

ENVIRONMENT, ECOLOGY AND ECONOMICS: SUSTAINING TOMORROW

Reginald Herbold Green

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Are both, perhaps, contained in time present
If all time is eternally present
All time is irredeemable
... Redeem the time.

- T. S. Eliot

We inherit the earth
From our ancestors
In trust for our children

- West African proverb

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I.

A Question of Relevance

Environment is sometimes perceived as a Western or Northern concern of little relevance for or interest to Africans. The proverb strongly suggests that such a view is untenable - we determine what our children inherit and, if we stand as trustees in relation to it, have an obligation to pass it on whole or improved, not degraded or disintegrating. It is perfectly valid to assert that more ecological damage in most of Africa is the result of actions by poor Africans than of trans-national corporations, but the reasons relate to their poverty and need, not to their being African or environmentally unaware. The 'choice' between starving ones children today and leaving less good soil and trees for them as adults is a 'choice' which can have only one less wrong answer. The goal of public policy should be to empower households to have other choices than those two.

A different issue of relevance relates either to economic policy in general or to short and medium term structural adjustment in particular. Given the impact that - for example - soil

erosion, exhaustion and neo-desertification can have on agricultural incomes and on food security, it would appear that while ecologists are not necessarily much concerned with economics a medium to long term macro, sectoral or social economist who fails to be environmentally informed is likely to make serious projective and prescriptive errors even in narrowly economic terms.

The issue of timing is a legitimate one. Limited or readily reversible damage may be acceptable in the short run if other priority claims on resources have higher delay costs. That is a contextual question - as to issue, as to location and as to the prevention, regulation, reversal continuum. Some African rivers are grossly polluted or grossly overloaded with the products of erosion with dangers to health and costs - e.g. to dams and fishing - that require immediate answers. Air pollution - largely from fuel and vehicles - is generally, but not universally - e.g. Soweto, Cairo- low. However, prevention is usually much cheaper than reversal implying impact studies and regulations on major new policies and projects are priorities even if upgrading of existing polluting plants may be deferrable. Similarly the impact of deforestation in some cases - e.g. the Harmattan wind blowing through forest belt gaps to reach the West African coast from Benin City through Abidjan, and erosion and increased women's workload in refugee impacted Ngara District in Tanzania are so grave, and the time lag from study to initial action to limiting to reversing harm done so long, that even in the resource constrained short run action is needed. If the past shapes the present, the future can only be altered beginning in the present now in environmental as much as in economic or social policy and praxis.

Eco/environmental issues' relationship to stabilisation, structural adjustment and transformation (or halting free-fall, restoring balance and regaining sustainable development to rephrase the standard captions) is like that of other areas of concern, danger, opportunity and uncertainty. Some parts fall in each and some continue throughout.

Halting marine erosion threatening to take out whole coastal areas or rapid wood depletion threatening water tables and imposing hours daily of added workload for women and girls in fetching household fuel and water are halting free-fall, i.e. stabilisation. So is putting in place forest reserve regimes protecting both key watersheds and key exports. Broader agro forestry practice enhancement is structural adjustment aimed at restoring wood-water-time-food balance. Planning measure to use, transform, enhance and protect renewable resources (especially those which misuse will render non-renewable) and to raise quality of life via - e.g. - urban open spaces is transformation. The words used for what to plan are deliberate - sustainable conservation is about use and change more often than literal preservation while restoration is - of necessity - rarely literally restoring what existed before (e.g. a natural rain

forest) but a viable analogue (a managed, planted tropical forest with very different species and locational patterns).

However, precisely because literal restoration is rarely possible and working to reverse damage often difficult and costly (in the extreme case of the Namib desert, World War I scars still mar some parts) during stabilisation and structural adjustment there is need to project and to protect in order to avoid creating massive obstacles at the transformation stage. For example, selling off public urban open spaces and allowing private ones to be built solid to maximise short term revenue is a serious mistake because it effectively forecloses future options - buying up and demolishing hotels, office blocks and embassies to build parks is rarely feasible; holding the open spaces in reserve is usually possible. Similarly allowing short term slaughter forestry to service external debts while hoping to re-afforest later is virtually certainly neither a cost efficient nor even a feasible sequence.

II.

Some Complexities and Confusions of Definitions

Environment/ecology as usually discussed by non-specialists is a mix of four overlapping, but distinct, themes:

Human environment relates to the context in which people work and live (or have no livelihoods and die). It includes but is not limited to ecological aspects. Further, while bad sanitation has economic consequences (e.g. health costs and the livelihood costs of illness) its negative environmental impact is rather broader.

Sustainable economic development normally is defined to relate primarily to ecological constraints (non-renewable and renewable resource availability and pollution/degradation broadly defined) on economic, or broader development trajectories, patterns and styles. The broader meaning encompassing social, distributional and participatory stability is logically valid but less commonly used.

Limits to growth is a narrower variant of sustainable ecological development focusing on the non-generalisability of present Northern production and consumption styles with present or incrementally changed technology. In practice - if perhaps not inherently - it is usually an aggressive "what we have we hold" stance seeking to forbid Southern development on Northern lines but accepting present Northern patterns as only gradually and incrementally alterable, e.g. the Northern stance at the Rio Conference.

Sanctity of nature/bio-diversity is primarily a philosophical and normative approach focused on reverence for all creation and its preservation, although some presentations of bio-diversity and ecological protection do have well argued economic gain or risk reduction arguments incorporated in them.

This paper focuses on the ecologically related elements of human environment as they interact with sustainable economic development (including distribution) and also with the economic aspects of the bio-diversity/wilderness protection case. This is not to argue that no non-economic value can or should be placed on ecology, merely that it is not an area in which economists are experts and can best be handled by an exogenous value (or constraint) imposed by society through the political process rather than by artificial economic benefit/cost calculations which obscure rather than illuminate.¹

The particular concerns that have made environment/ecology an issue, or cluster of issues, of broad concern are also mixed. In Africa the degradation of many - not all - rural environments with clear livelihood damage and work overload (especially women's and girls' wooding and watering tasks) is one. Pollution of urban environments - with increased squalor, in-sanitation and workloads - is the second broadly perceived problem. Non-economic concerns are very real but usually relate to communities' own environment not to a general concern for bio-diversity or sanctity of life 'out there'.

The Northern concerns are somewhat different and more complex. One is perceived global risk - e.g. greenhouse/global warming, ozone layer depletion, nuclear facility debacles, new or renewed epidemic diseases (albeit this concern is usually not linked to broader eco/environmental concerns) - and its regional variants - e.g. acid rain, long distance air pollution, degradation of enclosed water bodies such as North American Great Lakes, Baltic and Mediterranean seas. Another is more localised disaster risk - e.g. Bhopal and its lesser West Virginian analogue. A third is sustainability, apparently raised to general consciousness levels by erratic petroleum supplies and prices, more localised issues such as water shortages in part of England, plus very simplistic limits to growth fears. The fourth is quality of life both

¹ The value of Nairobi National Park as a domestic and international tourist sector unit is subject to economic estimation as are its operating costs and alternative land use income flows. Its additions to the quality of life of present - and especially future - generation Kenyans are not usefully handled in that way. They can be introduced in the judgements on land use options made by political decision takers as influenced by social groups including, but not limited to, ecology focused organisations.

in respect to such issues as air and water quality but also to access to relatively undamaged 'natural' ² environments.

Driving Forces 1974-1994

Ecology/environment is not a new policy concern, but it is only over the past twenty years that it has become one commanding significant priority on major governmental and inter-governmental agendas. In respect to Structural Adjustment it dates - at most - to the past decade and primarily to the last five years.

In part this is a reflection of real costs and risks with the usual lag between their emergence, their intellectual identification and formulation and their entry onto decision-takers' agendas. This last phase is far from complete - when all is said and done in respect to ecological policy and practice the ratio of said (or exhorted) and done (enforced and/or resourced) is very high but both said and done are rising rapidly. The hazards (beyond military) of atomic energy facilities were not clearly estimated until the 1970s; the ozone layer depletion/hole phenomenon was neither identified as major nor understood a decade ago and, indeed, was then nowhere near its present magnitude; global warming (including reinforcement of natural cyclical change) is still not estimatable beyond a wide margin of error and was so problematic that its existence could be challenged credibly as late as the 1980s.

In part, too, it is the result of the emergence of a very effective body of ecological groups - primarily in the Northwest - since the early 1970s.³ Arguably they are the most effective issue oriented non-governmental cause/pressure groups of the last half of the 20th Century. Certainly their appeal has proven far greater than that of the alternative life style advocacy movement with which they are often associated. Because their chief rallying themes have been fear (including, but not limited to, economic implosion) and quality of life (including reverence for nature as a secondary element) they have:

- a. focused on preventing/reversing ecological damage by prohibition or strict regulation;
- b. perceived states - not the market - as the guardians of the environment;

² 'Natural' in that most - including most attractive - European rural areas are very decidedly the product of massive eco/human interaction.

³ Ecology oriented conservation groups are much older. The burgeoning in numbers and influence are the new factors.

