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Apartheid's Environmental Toll

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Introduction

The great red hills stand desolate, and the earth has torn away like flesh. The lightning flashes over them, the clouds pour down upon them, the dead streams come to life, full of the red blood of the earth. Down in the valleys women scratch the soil that is left, and the maize hardly reaches the height of a man. They are valleys of old men and old women, of mothers and children. The men are away, the young men and the girls are away. The soil cannot keep them any more.¹

With those words, South African novelist and political reformer Alan Paton described the landscape in *Cry, the Beloved Country* in 1948. The same year, the white voters of South Africa elected the white supremacist National Party, which, capping a long history of racist legislation, erected the scaffolding of apartheid laws and institutions that has made the nation an international pariah ever since.

Along the way, the architects of apartheid turned Paton's words from prose to prophecy: although few observers north of the Limpopo River realize it, institutionalized racism has been as devastating for South Africa's environment as for its people. Apartheid has polluted the air and water, pillaged the bedrock, and torn the earth away like flesh. In much of the country, the soil indeed cannot keep the people any more.

Within Africa—perhaps the most severely degraded continent—the Republic of South Africa has long cultivated an image as a conservation leader. The nation has much to be proud of. Six percent of its territory is protected in parks and game reserves, its corps of professional conservationists and research scientists is unequalled in Africa, and its wild flora and fauna are as well monitored and guarded as any in the world.²

I would like to thank Holly Brough for her uncommonly skilled research assistance and Henk Coetzee, Paul Conlon, David Cooper, Brian Huntley, John Ledger, and Lloyd Timberlake for their comments on a draft of this paper.

"Apartheid reveals with exceptional clarity the way unfairness within the human estate extends its damage into the natural estate as well."

In most respects, though, South Africa is far from an environmental model. Even setting aside for the moment the depredations wreaked by apartheid, the nation shares severe ecological problems with much of the world. For example, South African farmers, white and black, lose 20 tons of topsoil for each ton of crops they produce-not the worst figure in the world but five times the U.S. rate. The nation's southwestern deserts are marching to Pretoria, expanding across two and a half kilometers of exhausted pastures a year. And its overuse of pesticides, including DDT and deadly components of Agent Orange, endangers farm workers and the food chain alike.³

In these regards, South Africa is not alone. Modern history is all too full of societies that have squandered their patrimonies, fouled their nests, and poisoned their people. What is exceptional in South Africa's assault on its natural inheritance, however, is the factor of apartheid: the network of racist policies, and the extraordinary means to which the state has resorted in maintaining them, have doomed the nation's ecology to suffer great insults. Apartheid cannot be blamed for all of the country's ecological traumas, but it must take the blame, in part or in whole, for many. Its environment has been degraded far more than would have occurred if racial separatism had never been institutionalized. In this respect, South Africa stands alone.

Directly and indirectly, the set of policies and institutions called apartheid has exacerbated a long list of ecological ills. The bits and pieces of South Africa reserved by government fiat for the region's original inhabitants, and then packed with black people not wanted in the white economy, are today among the world's most degraded lands.

To finance the military superstructure that upholds minority rule, broad areas have been deeply scarred by reckless mining. Meanwhile, air pollution over the nation's coal region ranks with the worst in the world, partly because of an energy strategy that aims at minimizing dependence on anti-apartheid oil exporters. South African mining and energy policies contribute to global environmental threats on a scale completely out of proportion to the size of the nation's population and economy. And across the northern border, the South African military has collaborated in devastating herds of elephants and stands of tropi-

cal hardwoods, as part of its campaign to cripple and intimidate neighboring states hostile to apartheid.

Ell societies are stratified, to a greater or lesser degree, along lines of wealth, race, and sex: South Africa is unique in the degree of its inequality and in the way the government in Pretoria enforces inequality through the law. Apartheid, as an extreme form of the social injustices found so pervasively, reveals with exceptional clarity the way unfairness within the human estate extends its damage into the natural estate as well. In this light, the ultimate lesson of apartheid's ecological toll is that inequitable social institutions-whether the suppression of women in Islamic cultures, or tribal groups on the Indian subcontinent, or the poor in Appalachia-are not compatible with environmental sustainability. Everywhere, the dispossessed bear the brunt of ecological abuses and at times have no choice but to sacrifice their environment to save their lives and their families.

