

**Environmental problems in an African setting**ROBERT W. KATES and L. BERRY *Clark University, USA*

Environmental problems are nowhere more important than in Africa, but they resemble little the usual concerns with environmental quality. Thus, it may be fitting to remind an international congress that the problems of African environments are still those of the rains that fail or wash the soil away, of the wildlife that destroys the harvest, of disease so endemic as to mock the very concept of 'normal' health. These problems are complicated by forces of acute change, varying perceptions of the need for concern, and the international linkages of trade and transport that tie the continent ever closer to the developed world.

In Table 1 we have tried to set out schematically for Eastern Africa what we see as the major environmental parameters and to indicate their severity and frequency. Although differences will be found in other developing countries we think that the general picture holds throughout much of the third world excepting the great metropolitan centres. The final column attempts to assess active concern for these problems, internally through official government attitudes, policy, and newspaper reports, externally through the emphasis found in both the scientific and popular literature, and our own resident/expatriate viewpoint. This assessment highlights the variation in perception. The African nations' major concern focuses on the dramatic natural events or the growing parts of modern life which impinge on the personal life of the policy makers. The external view registers high concern, for those who bother to write are by definition concerned. We rate as high priority problems: land deterioration

on grazing lands in a number of ecological systems, the need for coordinated rural development and new approaches to the concept of urban life in an African setting. Some major differences of viewpoint emerge; for example, the high external concern with the preservation of wildlife ecosystems and the contrasting problem of wildlife as a handicap to rural development schemes.

Such tabular classification does an injustice to the complex interaction of man and the natural world. Each major ecological zone has its particular set of problems and in the area studied we would pick out, the desert, the semi-arid lands, the wet and dry savanna and the tropical highlands as having distinctive sub-sets of important man-land problems. To these we would add the two distinctive urban environments; the concrete, European type colonial city and the traditional African urban complex.

The zonal complexity is matched by dynamic changes, both induced by population-based growth and the disruptive impact of development inputs. Recent studies of population pressure, soil erosion, natural hazards, water development and international trade illuminate these changes, confounding some conventional expectations while confirming others.

Population pressure, although felt by only 5-10 per cent of the East African population, is growing, particularly in the highland zones. In these areas a major increase in population has occurred while there have only been low rates of increase in the prices and yields of cash crops. Thomas (1970) and Dattoo (pers. comm.) are working in Tanza-

TABLE 1. Some parameters of resources and related environmental problems in East Africa\*

| Resources and related environmental problems | Importance |           |              | Rate of change | Potential to affect or alter the problem | Concern  |          |        |
|--|------------|-----------|--------------|----------------|--|----------|----------|--------|
|  | Severity   | Frequency | Pop. at risk |                |  | External | Internal | Author |
| <b>HUMAN RESOURCES</b>                       |            |           |              |                |  |          |          |        |
| Population growth                            |            |           |              |                |  |          |          |        |
| Urban congestion                             | +          | +         | -            | ↑              | +  | +++      | ++       | ++     |
| Rural involution                             | -          | -         | +            | ↗              | ++                                       | +        | +        | ++     |
| <b>QUASI-NATURAL HAZARDS</b>                 |            |           |              |                |  |          |          |        |
| Drought                                      | +++        | ++        | ++           | ↔              | +  | ++       | +++      | ++     |
| Flood  | ++         | +         | +            | ↔              | +  | -        | ++       | +      |
| Endemic disease                              | ++         | ++++      | +++          | ↘              | +  | +++      | +        | +      |
| Fire   | +          | -         | -            | ↔              | +  | -        | -        | -      |
| <b>TECHNICAL HAZARDS</b>                     |            |           |              |                |  |          |          |        |
| Auto and related transport                   | +++        | +         | -            | ↔              | +  | +        | +++      | +++    |
| Industrial accidents                         | +          | -         | -            | ↗              | +  | -        | -        | -      |
| Occupational diseases                        | -          | -         | -            | ↗              | -  | -        | -        | -      |
| <b>LAND RESOURCES</b>                        |            |           |              |                |  |          |          |        |
| Soil erosion from cultivated land            | -          | -         | ++           | ↔              | ++                                       | ++++     | +        | ++     |
| Rangeland deterioration                      | ++         | ++        | +            | ↗              | -  | +++      | +        | +++    |
| Forest destruction                           | -          | -         | -            | ↗              | +  | +++      | +        | -      |
| Unplanned urban land use                     | -          | +         | -            | ↑              | ++                                       | ++++     | +        | +      |
| Uncoordinated rural land use                 | -          | +         | +            | ↘              | +  | -        | +        | +++    |
| <b>WATER RESOURCES</b>                       |            |           |              |                |  |          |          |        |
| Industrial                                   | -          | -         | -            | ↗              | ++                                       | +        | +        | +      |
| Sewage and human waste                       | +          | +         | +            | ↗              | -  | +        | +        | +      |
| Water related diseases                       | ++         | ++        | +++          | ↔              | -  | +++      | +        | +      |
| <b>AIR</b>                                   |            |           |              |                |  |          |          |        |
| Pollution                                    | -          | -         | -            | ↔              | +  | +        | +        | +      |
| <b>OTHER RISKS</b>                           |            |           |              |                |  |          |          |        |
| Conservation of wildlife                     | +          | -         | -            | ↔              | -  | ++++     | +        | +      |
| Marine pollution                             | -          | -         | -            | ↗              | +  | ++       | +        | +      |
| Agricultural chemicals                       | -          | -         | -            | ↗              | ++                                       | +++      | +        | +      |
| Biological crop hazards                      |            |           |              |                |  |          |          |        |
| Birds, insects, vermin                       | -          | ++        | +++          | ↔              | -  | +        | +++      | +++    |
| Wildlife and livestock                       | +          | -         | -            | ↔              | -  | +        | ++       | +      |
| Microparasites                               | +          | ++        | ++           | ↔              | +  | ++       | +        | +      |