- c. tended to be imprecise on both costs and benefits; and
- d. to use economic argumentation and analysis more as an add-on to broaden support, or to meet criticism, than as an integral theme.⁴

Their relative success in the 1980s is rather surprising as all four aspects run against the grain of neo-liberalism which was dominant in the Northwest, of survivalist/rehabilitationist short term economic political economic crisis management (including its liberalising version) in Africa, Latin America, parts of Asia and, somewhat differently, Eastern and Central Europe and of the "go for growth" transformations characterising the more economically successful Asian economies.⁵

The World Bank has always had a certain interest in sustainability - e.g. in agriculture, forestry, water - and also in urban environmental services - e.g. sanitation, water - but a rather muted one up to a decade ago. Its concern for persons displaced by development or for socio-political consequences for indigenous minorities has been largely conceptual or tied to low key, unmonitored project guidelines. It clearly created a substantial environmental department - which now has a very real life of its own - as a political environmental damage control measure, albeit one it has taken moderately seriously in terms of analytical and guideline prescriptive work highlighted and underlined by the 1992 *World Development Report*. Its impact is rather less in prioritisation within projects or programmes and much less in enforcing conditionality even in respect to projects in part financed by it when the user government's environmental priority - at least in respect to those groups suffering negative impact - has been low to non-existent.⁶

Quite predictably the Bank takes an economic, top down, deductive approach to environmental issues and, virtually equally predictably,⁷ a pragmatic one as to public sector roles and instruments.

⁴ To this generalisation there are exceptions, but the mass base and political weight of the Green Movement does not rest on eco-economics whether market, social market or regulatory.

⁵ Arguably they were appealing because they channelled broader opposition to dominant world views into an area in which the dominant approaches were less convincing, less self-assured and/or less dogmatic.

⁶ This is not to argue most bilateral or other multilateral programmes have an earlier or better record nor to ignore the suspension of several major problems on ecological or displaced community injury grounds.

⁷ The Bank is in principle and by inclination pragmatic. Its neo-liberalism has always been highest at rhetorical and least pronounced at operational level. Further, it is economically

The first and last are clearly sensible. An economist is well advised to apply his own tools and expertise to a problem if only to see how far they can go and a global institution with strong analytical capacity is well advised to try to generalise and to apply the generalisations to new cases. Similarly to invoke short term non-constrained market forces to deal with external and posterity costs (or for environmental protection/improvement benefits) is palpably absurd and the Bank does not do it.

The other two elements pose problems. Arguably environment/ecology policies and programmes need to be built from the ground up (often literally) and aggregated rather than disaggregated from initial central prescriptions. That is especially the case if the particular priorities among and within different regions and countries are highly variable. However, a large highly centralised, global institution like the Bank naturally tends to start with general top down prescriptions only loosely linked to limited prior case by case experience and to modify their application - up to building in micro to macro iteration - only with experience over time and only incompletely.

A primarily deductive approach (from general principles to specific applications) not an inductive one (from specific cases to generalised programmes and guidelines) is also typical of the Bank. In environment/ecology it is particularly limited and/or accident prone. The ecological impact of most macroeconomic measures on ecological practices is at a general level indeterminate depending on a host of case specific economic and technical factors as well as on rather divergent judgements on what is good and bad.⁸

serious enough to accept that even if "market solutions" to problems involving external and intergenerational costs and benefits are attainable, they will require substantial public intervention in and management of markets and also that they are not always practicable. Indeed that typifies the trend in North-western government policies as well. "The polluter pays" is an application of standard market economics to raise costs by internalising factors which were previously external because falling on another person or generation; ceilings and bans are straightforward intervention to block market solutions deemed to be humanly and economically unacceptable.

⁸ Devaluation will normally raise fertiliser prices more than liberalisation/competition will lower them. This suggest both more selective and lower use of chemical fertilisers post devaluation/liberalisation and - less clearly - greater use of mulch and manure. However, if import capacity limitations meant fertiliser was *de facto* rationed, both overall use and especially that by smaller users with little access to ration allocation, may rise. If fertiliser is used on household self-provisioning crops (but by definition paid for out of cash income) trends of marketed crop prices and/or rural wages/opportunities to earn them relative to fertiliser prices may dominate use level changes. Some analysts would argue chemical fertilisers ultimately degrade land, but most would agree - especially at typical SSA use levels - that the positive food security and intensive, sustainable continuous use of soil were the dominant results of moderately increased use.

Under such circumstances a bottom up approach from concrete problems to technically workable partial solutions and then to what economic policies would facilitate appropriate action subject to macroeconomic constraints and backed by ongoing research to enhance knowledge quantitatively and qualitatively⁹ would be more useful. But neither contextuality nor technical expertise are the comparative advantages of a Washington based, relatively new, economist dominated unit nor are ecological lobbies themselves very prone to accepting uncertainty and contextual specificity as genuine concerns as opposed to seeing them as rationalisations for inaction, delay and inadequate response.

History is useful to throw light on what and why. It cannot be changed retrospectively nor instantly. But imperfections in the present resulting from it can be altered - especially for altering the future by present action, e.g. building better bottom up eco/environmental policies backed by contextual analysis, research and argumentation. Since, in practice, the Bank and especially its PER (Public Expenditure Review) Missions do not place much priority on resource allocations to ecology beyond some aspects of forest rotation, this may be to argue for higher resource use. The main thrust is, however, to alter resource use and policy instruments to make them more environmentally and eco-environmentally efficient.

III.

Why Is Environmentalism Unpopular In The South?

Historically environmentalism has been an upper and upper middle class enthusiasm regarded with considerable suspicion by most working people. That has been true both nationally and internationally despite the fact that the effect of environmental damage on poor people and countries is more severe - now, and especially when projected into the future - than on rich. This is of little concern to SSA if either it has few damaging environmental problems or these

⁹ For example, Tanzanian banana research first linked declining yields to weevils and - without exploring weevil pest based control - prescribed chemical pesticides. These proved neither technically nor economically efficient (indeed killed beneficial insects more effectively than they did weevils) and further research suggested nematodes were a linked problem. Chemical (and pest enhancement) measures again failed. Further research suggested soil depletion reduced resistance to nematodes/weevils and turned attention to mulching (instead of burning) leaves and to greater manuring based on increasing cattle herds in banana growing areas (itself the reverse of previous prescriptions) with implications for pasture quality and rotational use improvement. Clearly no economist could have taken 'correct' decisions on the initial technical perceptions - or perhaps even the decade later ones! - therefore research in selected technical areas should be a macroeconomic priority generally but especially in the eco/environmental arena.

can readily be met from domestic resources. Neither of those propositions appears tenable; therefore it is of importance to see why environmental issues are - at policy and often at intellectual level¹⁰ - frequently brushed aside as trivial or of low priority today or even attacked as a new face of Northern imperialism or out of context missionary endeavour. There are several reasons.

Ecologists - like other people committed to an initially unfashionable issue - frequently tend to be zealots and/or to suffer from tunnel vision. Real examples include arguing that crocodiles have priority over children in rivers in populated areas or that the anopheles mosquito is an endangered species (sadly not true) so its preservation matters more than the nearly two million African children who die each year from malaria. Such extreme presentations - which are not a fair representation of most environmentalists - do result in real anger and closing of minds (and office doors).

Second, in the context of extreme imbalance in renewable and non-renewable resource use (at least ten to one) between North and South and of twenty to one between Europe and Africa limiting growth or requiring high environmental protection standards inevitable looks to be - and often is - protectionist of the rich. This is doubly so when the main polluters and forest destroyers are very slow to take unpopular measures to limit their own resource use/pollution and very quick to exhort poor countries to do so and, in particular not to follow pollution intensive industrial strategies or to use widespread forest slaughter cutting as a springboard toward growth.¹¹

The unsophisticated form of that approach in the Club of Rome's seminal *Limits To Growth* was very close to arguing "what we have we hold and the devil take the hindmost". The sophisticated variant - the Northern thrust at the Rio Conference - is to seek to 'export the problem'. Its message to the South is to do as the North should have done not as it did do, even though the costs of non-pollution and sustainability as proposed are likely to be quite high, to provide profitable markets for Northern research-consultancy-technology production firms, and (arguably) to slow Southern growth. Because at least on global risk issues - ozone layer and greenhouse effect in particular - it is a common human necessity that the problems be contained, this policy of 'exporting the problem' in fact proposes putting the cost of protecting upper national income life styles in the North on lower national income Southern economies.

¹⁰ By no means always. There is a growing African ecological movement and a substantial increase in concern with sustainability on the part of several African governments.

¹¹ Or in some cases to servicing external debt to the North.

For that distribution of action there is no particularly cogent economic case unless the North also pays for much of the Southern action. Placing the burden of external costs on a group quite separate from those who cause benefit from them (directly or indirectly) is unquestionably inefficient within neo-classical economic models while, at least as a general proposition, redistributing costs from rich to poor is antagonistic to almost any variant of intellectually respectable welfare economics.

The combination of aggressive, acontextual missionary crusading with overt intent by the have to hold on to what they have and to export the problems and costs of coping with external diseconomies of their past and present life styles to the have nots is, to put it mildly, unappealing from an African perspective. That, however, is not a good reason either to dismiss environmental issues as trivial or to stonewall in reaction against unacceptable Northern agendas.

The chief losers from environmental damage in Africa are poor Africans and especially poor rural African women and girls whose workload is increased by needing to go further for wood and water and to work longer to produce household food on deteriorating farmsteads. The greenhouse effect is also particularly devastating as to probable impact on SSA from rain shifts out of the tropics. Ozone layer damage will affect people quite irrespective of location or causal responsibility.

Poverty Reduction For Environment Protection

The South Commission answer was to treat global environmental problems as an opportunity to restate the case for global transfers for poverty reduction. The argument can be summarised:

- a. environmental problems are real and global;
- b. poverty and ecological damage interact in a mutually reinforcing downward spiral;
- c. the entry point to breaking that spiral is systematic poverty reduction strategies;
- d. most global threats (notably greenhouse and ozone layer) result from action in/by upper income economies;
- e. bio-diversity/conservation actions need to concentrate in poor countries but are to the benefit of all of humanity and, probably, disproportionately important to its richer members/economies;

- f. therefore both global threat containment/reversal programmes and poverty reduction interventions should be financed predominately by richer economy funding because they have the means and it is in their interest to make Southern action practicable by reducing resource constraints.