Today, apartheid's grip on the nation is weakening, and a spirit of reconciliation has begun to take hold among leaders of both races. A negotiated transition to full democracy-little more than a pipe dream just months ago-is now a real possibility. If it comes to pass, some of apartheid's environmental insults will be alleviated automatically. But many will be left to a new government as part of the racial system's legacy. At this crucial juncture, a full ecological reckoning of apartheid's past may help point the way to a future in which black and white live together in a greener land.

Homelands or Wastelands?

In 1652, Dutch settlers put ashore at the Cape of Good Hope to build a way station on the trade route to the Orient. Foreshadowing all that was to follow, they planted a hedge around their encampment and forbade the region's aboriginal people, the Khoisan, from remaining inside. The colonists and their descendants have been pushing that hedge out in larger circles ever since.∅

With the Land Act of 1913, the Dutch, by then known as Afrikaners,

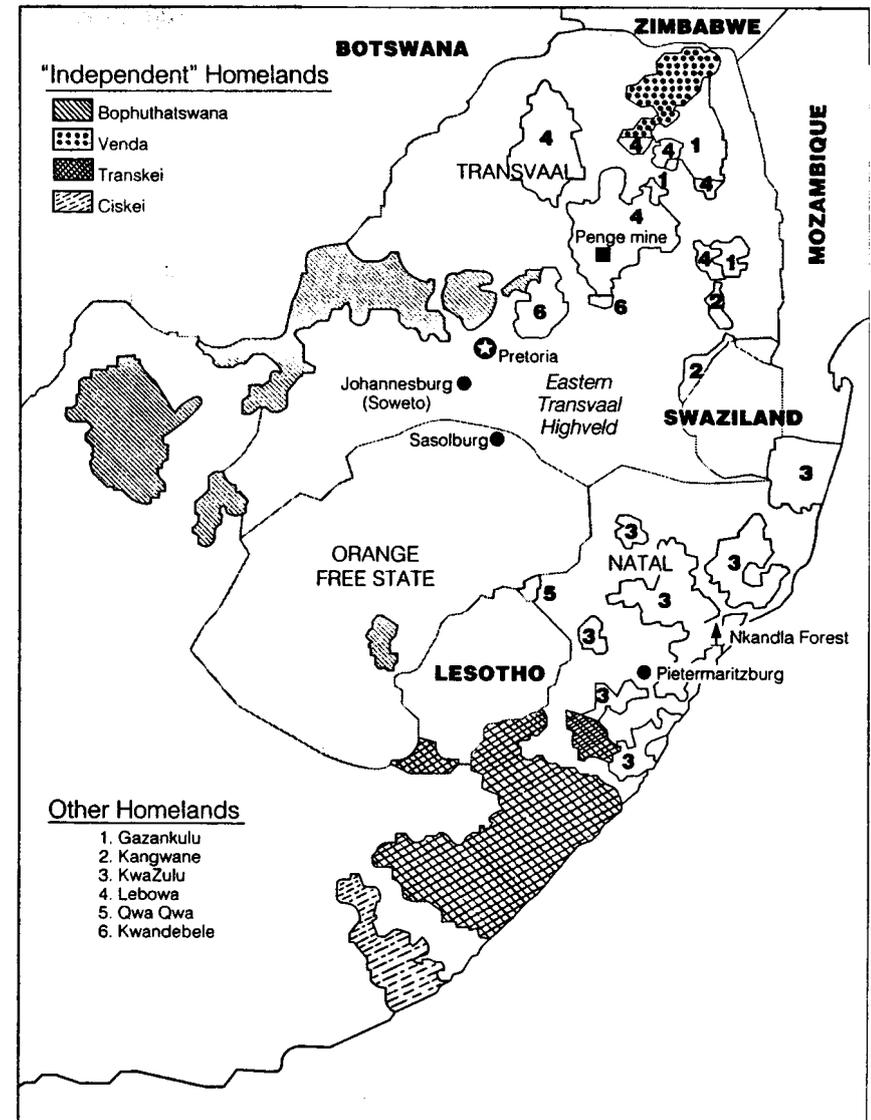
completed their appropriation of the 1.25-million-square-kilometer region today called the Republic of South Africa. The act divided the national territory between whites and blacks, marking off 87 percent of the land for the whites, and relegating the vastly more numerous black population to the so-called Native Reserves it established on the remaining 13 percent. (See Map 1.)⁵

