxes - in practice often tending to be levied on inputs rather than discharges - combine economic incentives to reduce waste discharges with administrative feasibility. Water supply is another example, where wasteful use is reduced by pricing according to real costs of supply; and where safeguards can easily be built in to ensure improved access by the poor and the achievement of health benefits. Similarly, reform of energy pricing, resulting in improved air quality, may not simply be a cost-effective, but actually a costless, means of reducing respiratory disease.

Obvious parallels relating directly to human health are the consumption of various goods which have «external» effects, such as motor vehicles, tobacco, alcohol and firearms, where taxes based upon MSC could yield both health improvements and substantial revenues. Indeed, the kinds of arguments made in favor of «green taxation» can readily be extended to the achievement of public health objectives. Such taxes, justified in efficiency terms, may substitute for distorting taxes on income and enterprise, and thus, if desired, be fiscally neutral. However, while price reform might ultimately be a necessary condition for sustainable development, it may not be effective in the short term if economic distortions or other non-efficient conditions prevail elsewhere. Subsidies may be required as long as inequitable income distribution precludes effective implementation of price reforms. Gradualism in introducing reforms may therefore often be necessary.

Greater reliance upon economic instruments must therefore often be accompanied by various institutional and social reforms. These will range from enhanced administrative efficiency, in which public sector decision-making is more likely to respond to price signals, to equality of educational, social and economic opportunity for women and other disadvantaged groups. Improved education is critical; the efficiency of the price mechanism depends heavily upon the assumption that consumers are well informed, and can make sound judgements about the costs and benefits to them of goods and services for

¹Exemplified by choices between forest and wildlife conservation and rural poverty alleviation measures in a number of African countries.



which they pay. While a generic issue, this has particular relevance for the efficacy of economic instruments in the health area, since epidemiological relationships are often but imperfectly understood even by the experts. Problems are particularly severe with regard to the ability of the poor and disadvantaged to make such decisions; thus, price reform must be accompanied with consumer education if it is to be successful. Population policy provides perhaps the best example; the introduction of direct or indirect economic incentives to achieve the interrelated economic, health, and environmental benefits stemming from fertility reduction must clearly be accompanied by parallel educational and other social programs.

Improved awareness may also be required at higher levels. Environmentalists propose **reform of national accounts** to elevate the status of their concerns, and to demonstrate to the most powerful government agencies - ministries of planning and finance - the macro-level consequences of environmental degradation. Subject to the qualifications made above with respect to environment, and in particular the difficulties of valuation, the case made for reform of systems of national accounts to better reflect environmental considerations can also be extended to health. Even if it is not possible to derive adequate monetary measures of changes in health status, at least systematic linkages between health and economic indicators should be developed.¹

Since health status is a determinant of development, and its improvement an ultimate objective, it follows that there are likely to be, as in the case of environment, many opportunities for **interventions which satisfy both economic and social objectives**. The leverage exerted by country-wide policies on all aspects of development can be expected to have major implications for human health, but in ways that are intuitively far from obvious. For example, while the adjustment process is frequently criticized by health officials because it often involves cutting health ministry budgets, determination of the net impact upon health is much more complex. To the extent that adjustment is effective in meeting its primary target, i.e. bringing about macroeconomic stability and growth, it will contribute to a positive health outcome. Individual elements of the process can also be predicted to be beneficial, such as price reforms for municipal water supply and energy referred to above.

On the other hand, greater reliance upon market mechanisms may have adverse income distributional consequences, with parallel impacts upon health. Experience in the environmental area suggests that it would be rare that the adverse by-products of the adjustment process should be a reason for abolishing it; but efforts must be made to anticipate those consequences and build in **compensatory or complementary measures** as necessary to protect vulnerable groups.² Environmental problems, their linkages with health, and their solutions tend to be location-specific and heavily dependent upon the prevailing culture and physical environment as well as upon economic policies. Generalizations about the impact of specific economic policy reforms are therefore difficult to make. What may be a beneficial impact of policy reform in one country setting may be adverse in another. Ideally, the linkages and feedbacks between economic policy, environment and health require **general equilibrium analysis**, although as with environment, the current need is to create the building blocks necessary for this to be done, by a series of partial equilibrium and multidisciplinary case studies.