This argument is valid. However, three caveats arise. First, a mutual interest case logically implies not voluntary grants but contractually binding agreements (including resources actually transferred). Second, the logic of the case is more evident from the South than from a Northern (especially a Northern Treasury) perspective so a serious education/selling job in the North is needed. Third, the tendency to put all desirable poverty reduction interventions on the environmental agenda/shopping list is certainly unsaleable and not all that easy to defend logically.¹²

Who Pays Now?

The general answer is that whoever cannot shift the costs pays. The correlative is that in general poor people will pay a disproportionate share - at least relative to their incomes. The exceptions are unshiftable costs, e.g. higher cancer incidence from ozone layer holes.

However, from a cost reducing intervention perspective, it is often more helpful to begin with cases. These also illustrate the complexity of safeguarding certain ecologically desirable conditions without loading costs on persons least able to bear them.

Crocodiles are an example. They are an endangered species - at least in some countries - and they do have economic/livelihood value in relation to tourism, hides and leather products. Therefore an ecologist and, perhaps, an applied economist would wish to protect them.

But to rural villages on streams, crocodiles are often a human and an economic menace. Young livestock and children as well as women washing clothes are the endangered species not the crocodiles. From that perspective eradication not protection appears suitable.

¹² For example, external debt service does enhance pressures to do ecological harm. However, general debt write-offs are probably not best handled under the environment rubric. Particular write-offs/write-downs to finance specific programmes may be a useful contractual component of debt reduction. However, for overall write-downs validated by macroeconomic analysis of ecological sustainability through poverty reduction - let alone specific eco projects - is probably not a particularly promising entry point.

In fact in this case a moderately simple and practicable way forward exists based on the premise that crocodiles and people cannot co-exist harmoniously unless one (in practice the people) can be made aware that they are the visitors and the others are the residents:

- a. eradicate crocodiles in areas of human settlement;
- b. protect crocodiles in wildlife reserves/zoos/game parks;
- c. raise crocodiles on farms to provide skins.

That three-pronged approach could protect bio-diversity, harvest economic gains, protect/improve poor people's environment. The only evidently valid objection is that of persons/groups with a principled objection to killing any sentient being. Raising crocodiles for leather is not basically different from raising cattle nor is killing reptilian interlopers in village waters from killing mosquitoes, cockroaches or rats.

A broader example is trees and bushes. The costs of their loss in SSA are high at household, local, national and regional levels and not insignificant at global (greenhouse effect). Perhaps the most visible example is the explosive rise in length and severity of the harmattan on the West African coast. But the most serious are probably those in rural areas or communities whose wood balance and broader ecological balance have been shattered¹³ by multi year droughts (e.g. Sahel), slaughter logging (e.g. parts of Cote d'Ivoire), rising populations (e.g. Owerri Plateau in Nigeria), massive refugee inflows (e.g. Ngara District in Tanzania) or combinations of these (e.g. Tigre hill country in Ethiopia). These households have had no visible survival option that did not threaten their own future, let alone their children's livelihood.

The costs fall disproportionately on poor households - unable to move and also with so little land or capital as to render standard land rehabilitation approaches impracticable. Within households they usually fall disproportionately (not only) on women and girls because of their responsibility for provisioning the household in respect to fuel, water and food. The fuel impact is evident - those on water and food result from the micro climatic, water table, erosion

¹³ It is perfectly valid to assert that not all African rural areas are afflicted in this way; that under certain circumstances higher population can trigger eco-friendly technological changes; that many forest/grove ebb and flow patterns are cyclical. The 1970s/early 1980s desertification/forest eradication rhetoric did misunderstand the causal pattern and extent of the former and vastly overstate the latter. But neo-desertification (pockets of quasi-desert emerging far from the desert margin because of ecological abuse), forest cutting (for several reasons) and "fuel free" zones around cities are facts - often serious at macro and frequently crippling at household level. To swing from one inaccurate generalisation to its opposite is not a useful way to understand or to influence a highly complex contextual jigsaw puzzle.

and soil exhaustion impact of loss of tree and bush cover. Men of course also suffer as main producers of marketed crops and providers of building inputs. The substitution of dried manure for woodfuel - as sometimes proposed, but to date not so frequently adopted - would have actual potential negative impact on agricultural sustainability because of its growing use as fertiliser.¹⁴

There appear to be four major causes of forest/bush cover loss. The largest is probably opening up new land for cultivation. This means loss of forest cover (which can itself be serious in greenhouse/global warming terms) but need not mean total absence of trees and bushes nor ecological devastation except on steep slopes (which luckily are difficult to log and unattractive to clear for cultivation). The second is - probably - ratchet effects of multi year drought, because - in the absence of systematic replanting losses are rarely made good except in very sparsely populated areas. The third is uncontrolled cutting whether for domestic (household or market) fuel and building poles or for the logs and wood products market more generally. The fourth is population growth beyond some tipping point when coping technologies no longer serve. Up to that point there is of course a decline in proportion of woodland as rotations shorten but, as with new clearing, not necessarily of an unbalanced, secularly deteriorating system.

It is worth noting that the first and fourth causes and the small scale part of the third are based on need not greed which applies only to medium and large scale slaughter logging. The policy implication would appear to be seeking means to enable present survival and income growth without eating away at the eco-base (economic as well as ecological). By the same token lowering household costs of replanting would appear to be the most hopeful route to reversing drought and human-made damage. Fees, regulations and systematic selective logging/replanting strategies are important (especially for urban and export markets), but target the medium and large scale logging operations which are dominant in a few forest areas but overall may well account for only 10% of total net tree and bush loss.¹⁵

Urban air pollution - to take a third example - is the result of a mix of industrial emissions, household cooking and vehicle emissions. Which of them is dominant depends very much on

¹⁴ Bio-gas approaches would-be more ecologically desirable as they facilitate manure collection and the slurry they produce as a by-product is easier to apply as fertiliser. However, given their scale economies, either co-operative or community use would be needed to make them accessible to poor households while their initial cash costs hamper adoption in areas in which self-provisioning food, fuel, water and housing dominate household income with labour and produce sale cash a quarter or less of the total.

¹⁵ An approach relevant to 10% of a problem is worth using. But to be truly effective it needs to be combined with approaches relevant to at least much of the other 90%.

location even within a city (e.g. Soweto's air pollution is basically household coal-fired, while industrial and mining area areas of metropolitan Johannesburg suffer largely from industrial operations and centre city from vehicle emissions).

Because upper income suburbs have better air quality but their residents work in poor air surroundings and rural air is rarely generally¹⁶ polluted, the cost distribution is somewhat different. Urban residents are the main losers and especially those working in pollution intensive areas or living on sites either downward of industrial pollution or self-polluting from household fuel. While slightly less so than vegetation damage the regressive distribution of the cost burden remains true of pollution at intra urban, albeit not necessarily at national level because rural areas on average are both poorer and less subject to air pollution.

Air pollution costs however are mobile. Cairene air pollution is most burdensome for poor Cairenes. However, it spreads over the whole Nile Delta, adds to Alexandria's home produced problems and blows across the Mediterranean to exacerbate the very serious self-generated air quality problems of Athens and Rome.¹⁷ There is a clear Rome-Athens-Alexandria-Cairo mutual interest in reducing Cairene air pollution with the implication that a cost and action sharing contractual agreement with Italian and Greek transfers of technology and funds to Egypt could be beneficial to all parties.

Who Benefits?

Who benefits from ecologically/environmentally damaging actions is in one sense the counterpart to who pays the cost. In another it is not because either there are no beneficiaries or present 'beneficiaries' are - and know they are - tomorrow's losers.

Damage caused by need benefits those who do the damage in the particular sense that they survive. It damages their future livelihoods and means that they hand on a severely degraded heritage to their children. Absolute poverty imposes a very high time discount. The main logical market intervention is to lower that time preference rate by creating other survival options, e.g. via agricultural improvement or paid public works (not least erosion control and reforestation).

¹⁶ In some SSA rural housing patterns the air within housing units is of very low quality.

¹⁷ Greenhouse effect impact of tree loss is of course also global but, unlike air pollution, cannot readily be identified in relation to specific areas outside their 'home' country. On balance SSA is a net greenhouse effect importer with the USA and the EU the largest exporters.

Damage caused by greed does have winners - usually that segment of businesses which have short time horizons/high discount rates. These are not necessarily TNCs who may take a long view and, e.g. be inclined to co-operate in sustainable forest management. In West Africa the worst enterprise group on average is that owned by minority community multi passport individuals with business relatives abroad and a goal of returning wealthy to their ancestral country.¹⁸ Here market intervention - e.g. in logging by long term contracts for successive partial cuts paralleled by replanting alter private returns by increasing the profitability of sustainable practices as well as by forbidding cut and run operations.

Urban environmental degradation is basically market failure based on institutional gaps and transaction costs. Both national and local government have economic interests in accessible pure water, sanitation, primary/adult education and primary/preventative health services and in facilitating better quality housing. The reasons turn on the fact that ignorance and squalor breed general low productivity and poor health and thereby reduce the tax base, the national product and - where relevant - the chances of re-election.

But no ordinary market can provide health, sanitation and education services accessible to poor people. Payment for health services at the point of lowest income (when sick) is economic nonsense and the external economics of preventative services are very high. Education may well pay but it does so in the future and petty loan systems raise serious exclusion, deterrence and practicability questions. Water is somewhat different because poor urban residents do in fact buy it at costs per unit so high as to exceed at least the operating and maintenance costs of public supply for most households.