Since the advent of apartheid in 1948, 4 of the 10 reserves have been pushed into a hollow sort of independence. Theoretically, they are autonomous nations with full self-rule. In fact, they have either puppet regimes or well-intentioned leaders with little effective power because the regions they govern are remote, barren, overcrowded, and entirely dependent on the republic for economic survival. In effect, Pretoria first guaranteed itself an army of low-paid workers by denying blacks land and then absolved itself of responsibility for those workers by declaring them citizens of "independent" internal nations.⁶

The ecological results of this policy of "separate development" are written all over the topography of the reserves, or, as they are euphemistically called, "homelands" or "bantustans." Poor land, crowding, a shortage of labor, and dire poverty, all flowing from apartheid, have been disastrous for these regions. As one U.S. Agency for International Development official in neighboring Swaziland said, "Many of the homelands bear more resemblance to the face of the moon than to the commercial farms and game preserves that cover the rest of the country."

tonaaArankis **Wilson** and health specialist Mamphela Ramphela of the University of Cape Town write in *Uprooting Poverty*, their comprehensive review of the plight of South Africa's poor, "Almost everywhere the land is breaking under the burden that has been laid upon it." Few comprehensive surveys of land degradation exist for the reserves, but what data do exist show a dismal picture. When the government's Ciskei Commission gave its report a decade ago, 46 percent of the land in the Ciskei reserve was already moderately or severely eroded and 39 percent of its pastures overgrazed.⁸

Similar land degradation is apparent in most homelands. In the Msinga



Map 1: South African Homelands

district of the kwaZulu reserve 'erosion gullies called *dongas* have grown into small valleys and topsoils scarce. KwaZulu farmer Creina Bond Alcock reported that "old fields have vanished completely in some parts of Msinga, opening up extraordinary expanses of stone." Sunduza village in the Transkei homeland is scarred with *dongas* 20 meters deep, and in the once-fertile Lebowa reserve boulders occasionally roll down denuded mountain slopes and crush the huts below.

Absent thorough data, the fate of the bantustans can best be judged from the closely analogous case of the independent nation of Lesotho, an impoverished land surrounded by South Africa that is similar to the homelands in history, ecology, demography, and economic dependence on the regime in Pretoria. There, 10 percent of the original farmland is now barren waste, and almost 90 percent of grazing and croplands suffer unsustainable rates of soil loss. Indeed, the destruction of Lesotho's vegetation is so severe it can be seen from orbit: American geographers L.A. Lewis and Leonard Berry write, "A Landsat image of the boundary area between Lesotho and the Republic of South Africa shows the boundary as though it were a natural geologic feature." Were satellite photos of the homelands to be compiled, they would undoubtedly show the same pattern.¹⁰

South Africa "' crests, too, -ire~overburdened.- Two-thirds of South **asewood** forfuel but because of the extreme population pressures'inthe homelands, wood is increasingly difficult to come by. Professor Anton Eberhard of the University ofCape Town surveyed fuelwood gathering in four reserves and found that women typically make treks of six to nine kilometers every other day, collecting loads each time that weigh about 30 kilograms. Similar situations exist in other countries in the developing world, but nowhere else are they a consequence of national pohcies aimed at subjugating the majority of the inhabitants. In South African bantustans, as energy researcher Mark Gandar writes, "If wood gathering is counted as part of food preparation, more effort is put into the preparation of food than the growing of it."