¹i.e. the analogy with environmental «satellite accounts».

²See for example, Ribe H., Carvalho S. (1990).



In fact, one of the key lessons from work in the environmental area is that a **multidisciplinary approach** is inescapable. There is much less need for theoretical work - at least in economics - than for the application of standard theory to real world situations. These situations require economists to extend their normal horizons, over both space and time; understanding of the effects upon human health of changes in economic policies through their impact upon the natural environment, and the feedback to economic growth, require many disciplines, epidemiology and ecology being convenient catch-all terms for many of them. Moreover, while policies at higher levels of decision-making are crucial, it is clear - as environmental experience indicates all too well - that policy reform at this level may not meet its objectives if local circumstances are not properly understood and taken into account. This involves understanding of the interaction between the chain of physical and behavioral effects which might stem from changes at the macro level. The building blocks needed to be completed in order for macro-level policies to be successful therefore also call for sociological or anthropological skills to be used in the decision-making process.

Generally, the range of technical options that might be employed to address environmental and health objectives are well known, but practice clearly lags well behind theory. This gives rise to the question as to why technically and economically efficient solutions are not in fact adopted. Clearly the **incidence of the costs and benefits** of socially desirable activities is a key determinant of their political feasibility. This problem is compounded by difficulties of unambiguously defining the linkages between economic policies and the environment. The root cause of environmental problems may lie in policies or events that are at first sight far removed from the environmental problem itself. Externalities abound; some find environmentally degrading activities very profitable, with those suffering most from such activities being, almost by definition, the relatively poor and disadvantaged, or others (including future generations) who have little say in the development process. In combination with outright bans or other legal constraints on certain commodities, the use of economic instruments reflecting the social costs - or MSC - of using tobacco, firearms, alcohol, drugs, and motor vehicles offers clear possibilities for «win-win» solutions for society as a whole. This however may be frustrated by the opposition of powerful vested interests who can finance the fabrication of compelling epidemiological or sociological «evidence». Stimulation of public awareness to overcome the political power of such special interests is a long term process, but one which merits priority in both developing and industrialized countries.¹

The foregoing suggests that **health impact assessment** should become an increasing preoccupation of health agencies and ministries. This should take a variety of forms, which are themselves closely related. The first, and most straightforward, is to build health concerns systematically into environmental impact assessment of individual projects. The second is to improve capacity to understand the direct impact of economic policies on health via changes in the level and distribution of income. The third, the main focus of this paper, is to develop the ability to anticipate the impact of economic policies on health via their effects upon the natural environment.

¹There are of course cases in which the poor survive by collecting and selling discarded wastes. In such cases, policies reducing the generation of waste should ideally be accompanied by measures to compensate the poor for loss of income.



X. RESEARCH NEEDS

More applied, case study research employing a variety of disciplines continues to be required, as is additional effort to assess the direct impact of economic change upon human health, and in turn the economic impact of improved health. Intervening in these relationships at various points is the environment, which both influences and is influenced by human health and economic change. A proposal for more work on this latter aspect is briefly discussed below. To date, actual work in this area has been fragmentary, as demonstrated in the WHO/World Bank-sponsored review by Weil et al.¹ Addressing macroeconomic policy as well as the agricultural, industrial, energy and housing sectors, this review confirms that analysis and evaluation of development policies rarely examine health outcomes. An example of this is government pesticide subsidies, which are intended to increase agricultural productivity, but which are not examined for their health impacts. This is despite the fact that various consequences of increased pesticide use are well documented, including mishandling and accidental poisoning, effects on the resistance to pesticides of disease vectors, and over-reliance on chemical pest control strategies when other measures might be applied more safely and at lower cost.