\*Not significant - ; low + ; moderate ++ ; high +++ ; very high +++++. ↑ rapidly increasing; ↗ increasing; ↔ stable; ↘ decreasing; ↓ rapidly decreasing.

nia on the relationship between land use and population pressure, and from this and other work it would appear that Boserup's thesis of steady growth stimulating re-adjustment is an over-optimistic one (Boserup 1966). To avoid rural involution much more productive combinations of resource use will have to be found.

Soil in any part of the world is a vulnerable resource, in the tropics with high rainfall intensities particularly so. Since the 1920s the misuse of the land has been a concern of government in East Africa, and a number of schemes were initiated. They all were poorly thought out, raised prompt resistance, and were, in the final analysis, failures (Young and Fosbrooke). Recently in East Africa a number of studies of mountain areas, by EAAFRRO and later by cooperation between Uppsala University and the University of Dar es Salaam (Rapp and Berry 1971) point to the conclusion that deforestation and even cultivation of steep mountain slopes in the tropics on particular kinds of soils is less hazardous than was formerly supposed though dangers exist in terms of *bare* ground and some specific localities. Continuous cropping on steep slopes in the Uluguru Mountains has been practised over the last 50 years without catastrophic changes in yields. But in grazing areas, improved stock watering facilities have led to a heightened erosion danger by concentrating grazing in the vicinity of watering places. One recent study traces the effects of improved water supplies in accelerating soil erosion with the increase in sediment measured by the loss of half of the reservoir's capacity within a decade (Cliffe et al. 1964; Murray and Rust 1971).

This type of unforeseen effect of water resource development is but one of a number of problems resulting from the efforts of African governments to overcome the marked seasonal water deficiencies found over most of the continent. Disruption of traditional life (Nicholas 1970; Brokensha 1963; Fernea and Kennedy 1966; Scudder 1966), the spread of bilharzia and other diseases, the creation of favourable ecological niches for animal and plant pests (Imerbore, in press; Bennett 1968; Boughey 1963; Wild 1961; Bell-Cross 1965-6), and the increase or decrease of sediment (Glymph and Storey 1967; Happ 1941; Pais-Codou and Rawal 1968), are among the unwanted and unplanned for ef-

fects of water development that frustrate the full realization of the human benefits of such projects.

Change is ever apparent in the impact of recurring natural phenomena. Evidence from our current studies of drought indicate that the costs of drought, as borne by the central government, are clearly increasing. These increased costs appear to arise from the growth in a population with a heightened expectation of assistance from now-independent governments and from the concentration of risks arising from regional crop specialization and greater dependence on marketed food crops.

Development both in the agricultural and industrial sectors brings new environmental problems of international origin. While African nations may choose to become 'pollution havens,' such choices are more likely to be accidental than planned. Imports of DDT or of vintage second-hand technology can spread the environmental crisis while exports of the raw material base diminishes the supply of low-cost resources eventually required for African industrialization. Depending on one's view of the finite nature of the resource base, the latter problem is more or less serious. But it helps little to note that African countries vie with each other for such exports. Clearly the international terms of trade for primary production makes mockery of the notion of comparative advantage unless it means that poor countries will have the comparative advantage of remaining poor (Rweyamaman 1969).

The environmental problems of Africa as we see them lie not in the maintenance of existing ecosystems, for these are inappropriate to the felt needs and desires of its people, but in the development of new, hopefully stable, relationships permitting higher levels of productivity without deferring to the future the spreading to others of heavy environmental burdens and costs.

Many of the difficult choices facing policy-makers are genuine questions of balancing development and conservation, but none should be made by omission or out of ignorance. Major development projects should routinely provide for environmental impact assessment. On a regional basis specialized personnel should be available, charged with reviewing imports of industrial and other machinery to encourage pollution control and to prevent the dumping of dirty technology.

The regional monitoring and quarantining of agricultural plant imports currently carried out in East Africa, should be broadened to include related imports of fertilizer, herbicides and pesticides. African-wide co-operation in natural disaster prevention now mainly in locust control should be broadened to cover a range of natural hazards, with planning for interregional food storage and distribution given a high priority. Modest amounts of directed research similar to the type described in this paper can serve to identify and focus energies on the most pressing environmental problems, energies which are now dispersed by the varying perception of external observers, resident scientists, and local policy-makers.

Finally, the legal systems of many countries are still in their early formative years and may be amenable to incorporating environmental quality as a public right. What Africa does not need now is another bureaucracy charged with monitoring or protecting such a right. Rather an assertion of public domain over environmental resources with provision for stand-by controls seems a more appropriate arrangement.

The two strands of thought running through this paper; the concern with the 'traditional' environmental problem and the growing awareness of the new set of problems brought by technology, reflects the basic nature of development. While the complexity and multiplicity of the problems seem daunting our own view is one of optimism. Africa has time; if that time can be used wisely an exemplary model may yet be achieved.

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