



Comprehensive Analysis of the Perils of Climate Change in
Africa and Suggestions on How to Ameliorate Them: An Application
of the Law of Change



CODESRIA

Anta Sane

Howard University

13

عمرة

Assemblée générale
General Assembly
Assembleia Geral
الجمع العام الثالث عشر

L'Afrique et les défis du XXIème siècle
Africa and the Challenges of the Twenty First Century
A África e os desafios do Século XXI
إفريقيا وتحديات القرن الواحد والعشرين

**DRAFT VERSION
NOT TO BE CITED**

A Comprehensive Analysis of the Perils of Climate Change in
Africa and Suggestions on How to Ameliorate Them: An
Application of the Law of Change

Anta Sane

Howard University

5 - 9 / 12 / 2011

Rabat Maroc / Morocco

Introduction

All works dealing with the issue of climate change in Africa agree that the continent stands to suffer the most from global warming. They also show that past history provides us with poignant lessons on the likely effects of future climate change, the greatest concern being the large infrequent disturbances to the climate as these will have the most devastating effects. In a sobering study from the Kenyan Tsavo National Park published in a November 2006 edition of the *African Journal of Ecology*, Lindsey Gillson reveals evidence for a drought that coincided with the harrowing period of Maasai history at the end of the 19th Century termed *Emutai*, meaning to «wipe out.» Ecological shocks such as that experienced by the Maasai are predicted to be a feature of global warming. Gillson explains that her work involved analyzing sediments from the famous Tsavo National Park. The age of the sediments was obtained by using radiocarbon dating and an analysis of the pollen and charcoal fragments provided a picture of environmental changes to be built up. Also, John Lovett, who has been researching the impacts of climate change on Africa, says that we must learn from history and be prepared (*ScienceDaily*, November 27, 2006).

Prepared or not, the perils of climate change are already being felt across Africa. Andrew Simms of the New Economics Foundation, for example, reports that although climates across Africa have always been erratic, scientific research and the experience of groups monitoring the situation indicate new and dangerous extremes. Arid and semi-arid areas in eastern, western, northern and parts of southern Africa are becoming drier while equatorial Africa and other parts of southern Africa are getting wetter. The continent is, on average, 0.5 centigrade warmer than it was 100 years ago; in some areas, the temperatures have risen much higher. In a part of Kenya, for instance, the temperature has become 3.5 centigrade hotter in the past 20 years. As a result, in the past few years alone, 25 million people in Africa South of the Sahara have faced a food crisis because subsistence farming has become very difficult. The great tragedy of all this is that Africa had played virtually no role in global warming, a problem that was caused by the economic activity of the rich, industrial countries (BBC News, October 28, 2006). Thus, what the rest of this essay does is to provide a comprehensive picture of the problem and offer feasible suggestions on how to deal with it. But before doing so, I first discuss the *law of change*, the theoretical postulate upon which the analysis in this paper is grounded.

The Law of Change

Humans, like all other animals, and all plants, influence their environment, and they are in turn influenced by it. Mutual influence is part of life itself, a fundamental force behind development, through millions of years, of the many living things on our planet. We can envision this force as a law of nature: i.e. the law of change.

The concept *ecological balance* is often employed to simplify matters. The term implies a situation where the law of change works in various directions in a system of animals and plants, and that the various forces countervail in order to stabilize the system as a whole. But in a broader perspective, and in the long run, it makes no sense to speak about equilibrium, as the law of change is omnipresent. It works sometimes incrementally, with course corrections, sometimes by leaps and bounds, as ancient species and ways of life give way to the new.

A very long time ago, Africans, like other humans, were hunters, gatherers and fishermen. They needed large tracts of land. If the population density became too high, starvation or ethnic war, or both, were the inexorable result. Had these hunters, gatherers and fishermen achieved equilibrium with their environment? At any rate, they appear to have been unable to bring about great or rapid change. Arms and tools were slowly improved upon, and Early Human and Early Dog found it to be to their mutual advantage to extend their cooperation to each other's clans. But this did not represent the law of change in more than its snail's pace version.

Then, a few thousand years ago, there was the great leap forward ushered in Africa in that the art of systematic growing of useful plants was developed instead of just collecting seeds and fruits in their natural habitats. In one stroke, *Homo sapiens* developed much improved means of guiding their destinies. The mechanism of collaboration could be utilized more efficiently, the physiological capacity of the brain could be used for planning, storing, foresight and prediction in a manner vastly different from what had been possible when all one could do was to run after wild quadrupeds in the wild forest. Humans were coming seriously to the fore, beginning to influence their environment in a way that was very different than ever before – it began very slowly at first, but then more rapidly, to fill the earth.

The influence of agricultural human on nature was and is by no means destructive as a rule. Indeed, the classical farming land constitutes a better and more pleasant environment than the preceding virgin forest, not only to humans, but also to many other living things.

Large parts of Africa have achieved their present vegetational appearance as a result of ancient agricultural practices and animal husbandry that have been going on for thousands of years, due to the great grass fires which Africans in many places start every year to improve grazing conditions. This practice has also benefited many wild herbivores. Much of what we call nature is largely the creation of humans, and it is dependent upon humans for its continued existence and, therefore, unstable in the sense that we choose to apply when we wish to pretend that humans are not part of nature. It is evident, however, that instability becomes manifest when Nature's son/daughter modifies his/her way of life for one reason or another.

Industrialization, so far incomparably the greatest intervention by the law of change in our existence and environment, is due to accumulated cleverness, inventiveness and organizational talent. But we now see the limits of what the new concoction can provide: pollution of air and water, din, acidity of lake water, maltreatment of nature, the health hazards of many products and production processes, mega-crowds, the breakdown of traditional groups and values. All these are consequences of industrialization or, at least, of a too rapid and, in part, obviously unpremeditated process of industrial growth. These consequences are the price we have paid for our un-paralleled supply of goods and services per capita and our un-paralleled growth in numbers. Most of us became genuinely aware of these consequences very late in the game.

One corrective seems to be coming along all by itself: i.e. the tendency towards decreasing child-births and, consequently, decelerating population increase. It is comforting to reflect that, at least in one respect, humans seem to conduct themselves differently from bacteria in a nutritious concoction. While many learned arguments have been made to explain this development, it is commonly agreed that it has something to do with high or improving material standards, with the attendant general education and emancipation of women. Improved contraceptive methods are a help, but they are not decisive for demographic developments. Modern contraception was hardly in the picture when the population in France stagnated in the late 19th Century, at the same time as living standards rose. Nor is it evident that contraception has constituted any significant brake on population increase in African and other Third World nations. That contraception should form an essential part of modern health care is quite a different matter.

It is imperative to keep in mind the link between material well-being and interest in environmental improvement when we consider the problems which African countries face

with regard to soil, vegetation and water. The existence and increasingly critical nature of these problems are generally recognized and eloquently described. That the developed world donors of development assistance should try to help towards their mitigation is undisputable. The least aid donors can do is to avoid causing further damage through the support of poorly planned development projects, such as gravely polluting industry, or water for cattle in such geographical concentration as is liable to cause overgrazing and trampling of the vegetation. In addition, they can provide expertise, equipment and money to stimulate and support such attempts at preservation or restoration of the natural environment as are proposed or initiated in African countries.

Indeed, it is not industrialization which constitutes the main environmental dilemma for African countries. Industrialization has not gotten very far in Africa; the law of change has not yet had the same impact there as in the other industrialized countries. Agriculture and animal husbandry, generally on the subsistent level, constitute the dominant pattern of the African economy. Formal Western-style education, especially of women, has not reached a level which would lead us to expect rapid demographic change. In their pursuit of survival, peasants exploit ever more marginal soil, ever poorer grazing grounds.

The problem of Africa, when it comes to the natural environment, as well as in most other respects, is not an over-hasty development, but a too sluggish one, or none at all. The exposed land would be best preserved by being left alone, and this would be possible if people could do something else than trying to cultivate it—for instance, pursue industrial development. But this is precisely what African countries are short of the means—management capacity, know-how, trained manpower, and capital—to do.