The barriers to free market operation and to a host of small, time of use, payments appear to be primarily institutional and transactional (one is tempted to say of inadequate imagination). Poor urban households can and will pay something for drains, accessible standpipe (public tap water) preventative and primary health care. They will, where feasible, participate in construction, management and maintenance. The problem is that users committees - especially if their form and the form of their contributions vary - cannot readily be handled by a central ministry rule-book. Nor can free or reduced fee access for very poor households be handled by external officials who do not know their service users.

However, at unit level (e.g. a clinic, a public tap scheme or a primary school) negotiation among viable user committees and professional staff leaders is feasible. In general the users

¹⁸ This comment is not racist. Any businessman with short term profit maximisation for export as his overriding goal poses serious problems and a significant community of them pose serious macroeconomic problems. It is not irrelevant to any government whether a portion of profits are reinvested locally or all are exported.

can identify the poorest households and either reduce their monthly or quarterly fees or allow them to pay by work on maintenance. If the Ministry sets targets of - say - 20% of operating and maintenance for non-water units and 75% for water to be met by contributions in cash or work so that only 80% (25%) of nominal budget item is paid in cash the fiscal coherence and the local contextual pattern of community support can - with goodwill and effort - be reconciled.

IV.

Ecoguardians, Ecovandals Or What?

Two very different views of Africans are sometimes projected by different Northern environmentalists. One is of ecoguardians spiritually devoted to the protection of nature in all its aspects and the other of ignorant ecovandals wilfully destroying their own future for short term gratification. Both may tell more about the observer than about Africans.

With few exceptions, people's commitment to their environment is grounded on practical as well as philosophical reasons. That is as true in Africa as anywhere. Ecovandalism characterises only those who can make a large short term gain and easily enjoy it - a situation more characteristic of TNCs and certain indigenous cut and run logging/milling enterprises than of African small farming or herding families.

A more realistic perspective is that Africans historically have observed and adapted to, usually harsh, environments so far as their knowledge and technology permitted. Because moves were hard and often dangerous, they had strong reasons to wish to utilise the areas in which they lived to provide sustainable livelihoods.

In most cases pre-colonial periods (and indeed the colonial and the post-colonial periods up to 1960) coping mechanisms worked relatively well. The exceptions were primarily multi-year great droughts (the apparent cause of the collapse of successive Western Sudanic states and possibly of the historic southward migration of several Southern African cattle rearing peoples). That is a clear example of the limits of technology - neither transport nor commerce could cope with the volume of food required to avert disaster. Indeed the virtual end (except in the Horn) of non-war linked mass famine deaths relates in both time and causation to the introduction of the lorry.

Otherwise coping mechanisms were feasible - up to some population density threshold. Long rotation agriculture (once contemptuously called "slash and burn") had cycles of up to - say - 25 years with 5 of use and 20 of regeneration. Complex inter-cropping maximised positive

interactions among different plants and - by limiting bare ground - reduced evaporation and erosion. Most pastoral systems had rules and institutions to limit overstocking and to enforce rundown during drought years to allow core herds to survive. Ironically all of these have come to be better understood, and often somewhat naively praised, from the late 1970s. That is precisely when they were to an increasing extent breaking down, largely - but not only - in two sets of circumstances: a.) in places in which population density passed a tipping point on better land as happened early on the Owerri Plateau in Nigeria and in parts of the Ethiopian Highlands areas and/or forced use of highly marginal areas (as on the herding/cropping frontiers in both the Sahel and Kenya); and b.) in contexts in which the growth of market opportunities and colonial and post-colonial delegitimation of historic community institutions weakened their ability to operate regulatory systems (especially in respect to cattle).

Permanent cultivation is not historically common in SSA. When it has become necessary, technological adaptations have often been beyond the reach of small farm households. Mulching and manuring plus hand-built anti-erosion measures have limits. Indeed, modern technological research has yet to find general, economically viable answers for the low income per hectare, moderate to poor soil quality, low and erratic rainfall areas which characterise most of Sub-Saharan Africa.

The problem is not lack of desire for sustainability or lack of willingness to use proven affordable techniques. Rather it is lack of knowledge (sometimes because of bad extension and attempted enforcement without explanation of less than self-evidently viable approaches, e.g. colonial erosion control in East Africa) plus lack of resources exacerbated by extreme poverty, drought cycles and moves into new areas less favourable in soil quality and/or rainfall and therefore not necessarily sustainably usable by techniques brought from more favoured areas.

The same characteristics apply to human environment. Isolated African homesteads and villages are usually clean and with adequate sanitation (including the adoption of pit latrines). The poorer urban areas (and in West Africa even city centre) are notably filthy with very hazardous sanitary conditions. The reasons are hardly psychological - the scale of urban areas requires technologies and infrastructure resource commitments beyond household levels. Colonial regimes - and to be candid some of their successors - were not much interested unless (and where) there were substantial urban settler groups. The financial mechanisms (rather more than the technology) for low cost urban water supply, sanitation and rubbish clearance are rarely well developed and rarely involve users in management and maintenance other than by rather crude fee attempts. The success of a number of programmes involving low income areas in partially financing and maintaining such services suggests that - as with sustainability - the problems relate not to attitudes (or at any rate not to poor household attitudes) but to

understood, affordable means (including soft as well as hard technology and cash) to make and to sustain improvements.

And So? Participation Not Coercion

The most reasonable general premise is that the vast majority of Africans do desire environmental protection and improvement if - and only if - it makes a net contribution to their and their children's welfare. They will adopt them if - and only if - they understand them, believe they will work¹⁹ and can afford them (in terms of present cash and/or time costs).²⁰

Most communities - especially poor people - will not accept environmental protection which has only costs for them and benefits only for others, e.g. exclusion from historic branch and pole collection in forest reserves or not killing game destroying livestock or crops. Indirect present gainers - e.g. urban buyers of fuel and building materials - will object to environmental protection measures that raise costs to them but may be less directly conscious or able to thwart them.

To be successful, both technology and policy must take account of these points. A number of implications arise:

1. Intended beneficiaries should be consulted as to how they perceive environmental problems (with education to enhance their perceptions if these are limited by a narrow knowledge base);

¹⁹ This point underlines the high cost of false starts. When - as in Tanzanian banana culture - two policies have been promoted on the basis of incomplete data with inadequate field testing and have proved, at best, near useless there is a high disbelief barrier for the third (probably at least a partial genuine answer) to overcome before adoption. Twice bitten, thrice shy, is a relatively universal adage.

²⁰ In theory coercion (regulation backed by force) is an alternative. For most environmental policies it is not. Coercing a limited number of large enterprises may be possible. Coercing a minority by community pressure (if the community majority does support the measures) is often practicable. Coercion by state policing is rarely even a remotely plausible option. To stop tree and bush destruction in severe drought conditions by that method would require a line of gallows from Dakar to the Karoo Desert in South Africa which is neither humanly nor politically acceptable and would in any event wipe out a high proportion of remaining trees to build the gallows!

2. Building their knowledge (often contextually better than that of experts), priorities and institutional preferences into programme articulation through some type of participatory mechanism (whether local government or other);
3. Encouraging local community and social sector environment-friendly or environment sustaining activities including by partial funding of ones within the national priority framework;
4. Building up the numbers of pro-environmental households and avoiding building up a mass of injured households, combating measures which afflict them (e.g. allowing monitored use of game park watering points, collection of dead branches-poles trees in forest reserves and traditional hunting of small or non-scarce game in reserves as done successfully in some Tanzanian National Parks and Reserves and/or distributing part of park fees and other tourist incomes to adjacent communities as at least sometimes practised in Zimbabwe and Kenya). In that case the community majority will become auxiliary police against pirate loggers and poachers. They are the main means to solving the environmental problem not (as some ecologists seem to assume) the problem to be solved by exclusions, removals and policing;
5. Accepting the limits of market oriented policy instruments in respect to poor - especially poor rural - households. For example, higher logging fees may well augment resources for conservation and - if levied on trees cut not wood sold - improve logging techniques for commercial enterprises but are hardly applicable to rural households engaged in collecting fuel, fodder and home building, just as higher crop prices are relevant to rendering more fertiliser purchases possible or justifying more labour use for crops sold, but only marginally so for those used for household self-provision;
6. Recognising the need for differentiated, multiple instrument approaches toward different sectoral and geographic contexts. For example, logging fees, long leases, selective logging cycles and required replanting form a quasi-market package potentially usable in respect to medium and large scale timber enterprises.²¹ Watershed protection forests under community management with national or regional funding, agro forestry extension services (including seedlings where appropriate) and general encouragement (including technical and, perhaps, financial support) of villages and households to plant trees where (e.g. village woodlots and around public buildings, at homesteads, as windbreaks, to shade certain crops, in fields) and of the types (usually a mix of food, fodder and building

²¹ They adjust the market to include external costs and to increase certainty of future gains thus rendering cut and run unprofitable relative to sustainable production/replanting cycles.

material - not just fuel - trees) desired can be appropriate to most small farming (and perhaps to many peri urban) households.²²

7. Gender concerns need to be faced explicitly. It is necessary to know who will perform an activity to know to whom to extend information and support services. Rural (and increasingly urban) women's and girl's workloads are often so high as to make additional time allocations impractical and undesirable unless the same package includes labour-saving aspects, even if not in the same activity. If time costs go to one gender and benefits to the other, there is likely to be a rather limited actual response to proposals even though the would-be beneficiaries may applaud them.

V.

How To Set Out For Where?