The review also confirms that there has been a major gap in research on health problems in developing countries, the role of development policies as an underlying cause of ill-health having been virtually ignored. Although structural adjustment policies have been widely alleged to have had negative impacts on the health and nutrition of poor populations in developing countries, popular criticism has not been matched by serious efforts to address these relationships. Health policy analyses have tended to be based upon epidemiological studies of proximate relationships, and have rarely encompassed the multidisciplinary approach required to trace the underlying causes of ill-health. Researchers have therefore tended to analyze choices between alternative health sector interventions rather than to examine the health consequences of overall development strategies.

Emphasizing the need for a multidisciplinary approach, the study recommends that strenuous efforts be made to improve understanding of the underlying (economic policy) causes of major health problems², and proposes a series of in-depth country case studies, to be comprised essentially of the following steps:

- (a) determine health priorities by use of epidemiological surveys, specifying target groups;
- (b) determine the proximate and underlying causes of the identified priority problems. While this step would be highly familiar to health planners, it is in fact the heart of the exercise, and would delve much more deeply into the underlying causes than is traditionally done - going well beyond the physical indicators which typically dominate such analysis, and specifically including policy and behavioral variables. Such research should be aimed at both the direct relationships between health and the level and distribution of income, as well as health impacts which result via changes in the natural environment;

¹Cooper Weil D.E., et al (1990).

²A similar conclusion is reached in WHO (1991).



- (c) on the basis of (b), identify policy reforms or the introduction of policy instruments in a range of sectors, or at the macro planning level, which would be, from a societal aspect, a cost-effective means of addressing health problems. For example, the traditional engineering approach to the choice of pollution control instruments would be a least cost comparison of alternative physical structures. But the cheapest means of achieving a given level of pollution and consequent health improvement might be by means of a tax on energy consumption or by reform of materials pricing. Effort should not simply be made to identify cheaper means of improving environmental quality, but to find ways of doing so which are economically justified measures in themselves;

Complementing the country case studies, it would be appropriate to systematically address the role of economic analysis with regard to the various environmental health activities undertaken by WHO. It would be useful to set out, assisted by case material, how in principle economic policy reforms might be a substitute for or complement traditional investment policies or regulatory measures e.g. for air pollution, solid waste, and water supply, in a developing country context. This would be followed by developing a similar set of principles for addressing environmental causes of ill-health which are not explicitly defined as being part of environmental health, (e.g. impacts of trade, agricultural, or industrial policy).

Outputs from such research should include guidelines and policy reform involving the use of cost-benefit analysis. This technique, flawed though it is, remains an indispensable organizing framework for bringing together a wide range of disciplines to trace impacts of development activities. The focus would be less on putting dollar values on health than on improving methodologies and practice for anticipating the complex sequence of events that flow from investment projects, and, even more important, from country-wide economic policies.



XI. FINANCING ISSUES

The objectives of economic development, sound environmental management, and improved health are closely intertwined, so it is more appropriate to think of the additional financial resources required to promote sustainable development rather than environment or health per se. This was recognized by the United Nations Conference on Environment and Development (UNCED) Secretariat, which estimated (Agenda 21) that between 1993 and 2000, an additional \$125 billion per year would be required on grant and concessionary terms from external donors, plus another \$500 billion per year from the developing countries themselves to put their economies on a sustainable development path. Since UNCED, however, the much heralded «Earth Increment» has not materialized; aid fatigue, and increased demands to assist economic reform in Eastern and Central Europe suggest that additional concessional assistance will be difficult to find. Among other things, this indicates the dominant importance of developing (and indeed industrialized) countries identifying and implementing policy reforms and projects which satisfy economic, environmental, and health objectives. The financing implications are clear. Such policy reforms would reduce environmental damage and the threat to human health, and therefore funding requirements; and investment projects which pass economic, environmental and health tests qualify for non-concessional funding, which is relatively easy to obtain. The distinction between policy and project interventions which pass and those which fail economic tests, is therefore a critical one.