Direct measures of assistance to soil conservation and other forms of preservation of the environment are vital, and they are already part of developed countries' battery. But what will be decisive, in the long run, for the prospects of African nations to remedy soil and water problems as well as other environmental problems is their success in improving the low productivity of their people and the prospects of economic progress. What is needed is the stimulation of productivity to enlarge the scope for economic activity. That would be pushing the law of change forward, and that is what Africa needs.

Environmental Crises in Africa and the Developed Countries: A Brief Comparison

The environmental crises in Africa and the developed nations are Janus-faced: i.e. whereas the environmental crisis in Africa is one of under-consumption and inadequate technology, the environmental crisis in the developed countries is one of mass consumption and advanced technology. That patterns of production and consumption in the developed nations have had a severe impact on those nations' environments is now becoming fatefully apparent to every citizen in those countries.

Today, about 20 percent of Americans, for example, refuse to drink water from their taps, at least partly because they doubt its safety, the dangers of floods (increased by the clearing of forests for farms and timber), the leaching of garbage buried in landfills, and pesticide runoff in irrigation waters from agriculture. Many Americans are worried about the ways the society generates energy and the resulting global warming, air pollution (as much of the 2,500 gallons of air inhaled in the United States each day contains exhaust fumes, lead, and asbestos), and ozone depletion and its relationship to skin cancer (Blatt, 2004).

The relationship between poverty and environmental abuse is not so widely understood. Even so, on closer examination, it, too, seems inevitable. This relationship is painfully apparent in Africa. Affluent societies' appetites for exotic hardwoods do, of course, contribute to the rampant devastation. American, European and Japanese corporations, constrained by severe restrictions at home, have been able to operate quite uninhibited in Africa. The royalties the developed countries have paid for laying waste African lands have been welcomed by African governments as much-needed nest-eggs for their countries' «development.» Now, albeit late in the game, a few African leaders are beginning to slam on the brakes.

Nonetheless, native slash-and-burn farmers are also contributing to the problem, as they cover ever wider territory to eke out food for the day from temporary croplands. In addition to the farmers, there are hosts of landless peasants who wage a desperate struggle to ward off hunger and malnutrition. Yet still, millions are in desperate need of firewood, especially for cooking. The scarcity of firewood is the real energy crisis for a majority of Africa's people. Anything and everything that could be burn is being torn out of the soil; naked circles around villages are widening. Gathering food for cooking is beginning to take all day for many.

Where the forest is gone, wells dry up, rivers alternate between flooding and running dry, topsoil is leached and washed away, and dams clog with silt. In this way, the poorest of our fellow humans are literally destroying their own future, as the very basis for future generations' existence goes up in smoke.

Marine environments are also being subjected to ruthless destruction. Mangrove forests and coral reefs, havens for young fish and a buffer against the land-eating onslaught of the tides, are being exploited and ravished at a scary pace. Substandard technology further leads to serious pollution, of water in particular. Waters in which two-thirds of the world's fish mature from egg to adulthood are now in jeopardy. Supplies of drinking water are in many places impaired or endangered.

Thus, no form of assistance from the developed nations can be more important than assistance with the aim of saving the prerequisites of life of coming generations. No economic assistance can be more economically sound than assistance to emergency efforts to protect threatened biotypes. The scale of developed countries' advanced technology and overall approaches to problems is frequently ill suited to such efforts. Assistance efforts encounter a crucial difficulty in the very fact that all assistance presumes a form of knowledge transfer. Another prime difficulty resides in the fact that many African governments are often quite removed from those most in need of assistance. Consequently, developed nations' officials must reach out to the people in the villages, listen to their views, their accumulated wisdom, get them involved, and get them to realize that it is a question of their day-to-day existence. In essence, it is in small communities of individuals around the world that the great work to save our global environment must be carried out.

Poverty and Hunger

Are the problems of pollution and environmental degradation really the sole headache of the industrialized countries? Problems of conservation are mounting in African and other developing countries as well, but they are generally of a different kind compared to those in the industrialized countries: desertification (i.e. the process whereby vegetation and soil are debased to the extent that more or less permanent areas of desert-like barrenness materialize in arid tracts outside actual deserts), the wholesale razing of tropical rain forests, the pollution of highly productive coastal waters, etc. As such, the aid donors must consider the

environmental impact of projects beforehand, so that they and the recipients need not spend future time and effort repairing the damage the «aid» has done.

In the last three decades, increasing attention has been paid to environmental questions in the debate on foreign aid and development. The reason is obvious. In many African and other developing countries, there is now taking place a ruthless exploitation of scarce natural resources and a dramatic degradation of the environment which is threatening the basis of human existence. Thus, the customary view that environmental degradation is only a problem for the industrialized countries, and that environmental protection is a luxury which the developing countries cannot afford, appears increasingly obsolete. There should be no conflict between environmental protection and development in African nations. In many places, environmental degradation constitutes a direct threat to development. This is especially true of the efforts to improve the living conditions of the numerous poor in the rural areas. Active environmental protection is in many cases a prerequisite for development.

Environmental degradation in African countries is principally a result of over-exploitation of natural resources. This is, for instance, true of arable land, pasture, groundwater and forests. Even though there is profit-motivated devastation, especially in the case of the felling of forests, over-exploitation is mainly due to poverty. To subsist, people are forced to use natural resources in a way that drastically reduces the capacity of those resources to provide yield in the long term. The energy and food crises have created a vicious circle of poverty which has led to an ecological disaster in many areas.

To reverse the present trend, steps must be taken to combat poverty, from which the environmental problems of African countries actually emerge. To begin with, the general economic and social conditions in the rural areas must be improved. Steps must be taken to find new ways of earning a subsistent living. Alternative kinds of energy and a technology that is better adapted to African countries must be introduced. Furthermore, a better integration of environmental aspects in development work is imperative. Development must be adapted to the conditions laid down by nature. The limits set by the natural environment and natural resources must not be exceeded. At all times, attention must be paid to the close connection between natural resources, the environment and development.

The decisive importance of environmental aspects has been better documented at the international level, and it has also been recognized more widely in recent years. For many years, Sweden has been working diligently in bringing that about. A United Nations

symposium convened in Stockholm in 1979, financed by Sweden, drew attention to the necessity of recognizing the connection between population growth, natural resources, the environment and development. Sweden believes that only through the integration of the aspects of natural resources and the environment into the development process can a development which is ecologically tenable be guaranteed. Since then, a Swedish initiative has been taken to establish a United Nations program—the United Nations Environmental Program (UNEP)—aimed at ensuring that greater attention is paid to these fundamental links.

A World Conservation Strategy was initiated in 1980 by a number of international organizations both within and outside the United Nations system. This strategy emphasizes the connection between social and economic development and the natural environment, and suggests alternative approaches to development that take this connection into consideration. For the United Nations Environmental Program (UNEP), environmental development is a major component of its work. The aim is to achieve an integration of the environmental and resource aspects in all of the United Nations' development efforts and to work out methods of integrating them into the development work of the individual countries.

All development and development assistance cooperation must hinge upon the wishes of the recipient countries. Consequently, the frequently discussed question of choosing a suitable technology for a development project should be, first of all, a matter for the recipient country. The task for development assistance should be to help the recipient country to develop its own capacity to assess, receive and adapt the technology that is exported.

African countries and the developed countries must markedly increase their commitments in the sphere of land management, principally in village forestry, and the combating of desertification. The problems of soil erosion and desertification seem especially acute in the Sahel area, where the advance of the desert constitutes an ecological disaster of enormous proportions. The very basis of human existence is being rapidly eroded over large areas by the desperate search by the poor for shrinking grazing land for their livestock, for fuel, for water, etc. Bilateral projects which must be brought to the fore should include planting of trees and village forestry, providing more efficient stoves which use less wood, restoring of areas around water-holes, etc. which have been over-grazed in countries like Burkina Faso.

A corollary to poverty, inevitably, is hunger. The reasons for hunger in Africa are many; environmental degradation is one. Another is that African countries today produce raw materials for the industrialized countries that pay very little for them. In order to feed

their own peoples, African countries are then forced to increase their production of the raw materials at the expense of the environment.