In a processual sense a national environmental policy is logically the mirror image of a national real exchange rate policy. In the latter case one can start from the premise that serious (say over 15%), and especially growing, overvaluation (or under-valuation) is damaging. Both macroeconomic logic and empirical evidence support that contention. The issues turn on how and how fast to return to a sustainable real exchange rate and how to ensure domestic (or external) developments do not lead to the re-emergence of serious overvaluation (or under-valuation). Contextual (including institutional and expectational) factors matter, but largely in terms of institutional structuring, phasing and parallel measures.²³

²² Improved processing (e.g. charcoal kilns) and use (e.g. 'open fire' and stove) innovations may be useful if cost (time and cash) efficient technologies have been identified, tested and are physically and financially accessible. While many of the more optimistic claims for them look overblown, detailed research at Tanzania's centre for simple technology development and testing suggests there are real possibilities - not least for small rural institutions and enterprises - but a glaring absence of enterprise (to make) and user (to buy) awareness of what has become known/tested. The same considerations apply to other types of technology in brick making, agricultural processing and animal drawn implements.

²³ For example, if significant liberalisation of import licensing/quantitative restrictions is envisaged, substantial devaluation (and conversion of specific to *ad valorem* duty rates) should parallel or precede liberalisation to avoid creating an unintended negative, or catastrophically rapid reduction of the, protection pattern. It is presumably the combination of devaluation and freedom to import competitive goods taken together, not the former by itself, which has led to the intuitively implausible but widespread assertion by several African manufacturing sectors that devaluation and easier access to imports (in their case raw materials and spares) were killing them, whereas they had previously cited overvaluation and very limited access to imports as the crippling policies.

In the case of environmental strategy the principle of economic sustainability is a useful guideline, but not an adequate template for even a very rough blueprint. *A priori* cost/benefit analysis of macroeconomic measures on environment yield indeterminate or very context limited results.²⁴

The optimal starting point would appear to be at grass roots (or street) level. What environmental problems confront households, gender groups, enterprises? How are they perceived? How costly are they and how rapidly are the costs rising? In which cases does a high time preference for halting or reversing damage exist - because it will be much more costly or impossible later? In which areas can significant household, enterprise and external resources for environmental protection/resuscitation be mobilised and how? What are probable benefit/cost ratios and time profiles?

That phase ends with something of a shopping list but - if carefully done - a prioritised one. Even if the first round is incomplete the most crucial and most urgent topics (i.e. the basic priorities) are likely to be included. From the list an organised - sectoral, geographical, macro - pattern plus a checklist of ways toward acting effectively at sustainable benefit/cost ratios can be identified.

The "environmental sector" can then be slotted into other sectors (whose outputs and cost structures it presumably affects) and into macro balance constraints, e.g. prices, fiscal, external, nutrition, poverty.

Unfortunately that approach implies much less mileage can be gained from general external analyses (e.g. those of the World Bank) and cross-country regressions than in respect to - say - exchange or interest rates or inflation levels. General principles and checklists for exploration, yes, but even a skeleton programme, no. The positive side is that if an African economy crafts a coherent environmental strategy from articulated sectoral programmes with plausible implementation packages (intervention instruments) this is less likely to be opposed on *a priori* grounds than are non-conventional approaches to more standard macro or sectoral strategies. That evidently raises the possibility for African sectoral strategy "ownership" - as well as the likelihood that in the absence of African ownership there will be nothing of much operational significance to own.

²⁴ For example, whether a higher real interest rate is - on balance - pro or anti environment "all depends" on sector, type of enterprise, cash flow position, constraints on user friendly ways of altering technological processes, etc. The assumption that on balance it is probably detrimental is intuitively and quite often empirically correct but - perhaps luckily - by no means overriding. Luckily, given the rather more direct macro and micro economic reasons for real interest rate management.

Simple Or Simply Wrong? Policies and Packages

Measures to protect or restore the environment may well need to be simple especially when broad understanding of, commitment to and participation in acting on them, is needed.²⁵ However, simplicity in the form of single interventions without prior contextual analysis is likely to be simply wrong.

For example, small farming family agro-forestry, fuel production and watershed protection programmes often need a package of parallel actions to be effective/accessible.

First, if replanting of tree crops with over 18 months to first crop is needed, small farm families may not be able to afford the cash flow gap even though they comprehend very well the need to upgrade output and incomes. The logical interim measure is raising off farm income. That is consistent with state redesign of priority works (including watershed protection reforestation) to be labour intensive thus providing additional employment. Village and co-op woodlots may face a blockage because, while the benefits are perceived and labour is available, cash for tools and seedlings is not. Loans in kind of seedlings (of types selected by the planters) plus tool provision linked to maintenance and protection work on watershed stands may help bridge the gap between establishment cost and time saving from nearby fuel supply's emergence.

Both enhanced agro-forestry and village/co-op woodlots are likely to require additional work by women and girls. Either loss of time for other crucial activities plus increased absence from school or/and damaging - to health and to social relations - overload may result. (Or the proposed interventions may not be done because perceived as desirable but impossible.)

Again parallel interventions may be needed. When simple, low cost, tested for user friendliness fuel saving stoves or hearth designs are known but not widely used, extension plus encouraging small businesses to produce them may save both women's time and trees. Improving access to water or to improved agricultural processing technology may be alternative or complementary elements.²⁶

²⁵ This is consistent with considerable technical complexity, e.g. emission cleansing/by-product recovery operations at smelters or power stations are often technically advanced, but as actions are quite understandably simple to managers and workers.

²⁶ A substantial body of improved, simple, low cost technology - often based on best practice local approaches - does exist. Some is in fact low payoff or not user friendly, but some which is has low take-up rates. It is worth exploring whether this relates to underdeveloped extension programmes and a parallel reluctance of enterprises to produce until a demonstrable

Sustainable agro-forestry depends on sustaining soil fertility. In at least some contexts that depends on mulching and manuring. Therefore - somewhat counter-intuitively - it may require enhanced livestock and smallstock herds. To the extent plantings includes fodder providing trees (or produce by-product leaves as with bananas) an enhanced animal food source (and the possibility of stall-fed dairy cattle) arises. Further, if soil preparation is a constraint (as is often the case in respect to men's as well as women's time) then additional oxen or donkeys may relax that constraint through allowing substitution of animal-drawn ploughs for hand wielded hoes.

The exact model sketched may be suitable in some districts. However, the point of this simple verbal model is to show the complexities, need for contextual analysis and possibility of crafting packages of interventions in which the whole is greater than the sum of the parts.

Issues Of Scale And Profitability

Small is beautiful is not a safe assumption in respect to environment. Small game or forest reserves may be unviable, although in agriculture smaller fields and less extensive pure stands of one crop are often better in terms of risk avoidance and stability.

Further, there are real technological issues. Some environment friendly technology has very large economies of scale. Small alluvial, as contrasted to large scale placer/dredger, gold production in Ghana illustrates this. Closed circuit mercury based separation systems when well maintained (which is cost efficient because mercury is expensive) are environmentally friendly and are routine for modern dredges. They are impracticable for panners or small placer miners whose open mercury separation process is inherently grossly polluting.

Nor should anger at hit and run, high short term profit environment miners (in agriculture, fishing, forestry, mining) be confused with the concept that poor cash flow and high environmental friendliness are likely to go together. The converse is usually nearer to reality. Adequate profitability and a positive cash flow encourage attention to the medium and long term and make possible investment in pollution control which have relatively long payback periods.

Ghana gold mining is again illustrative. In the late 1980s two medium sized mines which were barely surviving and badly needing major rehabilitation investment to have a future did not -

market exists (which it will not until the product is understood and successful local use examples can be seen).

and could not - have any plans to clean smelter smoke of arsenic and sulphur. The much larger and highly profitable Ashanti Gold Mines was engaged in pre-feasibility studies of emission scrubbing to recover arsenic and sulphur for sale. Its profitability scale, and assured life expectancy made a substantial investment plausible since operating costs and depreciation could be covered even if the return on capital - while positive under reasonable assumptions - was likely to be relatively low. Enterprises with severe cash flow (survival) problems, like similarly placed absolutely poor households, have very high time discount rates and are not merely reluctant but frequently unable to invest in environmentally friendly processes or ancillary facilities.

VI.

Toward A Checklist - The Global Dimension

There are four headline global environmental issues and one regional one. Each has a convention, a momentum and potential access to funding. In these areas the challenge to Africa is to see how they relate to national requirements and potential programmes. The issue is not to be trendy or even to craft fundable proposals (albeit that is not to be treated as frivolous) but to integrate national and global agendas. Ozone layer collapse, global warming, desertification, loss of bio-diversity and transborder air and water pollution are threats to Africans at least as much as to anyone else even if in most cases the chief historic and continuing damage is Northern in origin.

Ozone layer erosion is primarily the result of fluorocarbon use in refrigeration/air conditioning, aerosols and certain other industrial uses. SSA has made a trivial contribution to it, but will not be exempt from the damaging (not least massive increases in skin cancer) results if it is not reversed. Because of the time lag between emissions on earth and ozone layer damage in the upper atmosphere action now is needed to halt ozone damage from about 2020. The formal framework of the Montreal Convention is semi-compulsory and most Northern countries do have definite targets and some policies/regulations toward achieving fluorocarbon phase out.

For SSA the issue is access at viable prices to ozone friendly technology. Most is private intellectual property. To avoid limitations (access or cost) to industrial development, what SSA needs is either a preferential royalty scheme partly financed by rich countries or contractual agreements with the SSA countries agreeing not to increase fluorocarbon increase in return for Northern provision (presumably by contracts with owners) of specified technology use rights and equipment embodying them.