It is generally agreed that development financing needs over the next decade are likely to place a considerable burden on the poorer countries, who may be unable to take the often politically difficult measures to ease this burden. There is also a general recognition of the kind of obstacles to increasing financing for environment and health. One of these is the uncertain nature of some of the benefits, which may often involve large tradeoffs with short term economic objectives. Another is the distributional issues involved; politically powerful interests may form a severe obstacle to policy reform. It is also apparent that it is largely up to the developing countries themselves to put their own houses in order; the investment needs dwarf the contributions likely to be available from official development assistance.

In early 1994 a Meeting on Financial Issues of Agenda 21 was held in Kuala Lumpur. This meeting, designed to prepare for the first session of the Ad hoc Working Group on Finance established by the Commission on Sustainable Development, reviewed the various mechanisms for raising the funds required for sustainable development and implementation of Agenda 21. Stressing the importance of both increased official development assistance as well as policy reform, this meeting considered the prospects for debt reduction and conversion; restructuring of the Global Environmental Facility; redirecting military expenditures to sustainable development; new commodity pricing arrangements; and schemes for transferable development rights. Noting that the many subsidy programs are environmentally damaging, and recommending greater use of environmental taxes, the meeting also proposed that several other mechanisms should be given further consideration. These included the establishment of national environmental funds, and the introduction of environmental stamps and taxes on air travel.



The financial potential of sectoral policy reform in solving the financing issue is in fact considerable. For example, a recent Asian Development Bank study¹ notes that continuation of present trends would mean that in the year 2000 the developing member countries of the Bank (the DMCs) will spend about \$US 350 billion on new power generation facilities. If transmission, distribution, and energy and other operating costs are added, total expenditure on electric power under such a scenario would be well in excess of \$US 500 billion. Throughout the region, electric power is still priced at well below its economic cost (even if environmental damage costs are excluded), and on average throughout the DMCs, a tariff increase of at least 25% would probably be required if marginal cost pricing, justified on efficiency grounds alone, is to be achieved. Given supply constraints and continued unsatisfied demand, a tariff increase of this magnitude may not actually reduce total electricity consumption in the near term; it would however switch consumption from lower to higher value uses, and would certainly increase public revenues. If in effect total demand is perfectly price-inelastic in the near term, the additional revenue thus generated would be about \$US 100 billion. This may be compared to an estimated total investment in environment under an optimistic «accelerated progress scenario» for the region of about \$US 70 billion in the year 2000. Although there may be many questions about the accuracy of these numbers, or the political feasibility of bringing about such reforms, the estimates clearly illustrate the general principle that improved pricing - particularly in key sectors such as electric power - has a potentially critical role to play in facilitating multiple development objectives.

General economic policy reform in the developing countries will play an important role in determining the availability of adequate financing. The role of economic instruments, in improving efficiency in resource allocation and avoidance of waste, is crucial. The case for new funding mechanisms requires further refinement in estimates of the extent to which financing needs can be met by reducing the need for resources by improved policies within the developing countries. This would include institutional strengthening for rationalization of the health sector as well as of environmental regulation such as measures to restrict wasteful use of energy and materials (and thus reduce environmental damage) by improved pricing, along the lines outlined above. In parallel, closer consideration needs to be given to the scope for mobilizing additional financial resources in the developing countries by the use of market based instruments, including full MSC pricing.

¹ADB study on *Financing Environment in the Asia Region*, in progress.