There already exist signs of stress on the world's bio-productive resources. If the production of major commodities of biological origin is viewed in per capita terms, it is evident that many of them have already exceeded their peaks. And as population and per capita consumption continue to increase, it is likely that more commodities will reach their peaks in the near future.

Some studies have shown that the earth's physical resources and expanding technology can sustain an average growth rate in food production of about five percent. Even a humble population growth of 2.1 percent per year, however, would lead to increased pressure on resources, higher real costs and environmental deterioration—factors which would further undermine the global food prospects. Humankind has entered an era of scarcity as far as arable land is concerned. The declining availability of arable land suggests that expanding food production will depend on a wide range of resource-augmenting inputs like fertilizers, pesticides and high-yielding varieties.

But this leads to another problem. Not only is the production of fertilizers and pesticides energy-intensive, it is also expensive and dependent on the global petroleum prospects. Producing one ton of nitrogen requires about 1.8 tons of oil-equivalent. Much of the fertilizer applied to farms is not utilized by crops and leaches into water systems where it poses environmental health risks through nitrate contamination. The presence of nitrates in drinking water may induce a disease called methaemoglobinaemia, through which the capacity of the blood to carry oxygen from the lungs to the rest of the body is reduced. Infants are most vulnerable to this disease. Moreover, the leaching of nitrogen fertilizer may lead to the problem of eutrophication. It has been estimated that more than 70 percent of the nitrogen entering surface water comes from agricultural activities. If eutrophication is modest, it may be a source of food for numerous herbivorous animals, which in turn are fed upon by fish. But if the bloom becomes excessive, it may choke waterways and hinder navigation. And when the bloom decomposes, it depletes oxygen and may affect the fish population.

Most of the pesticides used in Africa and other Third World countries include persistent organochlorines like DDT, aldrin, dieldrin, and heptachlor—all of which have already been banned or are heavily restricted in developed countries. Pesticides poison at least one person every five minutes in the Third World, making a total of 250,000 people a

year, of who about 10 percent die. This estimate, however, does not include the thousands who suffer from cancer, have miscarriages and still-births, bear deformed children or suffer from the effects of pesticide contamination. The world produces about 1.8 tons of pesticides each year, an equivalent of 14 ounces per person on earth. Approximately 360,000 tons are exported to the developing countries. Despite this massive production of pesticides, the problem of pests is far from being solved; the bugs are fighting back by developing resistance against pesticides.

Future growth in agricultural resources will depend on the provision of more water and better water management in the arid and semi-arid areas. It will also depend on the drainage and management of surplus water in the humid and wet areas which account for well over 50 percent of the world's remaining reserves of arable or potentially arable land. Water will continue to be a major limiting factor to food production. Producing one kilogram of dry wheat grains needs at least 0.75 tons of water, and irrigating a hectare of rice requires up to 787,400 cubic inches of water in a season.

Food production faces the challenges of soil deterioration, despite the fact that some of the previously unutilized land is being brought under the plough. Soil deterioration is mainly a result of desertification, waterlogging, salinization, alkalinization, deforestation, loss of farmland to other uses and general soil erosion. The problem is compounded by the lack of effective technology for reclaiming salinized and waterlogged farmland. And bringing more land under irrigation may reduce the availability of pastureland and intensify pressure on the remaining pastures.

Forests and Trees

The threat to tropical forests is a threat to hundreds of people's chances to survive on agriculture. The devastation of tropical forests in Africa has created an energy crisis that is of concern to most people. The slaughter of rainforests is radically changing our climate and life condition, in spite of the denial by some policy makers and observers. The threat comes from transnational forest companies pursuing maximum profit and slash-and-burn farmers struggling to eke a living, but signs of resistance are beginning to emerge.

The rainforest is a 60-million-year-old ecological system that is unique in its stability. It rains constantly in the rainforest, often at the same time every day. It is permanently

warm and no wind penetrates into it. Eternal dusk prevails under leaves that form an impenetrable valve 110-140 feet up towards the sun.

Over millions of years, each species in the rainforest has developed a continuously higher degree of specialization. Birds exist that would die if touched by sunlight, and the richness of various species among insects, animals, plants and birds is tremendous. According to some estimates, half of the world's 10 million living species are in the rainforests, even though these forests cover only one-seventeenth of the earth's mainland.

Some generations ago, there were 840,000 square miles of rainforests in the world. About half of them have already been devastated and transformed into poor agricultural plots, ashes, infertile plains or toilet paper and luxury furniture. About a quarter of a million square kilometers of rainforest disappear each year. At this rate, this would mean that within a span of a generation, there would be no such forests left on this earth. What happens when a rainforest disappears? One outcome is certain: the rainforest will never reappear. It is even questionable whether an ordinary forest will ever grow out of this devastation.

The rainforest is a perfectly functioning biological entity. The sunshine and rains keep in motion a system that is almost totally closed. Dead plant matter is reborn at a staggering speed into new growing plants. The nutrients from smoldering leaves and branches are sucked up in new growing plants. The rest is immediately carried away by the permanently streaming rainwater. Under this thick skin of life, the ground is sterile. This is why it is difficult to create a new rainforest there, or fertile agricultural fields or grazing land without the help of extensive fertilizing. A new rainforest will never grow up again. Erosion will be thousand-fold. The result is that the rainforests disappear. With them millions of people's environmental conditions are destroyed. With them, we renounce our heritage, as aesthetical and biological resources that took nature tens of millions of years to create vanish. And with them also disappear the genetic materials from millions of living species which could have enriched our knowledge of medical plants or given us better grains, new fruit trees, root plants resistant to disease.

In addition, modern climatic research points out that clear-cutting of rainforests can heavily add to the increase of carbon dioxide content in the atmosphere created by the burning of fossil fuels. Stockholms Universitet in Sweden undertakes research in this field, and it has received international attention. Meteorologist Anders Björkström, a leading scientist on carbon dioxide content and greenhouse effects on climatic conditions, has found

that the content has increased by approximately 15 percent. Simple prognoses indicate that there will be a twofold increase of carbon dioxide between the years 2025 and 2050, which is hastened by the clear-cutting of rainforests. Estimates as to how much this contributes to climatic changes vary: from negligible amounts to amount comparable to, or even larger than, what derives from oil or coal burning. A doubling of carbon dioxide content in the atmosphere would mean a rise in the average temperature by roughly three degrees Centigrade. But such a rise in temperature will be unevenly distributed on the earth. At lower latitudes, it would only become one or two degrees warmer; at higher altitudes, it would get considerably warmer – up to 7-9 degrees. This is rather worrisome. One can imagine a certain melting of ice caps. This rise in temperature can lead to a general transformation of the climatic pattern on earth so that, for example, extremely dry areas would move north in the northern hemisphere and parts of presently existing agricultural areas would lose their ability to maintain a population.

Who is to blame for all this? The forest companies – Weyerhaeuser, International Pacific, Sunitomo, Honshu Paper, Volkswagen, Unilever, etc. – say not them. They argue that they only undertake a smaller part of the clear-cutting. For them, it is the fault of the slash-and-burn farmers. But it is the transnational forest companies that carried the biggest trees to their sawmills. In its original shape, the rainforest is much too dense and big for the local people to clear for their own agricultural needs. When the foresters go in and take away the biggest trees, the people move in as a result. They cut the smaller trees and burn the remaining vegetation and plant vegetables in the ashes. This particular area has never been cultivated before. As soon as the bigger trees have been removed, the slash-and-burn farming means a total change in the structure of the forest. Grass goes in and the forest is completely destroyed. The sun can burn the soil into a hard crust. In essence, the slash-and-burn farmers simply conclude the transnational forest companies' work: i.e. kill the forest for good.

Indeed, the future of Africa is intimately bound up with the future of its trees. Wood and charcoal are African households' most important fuels. Furthermore, trees provide shade and protect crops from the scorching sun. They help retain moisture in the soil, thereby combating erosion. But more trees are felled than are being planted. Turning the tide to avert catastrophe requires planting millions of trees each year. Fuel, too, must be used more efficiently. With an average population growth of about 3.2 percent per year, Africa's problem is acute, requiring mass mobilization and a firm political will to solve the deforestation problem.