Global warming (greenhouse effect) relates to the balance between carbon dioxide emissions (industrial, fuel, internal combustion engines, animals) and absorptions (vegetation and especially forests). Because climate changes have cyclical and stochastic (e.g. the Mount Pinatubo eruption and Kuwait oil fires had massive short term cooling impacts) the projection of the greenhouse effect's results on temperature are not only far from definitively agreed, but cannot be without accurate 100 year projections of volcanic and human conflict events. That it is temperature raising with resultant changes in rainfall distribution (against the tropics and sub-tropics) and rises in ocean levels is no longer seriously in dispute.

It is not particularly useful to argue that SSA contributes perhaps 1% to the causes of global warming. It will reap perhaps 10% to 20% of the costs (i.e. well over its share of world population). And the contributions it can make via better forest management (from household to national level), more plant cover in fields, reducing air polluting from inefficient heating/cooking fuel use and ill-maintained internal combustion engines are all justified on national grounds and of food and livelihood sustainability air pollution limiting which are quite independent of global warming.

Again a genuine North-South mutual interest exists in facilitating transfer of carbon dioxide emission reducing industrial, transportation and power generation technology. The same applies in respect to sustainable forest management. Moreover - because SSA is a relatively low cost area for improved/increased vegetation cover - contracts in which African commitments to tree planting and forest/farm management are in return for specified finance, personnel, technology packages should be both practicable and potentially substantial.

Desertification has a slightly odd convention. As written it appears to be utopian anarchist processually and altruistic, not contractual, in respect to resources and commitments. That may suggest neither Northern nor Southern signatories took it seriously, which is unfortunate if true. Disastrous environmental degradation in areas near existing, or constituting new deserts is a major cancer eating at household and district livelihood sustainability in many African countries. Action to halt and to reverse it is important whether it is technically desertification or not. Because of its interlock with global warming, it is a global priority logically and also because desertification sends shivers of fear emotionally. Clearly, soil stabilisation and vegetation establishment require local support to succeed even if some elaborate blueprints for local, area and national participatory committees are almost reminiscent of the draft legislation on promoting, maintaining quality standards for and rewarding participatory poetry writing actually prepared in at least one SSA country.

Because 'desert' creation relates to different types of abuse or overuse, varied countervailing approaches and parallel interventions (e.g. alternative fuel and fodder supplies, windbreak tree belts) are likely to be needed even in one country. Further, technological approaches are by

no means always intuitive. For example, tighter herding of more cattle in smaller areas with frequent rotation (and longer regeneration rests) is in parts of Southern Africa a means to reducing erosion, upgrading pasture, partially restoring water tables and either sustaining or raising safe herd levels in any year (absolute levels varying annually with rainfall and pasture conditions) especially if linked to better market access to allow down-stocking early in droughts to conserve remaining stock and to provide some cash reserve for subsequent restocking. Rushing in to compact soils and put in bushes is often not a particularly sensible instant response. Similarly, the SILS' 1970s-80s experience (and to a lesser extent Botswana's) demonstrates that putting in more boreholes in areas with normal year pasture but no surface water leads to herd levels and distributions which are very damaging (in both the shorter and the longer term) during droughts. Thus a detailed tested national strategy articulated to programmes is needed before beginning full scale actions, including before negotiating contractual action commitments to secure external resources.

Bio-diversity, wilderness areas, nature can be a romantic, vague, all inclusive feeling or a headline for a strategic set of hard-headed interventions.²⁷ The case for bio-diversity/'natural' reserves to Africans is:

- a. value in respect to domestic as well as foreign tourism;²⁸
- b. watershed, coastal reef/lagoon and other fragile environment protection;
- c. possible value of species use discoveries - in farming and/or medicine - especially if the country is foresighted enough to patent and charge royalties on direct and subsequent indirect use of any gene material taken out;
- d. provision of food, fuel and building materials to small, culturally divergent communities who are in fact able to live symbiotically with the forest or reserve, but clash (to their own grave damage) with 'standard' cropping pastoral or urban life and livelihood styles;²⁹

²⁷ It needs to be separated from the greenhouse effect cluster of issues. In respect to carbon dioxide ingestion enhanced/sustained vegetation cover is key and doing so by rotational logging and altered agricultural practices (which may be more intensive) are not necessarily inferior to preserving extant forests untouched. Bio-diversity, however, does require very much lower direct use levels and much tighter protection/management.

²⁸ Game farming may be valuable, but falls under innovations to improve land use not bio-diversity or wilderness protection - a wildlife ranch (whether for viewing or meat/hide raising) is rarely a nature reserve any more than is a Northern zoological park.

²⁹ Traditional conservationists would disagree and - on that basis - many Africans have been expelled from reserves with grave damage to them and to the image of conservation. Modern

e. present and future quality of life (the "common heritage of humankind argument").

At least in respect to the third and fifth points the main gainers from African action will be present and future generations in rich countries. Therefore - as at least some conservation bodies accept - the African response to wildlife or plant life protection proponents should not be hostility (unless the plant - e.g. water hyacinth - or animal - e.g. anopheles mosquito, crocodile in inhabited areas is environmentally damaging to Africans) but cooperation on the understanding that if the "common heritage of humanity" is to be protected then cost sharing should be based on income of future beneficiaries not on location of the heritage to be protected and should be embodied in contracts binding on all parties not 'aid' with conditionalities enforceable only against African programme operators and not on outside resource providers. One issue in bio-diversity is Northern acceptance that the providing state has an absolute right to substantial payments for the commercial use of genes procured from its territory. While fairly clearly implicit in World International Property Organisation conventions and GATT's Uruguay Round, the modalities have not been articulated and cannot be made effective without Northern cooperation against gene pirates (analogous to Southern cooperation against tape and software pirates which the North is not reticent in demanding with menaces!).

Air and water pollution do not stop at national frontiers and are not effectively controlled by immigration legislation. Therefore, they can be regional concerns. At present the only major African examples are Mediterranean water and Eastern Mediterranean (Egypt to Greece and Italy) air pollution. Because of prevailing currents and winds, Africa is in these cases the net exporter.

Coastal pollution is bad for the health of Mahgrebins and for their fishery and tourism (domestic as well as foreign) sectors. Cairene air pollution is most lethal in Cairo. Therefore it is in the interest of North Africans to negotiate for European funding for air/water quality improvement interventions and, in return, to make commitments as to efforts and - where feasible - quantified results. Co-financing of metropolitan sewage treatment plants may be an example as may financing of emission reduction equipment at hydrocarbon processing and metallurgical installations.

In principle - and in some cases in foreseeable practice - similar concerns apply among other groups of African states. The East African littoral states (at least Kenya-Tanzania and Mozambique-South Africa) may already be in this position as may all coastal range states in

bio-diversity thinking is frequently more sympathetic to the human as well as the animal and plant population of areas to be conserved.

respect to oil pollution because currents mean an uncontrolled spillage disaster offshore one country can do great damage to others.

VII.

What Now - Notes Toward National Strategy Formulation

The global issues do provide some entry points into national strategic formulation. How much will vary from case to case and depending how widely one chooses to interpret desertification. For example, Namibia uses virtually no fluor carbons, can never have more than a minimal (positive or negative) impact on global warming, does have significant bio-diversity importance in respect to desert flora and fauna and marine life - somewhat surprisingly with vociferous national debate on their protection - and has major desertification concerns if all pasture degradation and water table declines are lumped under that rubric.³⁰

Strategic formulation can begin with a cataloguing of environmental problems, potentials and data already to hand. At the least many of the most urgent items will then be identified as will areas in which more data is needed. Beyond that a participatory process - focused on ordinary households in both rural and urban areas is needed. Understanding perceived problems, present methods of coping desired action and perceived ability to become part of the answers as seen by these households is crucial to a support and participation base adequate to achieve results. Neither environmental protection nor pollution reduction can be imposed on non-comprehending, much less actually resisting, communities.

Five broad clusters of programmes and management can usually be identified:

1. Vegetation, Livestock, Soil and Wildlife;
2. Water;
3. Other natural resources (notably fish and minerals/hydrocarbons);
4. Localised pollution - enterprise based;
5. Localised pollution - household based.

³⁰ For international presentational and contract negotiation purposes that may be useful. But in both bio-diversity and desertification Namibia should adopt the same contextually based programmes with as it would without the global dimension. The difference is that if substantial contractual funding not fungible from other uses can be mobilised, the environmental action cost curve is moved downward and to the left thereby improving the benefit/cost ratio and justifying more projects sooner.

In certain countries broader air and water pollution issues may be significant. The distinction between the last two points is relevant to programme design rather than damage done. Both impact on individuals including respiratory diseases related to cooking smoke and to smelter fumes are much of a muchness but how to combat them is not.

Vegetation management includes pastures and field or garden cropping as well as trees and bushes. Livestock are grouped here because they are both competitive and symbiotic with vegetation and the two sets of uses combine in their impact on soil quality and erosion. Wildlife are included because - unlike fish and minerals - their protection and management integrally relate to large numbers of households and to broad rural areas and because fishing and mining are dominated - at least in respect to total output - by middle and large enterprises not household ones.

Vegetation is very much broader than forestry, agro forestry or trees and bushes. It includes sustaining pastures, field crops and agro forestry and of land use techniques minimising erosion and evaporation (or in other circumstances water-logging). It is a topic which cannot usefully be articulated - except in a rather tedious taxonomic sense - in the abstract.

Ecological, historic use, present use, population density and type of user issues are all highly relevant - and in some contexts highly complex.