XII. CONCLUSIONS

The use of economic analysis and instruments is becoming an increasingly important aspect of environmental policy in many countries. It has been shown that environmental and economic objectives can frequently be assisted by judicious use of economic instruments, adjusted as necessary to reflect institutional constraints and considerations of social equity. The adjustment process, characterized by greater reliance upon market forces, is also in general likely to be beneficial for the environment, although remaining institutional and economic inefficiencies may require compensatory interventions to protect vulnerable groups or eco-systems.

Ultimately the rationale for concern about environmental degradation rests heavily on the threat it poses to human health. It follows that much of the effort to improve the environment should be welcomed by health agencies, who should also support opportunities for socially cost-effective solutions - many of which involve explicit use of economic instruments - to addressing health problems, even though they fall within the responsibility of other parts of government. The advantages of pricing policies based upon the economic costs of environmental pollution, or of supplying water or energy, are equally applicable to achieving specific health problems arising from the use of alcohol, tobacco, firearms and motor vehicles. Experience in developing explicit environmental management instruments, including the choice between MBIs and regulatory approaches, also has much to offer the health sector.

The traditional approach to environmental health has tended to concentrate on investment projects (e.g. water supply, sanitation and pollution control) or policy reforms directly aimed at the specific manifestation of the problem (effluent taxes, food handling or occupational health regulations). While of critical importance, these activities tend not to address the root causes of such problems, which may often be due to macroeconomic policies or those applied to a wide range of sectors which may at first sight have nothing to do with health. Due to the considerable leverage exerted by such policies, it is proposed that health agencies should take an increasingly proactive stance toward economic policy-making. Paralleling recent trends in environmental management, health strategy should include efforts to establish the proximate and underlying economic and causes of priority health problems, on the basis of which the macroeconomic and sectoral policy steps and investments required to address them can be determined.

Serious utilization of economic analysis by health agencies therefore appears to be indispensable. Consistent with the principle that prevention is better than cure, increased effort should be devoted to better understand the direct relationships between economic policies and health, using standard techniques of economic analysis. Moreover, as this paper has emphasized, health ministries should also develop the capacity to better understand how human health is affected by specific economic and social policies via their impact on the natural environment. This would enable them to better articulate their concerns to ministries of finance and planning, to counter claims of powerful industrial interest groups, and therefore be a more effective voice in the determination of overall government policy. WHO should also develop such capacity which would enable it to undertake a major promotional role in this area.



Research is however required. While much is known about environment-health linkages, economic policy-environment linkages are less well understood. However, this situation is improving rapidly, and it is now appropriate that health expertise should be built into the environmental impact assessment process, which is moving from a preoccupation with individual projects to a concern with macroeconomic and sector policies. Health should be seen at the outset of this process as an integral part of it, not an add-on at some later date. This proposal is clearly consistent with the recommendations made in recent years by a series of WHO reports and studies. For example, the report of the 1988 Expert Advisory Panel on Environmental Health¹ in effect recognizes that environmental health might more broadly and usefully be defined to include the policy environment which impacts so heavily upon public health. A similar view is implied or expressed in various publications of the WHO intersectoral action program for health,² the WHO/FAO/UNEP/UNCHS Panel of Experts on Environmental Management for Vector Control (PEEM),³ and quite explicitly, in the report of the WHO Commission on Health and Environment, prepared for United Nations Conference on Environment and Development.⁴ This was also a major theme of the 1992 Public Health Summit, sponsored by WHO and the Saitama Prefecture (Japan)⁵.

As noted in the report of the WHO Commission on Health and Environment, progress in this area depends upon recognition of the importance of a variety of disciplines, including engineers, ecologists, economists, financial analysts, and behavioral and other scientists, to complement the skills of the health practitioner and biomedical scientist. It is therefore clear that a major break with traditional staffing patterns, and associated institutional changes, will be required on the part of WHO if that agency is to take the lead in promoting and implementing its own recommendations.

¹See WHO (1988).

²Intersectoral action for health, *op. cit.*

³For example, Mather T.H. and Bos, (1989).

⁴See WHO (1992).

⁵See Warford J. (1992).



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