Despite the abundant oil reserves in Africa, most of which has not even been tapped, the continent is facing two energy crises at once: an oil crisis in the modern sector and a wood fuel crisis in the traditional sector. The crisis in the modern sector is one of rising oil prices. Oil is mainly used in transport and industry. Increases in oil prices have meant that an ever smaller share of the economy is available for development. The crisis in the traditional sector has to do with the fact that more trees are felled than are planted, as noted earlier. Moreover, waste (plant mortality) is substantial: roughly three out of every five seedling trees are destroyed, with only two surviving 10 years after planting. In addition, the potential energy in the wood is used inefficiently. In rural areas, food is prepared over open hearth consisting of three stones. Such hearths have a fuel efficiency of roughly four percent: i.e. only four percent of the energy in the wood is utilized in cooking. In the towns, meals are prepared on simple charcoal stoves without chimneys, with a fuel efficiency of just about 10 percent. The charcoal, in turn, is manufactured in primitive coal pits which, too, have an efficiency of about 10 percent. Some coal is further lost in the distribution process, as charcoal is transported in jute sacks. In sum, town-dwellers utilize less than one percent of the gross energy content of the wood they consume.

Planting trees is one of the most important tasks facing Africans today, and it will require considerable efforts. A continental-wide reforestation program would cost billions of dollars, but no other course of action offers the same advantages at that price. The value of trees cannot be overestimated: as mentioned earlier, trees shade the soil and crops against the scorching heat of the sun; they help retain moisture in the soil and mitigate the effects of seasonal drought; they inhibit erosion, a severe problem in Africa; they pump up nutrients from deeper layers of soil; they provide fodder for livestock and food, fuel and timber for people.

In order to stimulate such a reforestation program, more money should be channeled directly to the planting groups, so that more people can be activated in the projects. The problem is so serious that governments alone cannot solve it without mobilizing the people. Bottlenecks in reforestation projects usually involve the supply of seeds and seedlings, shortages of automobiles for transport and implements and watering cans for use in planting. Seed collection and founding nurseries must get under way promptly.

The International Center for Research in Agroforestry (ICRAF) is an organization that studies the co-cultivation of trees and crops to see what systems are best suited to different types of soil. It has found that over the years, Western agricultural practices, with large-

scale monocultures that leave the earth bare from time to time, are poorly suited to African soils and climatic conditions. Combining agriculture and silviculture produces better yields, while combating erosion. This leads to better harvests and more trees, which is important inasmuch as food production is vital and cannot be made to compete with energy sources.

One out of every two Africans is under the age of 15, and it should therefore be a vital strategy to engage these young people and the schools in reforestation efforts. First, they have more reason to think ahead; second, the tree plantations would serve a major learning purpose in increasing young people's understanding of ecological relationships.

Energy must be used effectively in every phase, and there is a lot of room for improvement. Simple wood stoves, built of local materials, might increase the efficiency of wood use. It is vital, however, that the stoves be inexpensive, so that many people can afford them. An expenditure of any magnitude will not attract many users, even though households in many areas spend as much on wood as they do on food each year. A conceivable solution might be to introduce portable, effective kilns of the type developed by the Food and Agricultural Organization (FAO), the Cusab kiln. The kiln could be transported, making local purchases of wood. This model can also make charcoal of brush and wigs. The manufacture of briquettes might reduce wastage in transport by binding the coal dust. Coffee bean hulls, coconut shells, grass and other agricultural refuse can also be mixed into the briquettes. More efficient charcoal burners would also help increase fuel efficiency. Such braziers are already in the market, but they are more expensive than ordinary charcoal stoves without chimneys. It may be necessary to subsidize them in order to increase their sale and usage.

In the long run, alternative energy sources such as solar, wind and water will contribute to Africa's energy supply. But for the present, most people on the continent rely on wood. Hydro-power can be further exploited to provide more electricity for the modern sector. One problem with this energy source is that dams and reservoirs tend to clog with silt as a consequence of soil erosion. Therefore, hydroelectric power, too, is dependent on the success of reforestation and soil conservation efforts.

Geothermal energy has begun to be exploited in some areas of Africa. For example, in Olkaria, some 62 miles north of Nairobi, Kenya, a hole was drilled 353 feet into the earth. Steam is produced and harnessed to drive the turbines of a generator to produce electricity. Drilling was done at several other sites, so that geothermal electricity can contribute approximately 11 percent of Kenya's electricity.

Bio-gas (methane), derived from the manure of livestock, can be produced and utilized on large farms, albeit it is unlikely to contribute on a large scale, as cattle are grazed sparsely scattered over vast areas. Ethanol, or ethyl alcohol, can be produced from molasses, a by-product of sugar refining. Ten percent ethanol can be mixed with gasoline to reduce Africa's need of imported gasoline. But efforts to increase ethanol production further will be at the expense of foodstuffs. Producing methanol (methyl or wood alcohol) offers greater promise.

Solar cells are used for telecommunications, to drive pumps in isolated places, and to electrify fences to keep animals out of cultivated fields. They are too expensive, however, to have a major impact on the total energy strategy. Solar radiation is used to heat water and to dry various crops. The prospects for expanding this type of energy are vast. The sun can heat water for schools, hospitals, institutions of various kinds, hotels and homes. It can also be used to dry coffee and tobacco. The drying of tobacco leaves today consumes vast quantities of wood – approximately 30 trees per hectare of tobacco. Thus, in the short term, only mass mobilization to plant trees, coupled with more efficient use of wood fuels, can solve the energy crisis in the traditional sector.

Desertification

In 1973, two words became prominent in newspapers and television news around the world: Sahel and desertification. Sahel is an Arabic word denoting the belt of steppe and arid savannah south of the Sahara – from Senegal on the Atlantic Ocean to the west to the Sudan and Ethiopia on the Red Sea to the east. This roughly 310-496 mile-wide belt normally receives 2.5-15 inches of precipitation per year, but several years between 1968 and 1973 brought far below normal amounts of rain. Grass and other fodder disappeared, and millions of head of livestock perished. Deaths due to starvation among the nomadic herdsmen and small farmers of the Sahel were estimated at 200,000. The disastrous cycle of crop failure, famine, devastated pasturelands and cultivated fields has gone down in history as «The Sahel Catastrophe.» It also resulted in considerable degree of desertification – defined earlier in this essay as the process whereby vegetation and soil are debased to the extent that more or less permanent areas of desert-like barrenness materialize in arid tracts outside actual deserts.

Several types of land abuse can result in desertification. Two cases of the devastation of arable land in the arid regions of Africa are considered here: (1) Tunisia, an example of

the situation on the northern fringes of the Sahara; and (2) the Sudan, an example of sub-Saharan Sahel conditions.

The Mediterranean climate is characterized by long, dry summers and intensive periods of rain during the winter – a pattern that can lead to significant soil erosion if natural ground cover is weakened through farming, over-grazing, or the felling of bushes and trees. The same practices denuded the mountains bordering the Mediterranean to the north and east some 2,000 years ago. Greece, Italy, Lebanon, Spain, Turkey, among other countries, offer numerous examples. As the population of Tunisia has grown rapidly (about eightfold) over the past 100 years, the pressure on land, water and wood resources in that country has intensified. Consequently, the following six ecological effects have been noted:

(1) Over-grazing occurs because too many animals are allowed to graze freely on steppe land for long. Grazing and the trampling of hooves of goats, sheep and, to some extent, camels weaken the natural ground cover. As a result, topsoil is pulverized and is easily blown away by the wind or rinsed away by heavy rains.

(2) Over-cultivation of marginal lands that are extremely sensitive to erosion by water and/or wind results in permanent impairment of the fertility of topsoil and its ability to retain moisture after only a few seasons of farming. Disc-plowing by tractors, introduced over the past several decades, has caused particularly severe problems in Tunisia. It is a case of a highly inappropriate technology in a sensitive milieu, and many of the new flecks of desert that have come into existence in the steppe zone are directly attributable to this over-cultivation. The larger of these flecks, several miles in length, are clearly visible in satellite and aerial photos.