For example, Ghana has two types of forest land: closed reserve (state) and "stool" (local traditional authority). The latter cannot be protected, partly because most has already been felled, partly because new crop land is needed but perhaps most of all because both the British and the Nkrumah governments burnt their political hands and forearms (not just fingers) so badly trying to change stool rights no future government is likely to try - especially one facing competitive elections. To the extent breaks in the forest belt require replanting non-reserve areas, encouraging agro-forestry and/or buying up cut over areas to add to reserves are the plausible options.

Forest reserve land with optimal long cycle selective logging and replanting could sustain present total cutting (and perhaps up to 50% more). If combined with agro forestry and encouraging household grove and windbreak planting, it could stabilise total tree cover near present levels or, perhaps, mildly restore them. That, however, requires carefully designed long term, conditional logging right contracts with first refusal options. The short term, unconstrained, auctioned ones the World Bank advised (while funding the forestry service work demonstrating the need for a different approach) in the late 1980s are about as environmentally unfriendly as could be devised.

Single variety tree farms - community or private - may be technically sound (albeit by no means always) and relevant to limiting greenhouse effects or supplying urban fuel.

Unfortunately they are rarely viable as large scale enterprises³¹ and almost never correspond to farmer and village desires for mixed fuel-fodder-building materials-food trees partly in plantations, partly in homestead groves, partly sprinkled in fields and partly in agro forestry (often interplanted with field crops).

Bio-diversity requires different handling because it necessarily limits the way land (forests in particular but also wild animal or plant habitats in general) can be used. While limited local gathering of dead wood, use of water points and hunting (especially by historically resident communities) can be viable, full scale agriculture, herding, hunting and/or wood extraction can not. Even tourism needs to be limited in fragile (desert and - surprisingly - rain forest) environments. So one might add does random treasure hunting by gene and species freebooters.

Water management partly depends on maintaining (or restoring) tree cover on watersheds and steep slopes to slow runoff to prevent erosion and to give time for seepage into the soil to replenish aquifers as well as to avoid negative micro climatic effects. It also requires evaluation of aquifer extent and recharge rates to allow estimation of sustainable drawup rates as well as of stream and river flow for the same reasons. In many cases, e.g. most of South Africa, Swaziland and Southern Mozambique there is already a deficit in respect to total demand in below average rainfall (but non-drought) years.³² Whether diversifying well location, more check dams or other steps can augment supplies much depends on local hydrology and rainfall - sometimes but often not and certainly not in South Africa's focal PWV triangle, or indeed, most major urban concentrations. Whether long distance water movement (several hundred kilometres in Namibia and including river diversion in South Africa) is technically practicable, economically viable and politically sustainable (domestically and regionally) is another question answerable only in a specific context in a specific time frame.

Because water management is often likely to require user limits as well as supply enhancement, its short term acceptance may be difficult to secure. For this, as for other reasons, the gain in respect to women's and girls' workload of nearby water sources and the importance of more (as well as purer) household water to cleanliness, sanitation and health deserve priority attention. Requiring more efficient irrigation while also improving effective, all year household water access is likely to be much more popular than only the first.

³¹ The exceptions are more likely to relate to pulp and paper production than to urban fuel supplies, e.g. Swaziland.

³² In South Africa a series of cross border water use agreements (similar to that covering the Nile Basin) are needed. South Africa-Lesotho-Namibia, Angola-Namibia-Botswana and South Africa-Swaziland-Mozambique are the most immediate priorities.

Fish are a renewable but also a degradable (or erodable) resource. With proper catch ceilings main ocean, bay, river and lake production should be sustainable - often at levels above present catches. However, current knowledge to set quotas (by location, type of fish and season), means to allocate them and enforcement are gravely deficient in most cases.³³ This is probably as true of inland as of coastal and offshore fisheries. For inland and coastal operations characterised by small family fishing regulation is harder because of the greater number of operators and the lesser deterrent confiscation of gear/vessel represents in a low technology pattern.

Stock improvement and fish farming require prior environmental assessment. The former - when it involves introducing carnivorous species like the Nile perch - can have a devastating impact, not only on bio-diversity, but also on sustainable total population size and, therefore, catch. Some variants of fish farming are highly water intensive and or destructive of fragile environments - e.g. coastal mangrove swamps - with potentially serious local environmental destruction and damage to other economic pursuits.

Small scale fishing is harder to control than large. Whether artisanal fisher folk exceed sustainable levels is an empirical fact, as is the potential for fishing community self-regulation. To neither question are answers uniform. Central licensing is almost certainly of limited value and regulation by quota - as opposed to by closed seasons - rarely feasible above community level.

If it is desired to protect artisanal fishing in coastal waters experience suggests an exclusion zone or areas against larger craft is needed. How effective a one and a half kilometre or selected bay and lagoon zone will be depends on the movement pattern of the fish as migratory ones can all be scooped up before they reach coastal waters. Alternatively - or complementarily - commercial quotas can be set well below sustainability ceilings to allow more fish to reach artisanal zones.

Minerals and hydrocarbons are non-renewable even though reserves can be raised or sustained, for a time, by exploration, discovery and proving. Therefore the key issues are best use in terms of net benefit stream (not primarily an environmental issue) and environmental damage during extraction.

³³ The exception of Namibia illustrates this. Research (largely done during the South African occupation but used to set sustainable quotas, raised as stocks recovered, only after independence) has allowed the partial rebuilding of stocks and catches. Quota allocation has worked. Even with *ad hoc* enforcement, seizures of up to eight deep sea trawlers combined with draconic penalties and serious prosecutions appear to be deterring pirate operations.

To assert that any non-repaired surface damage is unacceptable is in practice to assert that mining and hydrocarbon extraction are unacceptable. Even less stringent limits create a bias against often lower cost, more employee friendly open cast mines as opposed to shaft mines which, in the absence of subsidence, are less visible on the surface. Common sense is needed. Where practicable, restoration is a reasonable requirement as are secure (literally and in terms of human environment) disposal of wastes including overburden and spent ore. But in countries with vast areas of low quality land to argue in absolute terms against one or two per cent being turned into pits or dump piles is not particularly convincing, especially not from northerners whose environmental controls on mining have come very late in their economic development.

The most serious immediate mining problems under the broad environmental head relate to employee and nearby resident environmental risks and to spot pollution. Here studying present northern requirements would be a useful first step - worker health and safety requirements and means are not radically divergent simply because a mine is in Africa and arsenious fumes - subject to prevailing winds and humidity - have relatively similar habitat and human impact whether in Tacoma, Washington or Obuasi, Ghana. What risks are acceptable is ultimately a question for those taking them but for them to give a valid answer they must first know the risks accurately which is rarely the case in SSA today.

Somewhat different considerations apply to small scale mining and mass prospecting. The environmental damage - for reasons noted earlier - is far greater relative to output as is risk to employees. In addition mass prospecting can have a devastating impact on affected farmers.

Pollution in SSA still tends to be relatively localised albeit the Lower Nile Valley in Egypt and the PWV Triangle in South Africa are clear examples of the emergence of regions of pollution and others can be expected as industrialisation and urbanisation advance.

Pollution arises from enterprises, households and the crosscutting sector of vehicles. Air, water and soil are all polluted in substantial urban areas and around many enterprises. Most African states have both inadequate urban infrastructure to cope with household sources of pollution (e.g. sanitation and drainage) and inadequate legislation to force enterprise polluters to restrict damage and to pay the costs to others of their pollution or - better - the construction of means to contain and reduce it. Anger at rather crass assertions that as a low pollution continent Africa has a comparative advantage in polluting activities (including noxious waste storage and/or disposal) had not been matched by sustained efforts to design and enforce pollution control.

Appropriate policies vary for the enterprise and household sectors and by density of population. For residential areas, improved pit latrines, drainage ditches plus accessible water

taps are affordable and sustainable and can be reasonably effective - high technology waterborne sewage/drainage systems with treatment plants and piped water to each residence are not economically viable and with maintenance likely to be skimped are also likely to be unsustainable and ineffective because wholly or substantially out of order. However, such systems are essential for high rise, high density centre cities and for industrial areas (as well as isolated high pollutant volume manufacturing, mining and agro industrial enterprises).

Provision and cost covering also need to be related to users. For households - and probably most small and medium size enterprises - public provision with costs covered from land rents, site rates and/or improvement rates would appear to be the least problematic approach. Larger enterprises can reasonably be required to pay the full capital and recurrent costs of pollution abatement, either by providing self-contained systems or by connection charges and annual fees in respect to public system use.

A particularly intractable issue is that of household and small enterprise fuel. Wood and coal are highly pollutant. Charcoal is less so but - like wood - raises serious sustainability issues for users and for rural areas. Kerosene may in some cases be economically attractive but poses massive fire risks given African low income construction patterns (and fire services). Bottled gas has initial capital costs for use which are likely to prove prohibitive as - especially for the supplying enterprise - does electricity at least until the recent South African experiments demonstrate low cost supply system and user charge collectability to be attainable. No general way forward is clear but even casual inspection of Soweto (let alone Seoul whose air pollution is dominated by household coal smoke) warns of the need to explore options and innovate in respect to low cost fuel/fuel use technology.

In these areas rapid surveys of key problems - as seen by technical experts and by residents - combined with collection of data on best practice policies and legislation in other low income countries (or in the north for a large scale high risk plants) is the initial priority. Only after a relatively clear picture emerges of what, where and why can what to abate, how and in which order over what time frame be addressed.

VIII.

Resource Mobilisation -Who Pays? How and Why?