(3) Wood derived from the cutting of trees and brush for household fuel, fencing or building material bares the soil, paving the way for ensuing erosion. Each family of farmers cut approximately one hectare of marquis each year to meet fuel needs. The areas are cleared and then planted, making them extremely vulnerable to erosion.

(4) Salinization of irrigated land results because the bedrock of southern Tunisia contains salt that in many places contaminates groundwater as well as soil water. Deposits of gypsum have caused the formation of alkaline crusts in the soil and salinization with gypsum in irrigated fields. Salinization due to insufficient drainage is believed to have ruined vast irrigated tracts in ancient Babylon, contributing to the fall of the empire more than 2,000 years ago.

(5) Water erosion and siltation in reservoirs are the outcome of the many fluvial reservoirs that have been built in Tunisia. Most of them lie in the mountainous and less arid northern reaches of the country. Dams have been constructed to supply the cities with drinking water, to irrigate various agricultural districts, and to control flooding. All of the reservoirs, however, are filling rather quickly with sediment.

(6) Wind erosion is symptomatic of the effects of the tremendous dust storms that carry soil particles from North Africa across the Mediterranean to southern Europe. Soil leaves Tunisia in other directions as well—e.g., eastward and southward. Clouds of red dust from Africa have descended from time to time on the Alpine glaciers—where the snow is colored red—and on European coasts and cities. The precipitation occurs in the form of dry dust or as clumps of mud in rainstorm. Each of these storms represents the loss of millions of tons of African soil. The loss of wind-borne sand and soil particles from the Sahara and the Sahel over the Atlantic is even greater.

The Sudan, the largest country in Africa, with an area of 967,247 square miles, contains a variety of climatic zones, ranging from Saharan desert along its northern borders to mountainous rain forests along the Uganda-Congo frontier to the south. The Sudan probably has more territory affected by desertification than any other country in Africa.

A 1944 report by a Sudanese government commission on soil conservation revealed that the problem was known even at that time. The commission's conclusion was that soil degradation and erosion were more a consequence of human beings and their domesticated animals than of a change in climate. Its recommendation mainly concerned regions surrounding towns, where it advised planting green windbreaks of trees and bushes around some centers. As we know today, the commission was only partly correct about both its diagnosis and suggested medicine.

Between 1968 and 1973, the arid and semi-arid reaches of the Sudan suffered as severe a drought as hit the countries of the West African Sahel, from Senegal to Chad. Three factors helped to lessen the impact on the Sudan, compared to its neighbors, Chad to the west and Ethiopia to the east: (1) Sudanese herdsman and their animals moved south, (2) domestic relief supplies were available from the surplus of Nile Valley agriculture, and (3) there was a certain degree of awareness and preparedness among policy makers of the necessity of combating desertification.

A detailed and well-thought out plan for the effort was drawn up under the sponsorship of the Sudanese Research Council and presented to the United Nations Conference on Desertification (UNCOD) convened in Nairobi, Kenya from August 29 to September 9, 1977. The plan entailed (a) an inventory of the forms and extent of soil degradation and erosion, and (b) a pilot program for soil conservation and desert control. Unfortunately, the Sudanese efforts to engage the industrialized countries and oil-rich neighbors in a common cause against desertification fell on deaf ears. Even the conference planned to be held in the Sudan in 1978 had to be cancelled due to lack of interest among the invited countries. Nevertheless, the Sudan started, with its own funds and probably support from United Nations organs and bilateral assistance, several successful pilot projects that have shown that soil conservation is possible even in areas of extreme aridity. These projects include windbreak plantations along the western fringes of the Nile Valley bordering on the Sahara. Sweden also supported plantations near the town of Atbara.

In essence, it is not an overstatement that the need to conserve basic resources like water, productive soil and vegetation in Africa is greater now than ever. Soil erosion is one of the most serious threats to the health and welfare of Africans today, especially marginalized groups, which are forced to live on the fringes of arable land. Traditional forms of land use can no longer support them. There is no place left for them to move should their present land be debased or destroyed. Soil conservation for long-term productivity must become a more central concern in the United States' development assistance programs than has been the case to date.

Water

Long, tiring treks for a bucket of water have been the plight of most women in Africa; and for many of them, it still is. Indeed, a growing number of villages have been furnished with piped water and taps within easy walking distance. An immediate and feasible goal of any African society's water program, to which the United States could contribute, should be for every villager to walk less than 300 yards to clean water.

Fetching water has always been an endless drudgery for most women in Africa. They have had to walk several miles for a pail of water. Whole families have had to make two or three buckets of water last several days. There were times when mothers had to even deny

their children a drink when they are thirsty to make the water last. Policy makers recognize the importance of adequate water supplies for industry, for mines, for herding and for a country's overall development, but they seem not to be equally impassioned about life in the village, even though many of them are descendants of villages.

It is obvious that when women no longer have to make the long, tiring treks just for a pail of water, they will have more time and energy to take better care of their homes and families and to do more creative work. They can, for example, begin their own small businesses and earn money. They can raise more vegetables, thereby giving their families more nutritious diets. A clean house, clean children and clean food are all important for improving people's standard of health.

Most women avoid fetching water in the heat of the midday sun, so demand on the water system peaks twice a day: between 8:30 and 11:00 a.m. and 5:00 and 6:30 p.m. The water pressure falls so that it sometimes takes twice as long to fill a bucket as it does other times of day. But the women seem not to mind waiting, as it gives them a chance to chat with their friends. When the buckets are full, the women lift them carefully up onto their heads and walk home. There they empty the buckets into large clay jugs, which keep the water cool. The jugs have no lids; and when the women sweep the ground outside their doors in the morning, clouds of dust swirl up and settle down over the jugs, forming thin films on the water.

Sometimes, too, hens drink right out of the jugs, or toddlers fetch drinking water in mugs that have been left on the ground and licked by dogs. Water is generally clean when it leaves the faucet, but it becomes polluted due to dirty buckets and poor storage facilities. Many village households still use the traditional clay jugs without lids. Households that store their water in big plastic tanks with caps are considered «modern.»

When school is out in the afternoon, one often sees children in their school uniforms with water buckets on their way to a tap. Teachers say that there is a significant correlation between a well-functioning water supply and less absenteeism from school. Among school-aged children, girls fetch water more than boys. Only when the household fetches its water in a large tank that has to be hauled with a donkey-cart do the men help out, as men are traditionally responsible for handling draft animals.

According to the World Health Organization (WHO), a person should use at least eight gallons of water a day in order to keep him/herself clean and healthy. Many African

families manage on far less, perhaps a little less than three gallons per person. Nonetheless, they all look clean and neat. The young children are bathed in a little water in a basin every evening; dishes and kitchen utensils are always clean, even though they are washed in the least amount of water imaginable. The average family uses about 53 gallons of water per week for cooking. Approximately 45 gallons go to personal hygiene. Adults bathe every day, using between one and two buckets of water each time. School children generally wash their faces, hands and legs each morning before going to school. Young women tend to bathe more frequently than older women and men because they want to be «attractive.»

Laundry is washed twice or thrice a week, each washing requiring four to five buckets of water. This means an average of 30 gallons of water per week for laundry. Household laundry done once a month requires even more water. Households located near community taps wash their clothes when they need washing rather than letting them accumulate. Some women take their laundries to the wells to wash there, but this practice is not encouraged. Instead, authorities have sought to interest villagers in building small laundry stations near their taps, but these remain to be built.

Water use in villages peaks in July and August after the harvest, when people return to their villages after spending the planting season in huts near their fields or cattle posts. As a result, there are more people in the villages than at other times. Also, this is the time of year when people tend to repair their houses. Most village homes are built of stone plastered with a mixture of clay, cow dung and water. The plastering of a family's walls, floors and low compound walls requires between 100 and 800 gallons of water. In addition, local beer is brewed after the harvest. Each batch requires approximately 40 gallons of water. Brewing, with the attendant beer consumption, has been found to increase sharply as access to water improves through drilled wells and piped water in the villages.

Water supply development has progressed faster and even more effective in some African countries. Advanced technology has made it possible to drill many wells in a short time, but one disadvantage has been the almost complete reliance on foreign expertise. Training of African personnel has not kept pace with the extension of modern water facilities. Maintenance of pumps and piping has been a major problem in many countries. Generally, foreign assistance has not covered maintenance, and most countries have used the money on investments, installations, and neglected maintenance.

A major figure in the functioning of the system is the pump-man. Often, he is elected at village meetings and sent to a training course to learn how to take care of the pump, pipes and taps. The pump-man maintains the pump, cleans and lubricates it, but does not undertake any repairs on either the pump or the pipelines. In case of trouble, maintenance personnel from the district water board are sent. When a tap does not work, people do not get angry; they simply go to another one.

Much of the water obtained through drilling is contaminated with a variety of substances, which, of course, is a major problem. Salt is one common contaminant, as are nitrates and the presence of bacteria. Efforts must be redoubled to see that people get pure water. In many villages, the water well is in the middle of town. As villages grow in size and as more latrines, installed over holes in the ground, are built, some serious cases of pollution have developed. The risk of contamination must be a prime concern in the planning and drilling of new wells. Meanwhile, existing wells must be fenced-in so that livestock cannot pollute the water supply. Chlorine is added to disinfect the water in some villages, but villagers complain of the taste. Another factor underlying their dislike of chlorine may be that chlorinated water is not good for brewing beer.

In some African countries, Family Welfare Educators (FWEs) stationed in villages play a significant role in teaching people how to handle their water. Chosen by villages, FWEs are trained and then work together with the personnel of local health clinics. They make house-calls and lecture mothers on health, hygiene and the importance of vaccinations when they visit the clinics with their children. First, people were weary of the FWEs and did not want them to make house-calls. Nowadays, the people understand the importance of the visits made by the FWEs. It is a difficult task to change people's attitudes. It is one thing to give people medicine and vaccine; it is quite another to get them to change their way of thinking, their diets, how they raise their children. On home-calls, FWEs can see for themselves how well cared-for the children and household are. They can point out, for instance, that the water jugs should be covered or that water should be boiled if a child has diarrhea. If the children look undernourished, they can refer mothers and children to a nutrition clinic in the village.

Global Warming

In June of 2006, the government of Niger requested that its citizens pray and fast so that it would rain. The country has had three consecutive years of drought and the situation was getting desperate. Could anyone in the United States imagine three years without a drop of rain? This is commonplace in parts of East and Southern Africa.

The major reason for this and other deleterious effects that have resulted from the global climate change, according to Dr. Sama Banya, Honorary President of the Conservation Society of Sierra Leone, is the reckless manner in which some developed countries are misusing the earth's natural resources and polluting the atmosphere with greenhouse gases. He suggests that while Africans have no control over the way the industrialized countries are causing climate change leading to global warming, Africans can minimize the effects of those changes by the way they treat their local environment.

That the effects of global warming are being felt on the continent of Africa is hardly disputable. As Godwin Obasi (in Ramsay and Edge, 2004:241) points out, global meteorological observational records show that Africa is now warmer than it was 100 years ago. Warming through the 20th Century was at the rate of about 0.05 degrees Centigrade per decade, with slightly greater warming from June to August and from September to November than at other times. The five warmest years in Africa have all occurred since 1988, with 1988 and 1995 being the two warmest years. Africa's rate of warming has mimicked those of the rest of the world. Obasi adds that a comprehensive characterization of regional climate change projection for Africa for the 21st Century is that future annual warming will be from 0.2 to more than 0.5 degrees Centigrade per decade—i.e. ten times the rate during the 20th Century. The warming is expected to be greatest over the interior semi-arid margins of the Sahara and Central and Southern Africa.

According to the Sciencebase Section News, in May of 2005, researchers from the University College of London found that the fabled equatorial icecaps in the Rwenzori Mountains will disappear within two decades because of global warming. The Rwenzori Mountains, also known as the «Mountains of the Moon,» are at the border between the Democratic Republic of Congo and Uganda. The mountains are home to one of the four remaining tropical icecaps outside of the Andes and are well known for their spectacular and rare Afroalpine flora and fauna. The legendary status of these mountains can be traced

back to the 2nd Century when Greek geographer Ptolemy proclaimed that the River Nile was supplied by snow-capped mountains at the equator of Africa. In his words, they were «The Mountains of the Moon whose snows feed the lakes, sources of the Nile» (Sciencebase Section News, May 15, 2006).

The glaciers were first surveyed a century ago, and the glacial cover over the entire range was estimated at the time to be 4.3 square miles. Recent field surveys and satellite mapping of the glaciers conducted by the University College of London, Makerere University and the Ugandan Water Resources Management Department reveal that some glaciers are receding tens of yards each year and that the area covered by glaciers halved between 1987 and 2003. The researchers also found that since the 1960s, there have been clear trends toward increased air temperature around the Rwenzori Mountains without significant changes in precipitation. If present trends continue, the less than one square mile of the remaining glaciers will disappear within the next 20 years. It is not clear, however, how the projected loss of the glaciers will affect tourism and the traditional belief systems of the BaKonso linguistic group. Nzururu, the BaKonso word for snow and ice, is the father of the spirits who are responsible for human life, its continuity, and its welfare. The irony of global warming as it pertains to Africa is best stated by Dr. Richard Taylor, the lead researcher from the University College of London, as follows: «Considering the continent's negligible contribution to global greenhouse-gas emissions, it is a terrible irony that Africa, according to current predictions, will be most affected by climate change. Furthermore, the rise in air temperature is consistent with other regional studies that show how dramatic increase in malaria in the East African Highlands may rise, in part, from warmer temperatures as mosquitoes are able to colonise previously inhospitable highland areas» (Sciencebase Section News, May 15, 2006).

The Youth

Work, having a purpose, is what gives us our identity. In African countries, children and young people often have to work too hard; but they serve a vital function in the families' lives and in society at large. These children are quite sure that they are needed. In the United States, this is seldom the case; consequently, young people are forced to seek their identity by other means. A number of toys and gadgets tend to play a significant role in their lives. Meanwhile, society and the schools ask them to be active, responsible citizens, to get involved

in important issues concerning the environment, waste of resources, the plights of their less fortunate counterparts at home, in Africa and in other parts of the world. How does all this add up? How can this course be changed?

Leading our children to the playing field and teaching them how to dribble a soccer ball has a powerful learning effect. Such an effect cannot be matched by any classroom discussion on the fine art of soccer. This is because the rewards the schools offer are usually quite inferior to those offered in life outside the classroom, even in the case of soccer. Teachers' scolding weighs less compared to convenience or the glint of admiration in a child's parents' eyes. Still, remarkably enough, children are usually those who hesitate the most before following the flock in a soccer game. Now this section is not about soccer; it is about how we learn certain important attitudes and values, among other things, about our environment and threats to it.

Is it at all realistic to try to correct bad habits on the soccer field and other aspects of life by means of information that appeals to reason and tries to influence people's attitudes? Educators and psychologists have long noted that it is almost impossible to change a person's behavior by advocating a different attitude—i.e. «preaching» (e.g., in teaching). Marketing executives are particularly aware of this and sell whole lifestyles in which gadgets and toys become necessary attributes. It seems that people develop habits, often as a result of pressure from their environment, due to prevailing circumstances or some other—unconscious—reason. With habit established, people then formulate or adopt a value or attitude, a rationale, that legitimizes the habit in question. If we consider what our institutions of education try to teach with regard to the environment, natural resources and economic distribution, we can make a number of interesting, albeit perhaps mainly depressing, observations.

Some years ago when alarming numbers of American teenagers were using illegal drugs, members of the United States Congress were asking about what schools have done about the problem. Some educators responded that they do not make or sell the illegal drugs, a response that reflects a profound understanding of the phenomenon known as the «hidden curriculum.» Thus, it may be fitting to take a new tack on the question and ask what the schools have done to take account of that insight—i.e. taking as one's point of departure the fact that attitudes on such questions are often formed by already established patterns of behavior.