In considering financing, charging and operating environmental expenditure four characteristics need to be kept in mind:

1. properly considered the bulk of environmental spending is capital investment - however classified in enterprise, government or national accounts;
2. under normal market conditions anti-environmental actions usually have substantial external diseconomies (costs falling on parties other than the actor) and pro-environmental ones substantial external economies (gains accruing to parties other than the actor);
3. both gains and costs (of action and of inaction) contain substantial, roughly quantifiable economic components and significant non-economic or socio-economic (e.g. women's workload) ones whose conversion to monetary economic magnitudes is either highly imprecise³⁴ or of very dubious meaning³⁵;
4. many pro-environmental actions have substantial economies of scale and coverage (an intuitively likely result since external economies and diseconomies are high).

Because many environmental programmes can operate satisfactorily only with community support, their participation is needed. The vital components are ones - leading to, e.g., tree planting and erosion control on own land and also to opposition to violators (including animal and wood poachers) providing to 'free' policing. They are not usually not cash nor - except on their own holdings - unpaid labour.

The same considerations suggest that many environmental programmes (those relating to large enterprises are exceptions) are best implemented via local government units from village through regional/provincial levels.

Again, however, there is no presumption as to how much own revenue the local governmental unit should raise for the purpose. Areas in urgent need of environmental protection/rehabilitation are likely to be poor and - like poor households - unable to finance the economically optimal size of programmes. The exceptions are among urban and isolated major enterprise areas assuming the big polluters can be taxed and regulated by local government (which is not self-evident).

³⁴ Reasonable estimates of net impact on women's workload can be made. The greater problem is valuation because this depends on how the freed time is spent. Shorthand methods - e.g. taking hours saved, assuming they are used on growing a major food crop and valuing 'additional' output at farmgate prices - do give results but rather problematic ones.

³⁵ Greater life expectancy and lower illness rates can be valued economically (albeit with the same problems as women's workloads) but most persons do attach a value to quality of life or amenity which cannot with any pretence at realism be converted to a monetary magnitude. Further, to do other than by an arbitrary constant figure per person tends to assert poor person's and women's lives are worth less than those of professional and commercial men.

These considerations apply very strongly to labour intensive programmes. The need to augment poor area (including urban and peri urban) incomes - taken together with the potential for additional external finance in respect to pro-environmental action - suggest that a substantial centrally funded component based on locally hired labour will usually be desirable. Local government self-financed and voluntary labour additions are perhaps best viewed as complements built on to the local portion of a core national programme.

A pure market solution would seek to manage markets so as to internalise costs and benefits. This is quite impracticable for many small operators (especially those producing for own use) and also for those driven to eco-damaging activities by need (enforced high discount rates). In addition the complexity of some of the interventions which might be needed places further limitations. However, to the extent - often substantial in respect to medium and large enterprises - simple market interventions can internalise costs and benefits the less the load on administrative regulations or on general finance supported offset programmes. The example of long term, conditional contracts in respect to logging rights is one of creating altered market parameters which substantially internalise both costs of overcutting and benefits of sustainable practices.

User fees are a plausible way of recouping some environmental programme costs, especially for enterprises and other above average level of service users. For reasons of collection efficiency, annual or quarterly - not individual time of use - fees are preferable and amalgamation into other property related charges - e.g. land rent and rates - may be. However, user fees have no magic about them, can overburden poor household budgets (especially if rapidly introduced for a wide range of services), and are frequently characterised by high collection cost to revenue ratios and are regressive for households relative to most direct and many indirect taxes (including a general single point sales tax or quasi VAT excluding unprocessed and simply-processed food). The strongest case for full cost user charging is in respect to special services provided for medium and large scale enterprises. In such cases no evident case for subsidisation exists and the total or total incremental costs of the services are usually reasonably accurately calculable.

There is no *a priori* reason not to use general tax revenue in support of environmental programmes except that it is scarce. However, that applies equally to defence, foreign affairs, health and education. Nor is it self-evident that additional revenues are more readily or efficiently raised by user charges than by general tax increases (or collection improvements).

Equally because environmental spending is largely on capital account no convincing a priori case against loan finance can be made out. However, scarcity of domestic savings and present and foreseeable external balance weakness do counsel against borrowings (not just

environmental ones) other than soft external ones unless the payoff is high and rapid while the cost of not taking action is serious and potentially results in irreversible damage.

Donors Or Contract Parties?

External involvement in environmental sustainability or rehabilitation has to date been seen largely as a question of official development assistance or aid. This may be neither necessary, helpful in reaching agreements beneficial to SSA, nor efficient in maximising additionality of international resource flows for environmental purposes (as opposed to their being sourced by reallocational from other uses of concessional finance).

The bulk of environmental expenditure in Africa will be in areas from which Northern economies will benefit. This is evident in respect to the five global and the regional areas. It is at least arguable in respect to sustaining timber and fish supplies and to averting land degradation which reduces food production and increases food aid requirements. In the case of mutual interests which can be specifically identified a contract in which each party makes interlocked commitments and enforceable against each party is more appropriate than the standard aid contract which is, in practice, not enforceable against the resource provider but only (and sometimes) against the recipient³⁶ and normally embodies one-way conditionality. To the extent environmental damage has global external diseconomies and environmental sustainability global economies common sense - not altruism or human concern for others - is the logical basis of contracts and gains made or losses averted the logical ceiling to external resource provision.³⁷

What resources (technology access, personnel, foreign exchange, external debt bought up and valued at a substantial discount) and what African commitments (programmatic, resources devoted, regulation adopted, results achieved) are topics, will necessarily vary from contract to contract as will the appropriate number of parties. Not all need be inter-governmental - several non-governmental bodies focusing on bio-diversity have substantial resources and are potential (in some cases present) contractual partners.

³⁶ Further, enforcement usually takes the form of suspending existing or rejecting new funding while, at least potentially, contract provisions could be more flexible and specific.

³⁷ Ceiling - not actual level. Assuming environmental protection is a positive sum game the total gains exceed total costs. Indeed in many cases the SSA state/economy gains will exceed total costs. Therefore, economic logic as well as realism would suggest most actual contracts will be below the ceiling level of resource transfers.

The difference between aid agreements and mutual interest contracts is not purely semantic but has at least three significant aspects:

1. because aid (especially grant aid and most particularly humanitarian aid) is perceived (however inaccurately) as philanthropic and disinterested the transferor often feels justified and the transferee bound to accept one-way conditionality based either on transferor perceptions of transferee interest which the transferee is too foolish to accept or on nominally non-contradictory transferor side interests. Paternalism not partnership is to varying degrees the rule, not the exception, for international agencies, bilateral aid bodies and Northern NGOs alike. Certainly the concept of the transferor being accountable to the transferee as a contractual obligation is alien. A mutual interest contract is a partnership toward stated common objectives, with common objectives and mutual (not one-way) conditionality;
2. in a contract each party is free to make proposals (bids) as to area covered, its own commitments (offers) and its requirements in return for them (price). Agreement depends on bargaining with the result somewhere between the maximal and somewhere above the floor positions of each party.³⁸ This allows much greater initiative to SSA parties to make and argue non-standard approaches (if they can convince the other parties of their soundness in terms of environmental payoff) than is, in practice the case in the core macroeconomic policy parameters of Structural Adjustment Programmes;
3. aid is not particularly popular in transferors - with governments or voters or enterprises. (It is also rather unpopular in SSA though for different reasons unless one treats the common strand as 'too much hassle, too few results'.) Certainly its substantial enhancement is problematic in the extreme. Environmental protection is much more popular and the case that promoting it in the South is a mutual interest 'business' deal is at least potentially saleable. In that case the contractual transfers could come out of environmental rather than aid budgets producing additionality rather than reallocation.

³⁸ A party should not be a net loser unless it has misperceived its own cost/benefit parameters. How near it will be to the other party's maximum justifiable payment (as opposed to its own floor) depends partly on its bargaining strength, partly on its understanding of other parties' valuations and partly on bargaining skill. Only on the first are SSA states inherently at a disadvantage. Negotiations are never simple because coverage as well as cross commitment levels may be altered and both resource transfers and commitments are usually multiple and can be for longer or shorter periods.

Looking Back - And Forward

While environmental strategies and their articulation are complex, a few basic conclusions - or starting points - are simple:

1. environment (including but not limited to ecology) is important both to the present and to the future at least as much in SSA as elsewhere;
2. in that sense environmental balance (sustainability) is as important as fiscal, monetary, external or poverty balance and should be among the core objectives of structural adjustment³⁹ - which is very far from being the norm today;
3. a series of major global environmental threats/imperatives for action exist and necessarily concern SSA because unless they are met heavy costs will fall on SSA;
4. however, both in respect to what can be done about global threats in SSA and in relation to more national and local environmental priorities a field (or street) level starting point and contextualisation (not *a priori* reasoning) is crucial to strategic articulation, programming and implementation;
5. poverty is environmentally destructive - indeed need not greed is arguably environmental degradation's main driving force in SSA - because when survival is at stake time discounts approach infinity. Therefore poverty reduction and resource injections targeted on environmental sustainability, not penal codes nor even managed markets, must be central to regaining environmental balance in SSA;
6. resource mobilisation considerations in respect to environment are - with one exception - not radically different from those pertaining to other issues characterised by high external economies and diseconomies, a high proportion of capital (as contrasted with recurrent) spending, and frequently substantial, economies of scale;
7. the exception relates to external resource mobilisation in respect to which mutual interest contracts based on enforceable commitments with multi-directional conditionality/accountability would frequently be preferable to the classic aid format.

³⁹ Alternatively structural adjustment can be defined as one element in a multi element development strategy with all elements significant, not marginal.

Biographical Note

This chapter has grown out of the opening presentation on environment to the 1994 Study Seminar on Structural Adjustment and Transformation in SSA and is influenced by participants' contributions. Major published influences on it include:

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