How do American schools provide for learning respect and awareness of the environment? Unfortunately, it is more the rule than the exception that students are asked to learn «respect for conservation» while the school milieu in effect systematically trains them to the contrary. When many American school children and children attending day-care centers feel thirsty, they normally have no other option than to go to a dispenser, pull out a plastic cup, fill it with water, drink up and toss the cup into a trash can. Thirsty again an hour later, they repeat the same procedure. School lunches can be a continuation of the same indoctrination—plastic cups, plastic spoons, plastic forks, plastic knives, half cartons of milk, foil wrappers around the butter, leftovers, etc. thrown into the trash cans. If you ask the students in American «plastic-wrap schools» from where the plastic comes, you will get some quite informative answers: «From oil, which entails this and that environmental risk in extraction, transport and refining, not to mention that it is scarce, expensive and most of it imported. Plastic in our refuse, when burned, produces so-and-so pollution, etc.»

Therefore, in a traditional sense, the teaching has been effective to a point. Students know all they need to know, but seldom if ever does their knowledge affect, nor is it permitted to affect, their behavior. On the contrary, they are systematically trained to behave in ways which, during certain segments of their school day, they have learned are wrong. The examples of such contradictions are just too numerous to discuss here.

The big problem, of course, is that the whole society outside the school—indeed, children's overall situation in industrialized societies—constitutes an effective training ground in behavior that in both the short- and the long-term is devastating to the environment and finite resources. From a global perspective, the situation is morbid. In the classroom, young people learn that oil, paper and numerous other commodities are in scarce supply and, above all, that they are extremely inequitably distributed and consumed. Out of class, they see plenty evidence to the contrary. The major tragedy is that this contradiction is even apparent in the schools themselves.

The schools are part and parcel of the predominant lifestyle in the wealthy countries. Naturally, they reflect the mainstream pattern of behavior. Indeed, they help reinforce it, with a few cosmetic amendments here and there in the form of slick slogans. «The population explosion in Third World countries» is still singled out as the most serious threat to natural resources and the environment, with no mention whatsoever of the far more invidious consumption explosion taking place in the industrialized societies, which hardly brightens

the picture. The schools even carefully avoid making any links between abundant wealth and rampant waste in the industrialized countries on the one hand and the exploitation of developing countries during and since colonialism on the other. Being kept in the dark, today's American students are not equipped to understand the environmental problems of developing countries.

Put differently, the schools make no serious effort to counteract or rebut the economic rationale behind the squandering of natural resources and the pillage of the environment. Neither could they hope to bring about any fundamental change acting alone. The few teachers who attempt to do so are hounded and threatened with losing their jobs by right-wing neoconservatives who call them «unpatriotic liberals.» But the schools in general could do more than they are doing if they are united in the pursuit of truth that will benefit the society at large. The schools are also pitted against a number of other factors that have made the youth in the industrialized countries particularly inclined toward the various attributes of the lifestyle of overdevelopment and over-consumption. They have been trained in the ideology of consumerism, a world of disposables, the latest gadget, of built-in obsolescence, in which possessions form a very central part of existence. A society that has given them everything: from iPods to satin satchels in which to keep their dogs' pajamas.

It may be difficult to fully grasp what growing up in such an environment means and the nature of the underlying mechanisms. A few comparisons with certain features of most African children's lives may be useful. Practically anywhere in Africa, one will see most of the children coming home from school, hanging up their book bags and, entirely on their own volition, going to take care of the family's most prized possession: a farm, a garden, cattle, or a kiosk, etc. Once home, they continue with household chores. These children have a purpose: filling a natural function within the family circle and in village life. How, then, do their developed world counterparts spend their afternoons and evenings? They may have two wheels with a ten-speed transmission or the latest GameBoy. Others spend the entire afternoon and evening on the basketball court or some other athletic arena. Still others walk around committing crimes or harassing their peers and elders.

African children with their gardens, farms, or cattle, etc. have a role in the family. Sometimes, the chores are too many and too heavy – which is not good, let alone idyllic – but that is up for debate. Feeling that we are needed, that we count, is a basic human need,

common to all, regardless of age. Our work, the role we play, is what gives us identity. Lacking such a role, the individual must seek to establish his/her identity by other means: for instance, by being first on the block to own an iPod, the latest designer jeans, etc. Those who cannot be the first will have to «borrow» their identity, emulating those who were. They will have to creep into the protective shell of the latest fashion, acquire the right kind of high-tech gadget and mannerisms, to do the «cool» things. This creates a virtual insatiable market for all sorts of gadgets and fads. This market is bountiful. Fads come and go at astonishing pace: witness the recent cycles of cellular phones.

Is it a hopeless venture to try to change the status quo? The answer depends on one's perspective. For the long run, we must recognize that comprehensive changes in American society will be necessary for classroom input to have a significant impact. But since the youth and children spend so much of their time in school and nursery schools or day-care centers, it should be possible to exert some influence that, in turn, might at least lead to perhaps hastened social change. The acceptance of this premise calls for a recognition that the schools must become more consistent, more consonant with their stated objectives. Plastic cups and the like must be banished if the schools are to have any credibility as advocates of non-consumerism and conservation. Meanwhile, child-care institutions must also make far greater use of the opportunities that do exist to let children feel capable, useful, needed: i.e. to develop a positive identity of self-image.

How can children be taught about respect for Nature when they no longer know that Nature provides things that are vital to our day-to-day existence? The answer hinges upon throwing out all kinds of so-called pedagogical toys—plastic beads mounted on Masonite, styrofoam Easter chicks and Santa Clause. Bring in reality, instead! What happened to pine cones, acorns and interestingly-shaped pebbles? Or take, for example, a meal of fresh red snapper. A mess of fish is all full of lessons. One can count them. How many red snappers to the pound? One can compare them in length and width. There is the icky-sticky-gooey fun of cleaning them. One might stop to consider what they eat (by looking in their stomachs) and what eats them. One can look for milt and roe, etc. This is a natural part of the conversation over the common activity of preparing the meal, which is exactly the way children used to learn in their homes: doing useful work together with adults.

Classes can cultivate useful plants. Many day-care centers and schoolyards in developed countries are surrounded by thorny hedges. Why not plant berries, instead? The

berries can be harvested, prepared and eaten. Meanwhile, the children will have a natural opportunity to learn all sorts of things about how nature works; they can work with their hands and minds. Is mental dexterity not better developed by dicing onions for meatballs that one can serve his/her classmates for lunch than mounting plastic beads on Masonite? Besides being able to assume a greater responsibility for their environment, older children might run a flea market exchange for second-hand items such as roller-skates, sports equipment, toys, games, clothes, shoes, books, CDs, etc. This should function as an antidote to the latest gadget craze. Where such activities yield a profit, the money might be donated to a worthy cause in an African country. The main thing is that the youth have the initiative. They certainly want to be trusted with the responsibility. Schools might also become centers for repairs and recycling projects of various sorts. Classes might also undertake fact-finding studies for local government agencies.

Any study on crime prevention that queries numerous schools on what measures had proved most effective in discouraging absenteeism and vandalism would yield answers concerning measures involving a greater measure of self-determination on the part of students themselves. There are actually many interesting examples of successful efforts to change teaching routines and the whole school experience to allow the schools to exert the kind of influence discussed here. Far more important would be to give each school greater freedom in drawing up local study plans designed to achieve curricular goals with respect to environmental issues and the conservation of resources. Furthermore, teaching with the aim of promoting resource conservation and environmental awareness can be economical. (This is not to suggest that the efforts should be promoted as money-savers, as that would put a serious constraint on such a program before it even gets started.) Such efforts have proven to be most effective when students and teachers together have been given whatever money their innovations have saved.

Anyone who suspects that young folk might just run to the store and buy candy with the profits from their initiatives will take comfort from the example of students in Kiruna in arctic Sweden who run the school café. These students have introduced a utilitarian pricing scheme, whereby mark-ups (surcharges) on such items as Danish pastry are used to subsidize more healthy foods like fruits and salads. It appears that adults are less utilitarian-minded than the youth.

Another major goal is to develop active, socially aware, responsible citizens. There is a strong connection between individuals' propensity to take action and the extent to which they are able to exert influence on their own surroundings. Generally speaking, those who are unable to influence their immediate environment and day-to-day situations tend to have the least interest in environmental issues, people in other parts of the world, etc. Indeed, if African and developed world policy makers want not only to give the youth an awareness of environmental problems but to also move them to do something about those problems, then the elements of a program relating to school democracy, student participation, self-determination, etc. must be among the most vital policy repertoires.

Conclusion

Dealings between Africa and the developed nations that relate to natural resource conservation are part and parcel of developed countries' development assistance to the continent. And since neither Africa nor the developed world has shown any signs (as of this writing) for terminating this relationship, it can best be characterized in terms of the type of «interdependent,» albeit unequal, relationship between developed and developing nations: i.e. on the one hand, developed countries' development assistance to Africa appears more as a means to strengthen developed nations' economic and geopolitical interests in Africa; on the other hand, Africa benefits by having a peaceful relationship with the developed nations and employing their aid to promote government programs. More basically, then, the issue can be raised as to whether or not the present developed nations' mode of pursuing its interests in Africa cripples the ability of the continent to control its own destiny. For implicit in developed countries' development assistance is an ethnocentric view that prevents it from seeing what is good in «underdeveloped» Africa and to feel justified in treating Africa as standing in need of developed nations' «know-how.»

This ethnocentric view hampers innovation and change and results in social isolation. This explains why some African leaders often reject developed nations' solutions to their development problems, and see no need to change what they feel is already a good thing from their perspective. At worst, it leads to stagnation; at best, it results in retarded growth and development. The fragmentation of developed nations' development programs in Africa is the additional negative consequence of this ethnocentric view.

Since the developed countries' governments possess most of the needed technological and financial resources for development, or enjoy access to them, they understandably «aid» the development efforts of Africa only to the degree that such activity enhances developed nations' objectives. And since the developed countries are technologically and economically more powerful, transfers of resources, information, and personnel consolidate the dominant developed world's position and further accentuate the dependency of an economically weak Africa.

When development techniques are transferred from the developed countries to Africa, only a fraction of the entire process of technical change is bound to emerge within Africa when the technique is implemented. It is those parts of the process that are taking part outside the developed world that dictate the basic properties of the technique. These characteristics are shaped by the social organizations and the factor endowments of the developed countries where the inventions and innovations are made. And for those techniques that are generated within the developed nations' transnational corporations, it is obvious that they will be geared toward those corporations' maximum profitability in their international corporations, and not necessarily adapted to the conditions in Africa. Most frequently, Africa is able to choose only among techniques generated in developed nations' transnational corporations. This limitation gives rise to a structural technical dependency by Africa in terms of developed countries' projects in the continent.

This being the case, a more coherent developed nations' foreign assistance program for Africa calls for terminating project aid and converting it to outright security assistance. This will allow Africa to spend its aid dollars on programs that it perceives important to its development needs (a relationship that will parallel that between the United States and Israel), putting Africa fully in charge of its own economic destiny.

The major consequence of such a foreign aid policy, however, will hinge upon the developed nations' publics' attitudes toward their governments. These attitudes, which must be conditioned by trust, call for clarity and honesty with which developed nations' leaders explain the African situation and argue for actions they believe are necessary to meet the critical challenge in that part of the world.

Such a foreign aid policy cannot be expected to lead the developed countries to a foreign policy consensus, but it can play a role in generating domestic support for African initiatives if it is explained honestly in terms of what it is and what it will do. It should

neither be explained as a humanitarian program nor as a development program, since security assistance programs are not primarily designed to spark self-sustaining economic growth (Israel is a good example).

A foreign aid program for Africa that is comprised of security assistance entirely would increase Africa's maneuverability; and what Africa will do with this ability will depend on its priorities and capabilities. This will also allow the African governments to increase their odds of survival – no government can pursue effective development policies if its future is in doubt.

This is why the application of security assistance compels different rules. The unpredictable nature of African politics and the uncertainties inherent in intra-African relationships, in particular, suggest that such a security assistance program for Africa will carry with it the potential for excesses. This could lead to charges of waste and inefficiency by its critics. While such outcomes are inevitable, they can nevertheless be kept in check through careful management.

In essence, development assistance to Africa should be used to reinforce both actors' political, economic and moral objectives. If these purposes are sound, then developed countries' aid will become an effective form of foreign policy for strengthening their interests in Africa. The continent, on the other hand, will be able to buy breathing space in maintaining stability as it works to meet its development needs.

In conclusion, the modern system of communication has overcome the geographical barriers between Africans and developed countries and expanded their horizons. Africans, especially, have become more acutely aware of the state of affairs in the developed nations than ever before. They are hauntingly reminded of developed nations' affluent style of living. Many in the developed nations have also been frequently moved to help Africans work towards eradicating poverty and causes of disease and unrest. Many in Africa grow restive to achieve a higher standard of living, to emulate the American way of living. Both Africa and the developed world stand to benefit from increased prosperity in Africa and from mutual trade.

References

- Banya, Sama. July 6, 2006. Apart from climate change what else? *Concord Times* (Freetown, Sierra Leone).
- BBC News. October 28, 2006. Climate change 'hitting Africa.' *BBC News Online*. Retrieved on May 7, 2010 from <http://news.bbc.co.uk/go/pr/fr/-/2hi/africa/6092564.stm>
- Blatt, Harvey. 2004. *America's Environmental Card*. Boston, MA: The MIT Press.
- Lapham, Nicholas P. 2004. A natural resource conservation initiative for Africa. In Walter H. Kansteiner III and J. Stephen Morrison, eds. *Rising U.S. Stakes in Africa: Seven Proposals to Strengthen U.S.-Africa Policy*. Washington, DC: The Center for Strategic and International Studies Press.
- Obasi, Godwin O. P. 2004. Embracing sustainability science: The challenge for Africa. In F. J. Ramsay and W. Edge, eds. *Africa* (Global Studies, 10th ed.). Guilford, CT: McGraw-Hill/Dushkin Company.
- Sciencebase Section News. May 15, 2006. Disappearing equatorial icecaps. Posted by Africans_Without_Borders@yahoo.com on May 15, 2006.
- ScienceDaily*. November 27, 2006. Impact of climate change in Africa. *ScienceDaily*. Retrieved on May 7, 2010 from <http://www.sciencedaily.com/releases/2006/11/061126115458.htm>
- Swedish International Development Authority. 1981/82. *Report, Theme: The Environment*. Stockholm, Sweden: SIDA Information Division.
- Vig, Norman J. and Michael G. Faure. 2004. *Green Giants? Environmental Policies of the United States and the European Union*. Boston, MA: The MIT Press.

About the Author

Anta Sane hails from Senegal and is a graduate of Pfeiffer University in Charlotte, NC. She has dual Master's degrees in Organizational Leadership and Change and a Masters in Business Administration concentration in Finance. Her undergraduate degree is in Communication Studies from Suffolk University in Boston, Massachusetts, coupled with a minor in Black Studies. Ms. Sane's professional career encompasses a diverse exposure in banking sales and service where she held different positions ranging from Personal Banker to Branch Manager. Her performance evaluations have earned her several «Play Like a

Champion» awards. She has been also nominated for the «Who's Who Among Students in America.» Her humanitarian work includes an internship with The United Nations Population Fund agency in Dakar, Senegal, where she wrote an article about world population day in the United Nations Newsletter, and an advocacy plan to prevent maternal mortality. Ms. Sane has also represented the UNFPA to the National Assembly of Dakar, presenting a bill regarding health reproduction, sexual health and family planning. Ms. Sane is a doctoral candidate and assistant in Political Science and at Howard University in Washington, DC. Her areas of concentration are Public Policy/Public Administration, International Relations and Comparative Politics. She is also teaching at Washington DC Community College and is the French Editor-in-Chief of an online magazine for the African Diaspora called Jamati.fr.

Anta Sane

2600 Keating St Apt 406

Temple hills, MD 20748

(704) 281 0841