With per capita consumption of fuelwood at 200-800 kilograms annually, forests in the homelands don't stand a chance. Twenty years was all it took for fuelwood gathering to strip the forests from the isolated

slopes of Lebowa's Leolo Mountain, and kwaZulu's complement of distinct woodlands fell from 250 to 50 in the last half century. A century ago, Cetshwayo-the Zulu warrior who led his tribe against white troops set on subjugating them-was buried in the heart of the Nkandla forest. The forest's receding edge is now visible from his grave. In the Qwa Qwa reserve, forests exist only in history.¹²

Analysts at the Energy Research Institute of the University of Cape Town have carefully estimated the supply and demand for fuelwood in the homelands. Their results show the dimensions of the rural energy crisis. (See Figure 1.) By comparing the growth rates of woody biomass in homeland ecosystems with fuel consumption rates, they conclude that 4 of the 10 reserves were already in fuelwood deficit in 1980--consuming more wood than their land produced each year and therefore depleting the ecosystems. Projecting population growth rates since then, along with the declining wood supply as ecosystems are over-taxed, they calculate that as a group the 10 homelands went into fuelwood deficit in the early eighties. Furthermore, if apartheid is not dismantled, they project that the homelands' annual fuelwood production will be half what their people need at the turn of the century, and that natural woodlands will be "almost entirely denuded by the year 2020."¹³

(Environmental deterioration in the homelands has four interlocking *~auses, and all of them trace their roots to apartheid: poor land, politically enforced overpopulation, labor shortage, and poverty. First, the 10 homelands are situated in fragile environments-regions best suited as rangeland. From the very beginning, blacks were given land where topsoil is thin, rainfall scarce and unpredictable, and the ground sloping and rocky. Borders were carefully drawn, and sometimes redrawn, to exclude anything of value: industrial sites, transport lines, mineral resources, and fertile land. The geographic result is that the reserves are 'landlocked archipelagos, scattered across the map of South Africa. A geographic survey of kwaZulu reveals 48 large and 157 small isolated tracts, and one of Bophuthatswana's six segments is 320 kilometers from the others.¹⁴

Second, apartheid forces the land to support an astronomical number of

"Forced relocations and natural increase combine to give the homelands an average population density higher than all but three countries on the continent."

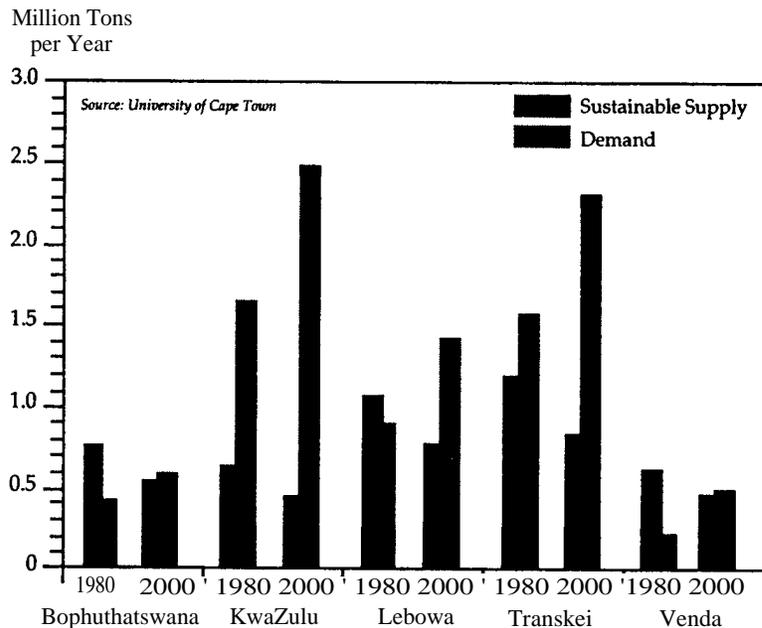


Figure 1: Estimated Fuelwood Demand and Sustainable Fuelwood Supply, Selected Homelands, 1980 with Projection for 2000

people. Of South Africa's nearly-4 million inhabitants, 29 million are black, 5-million are white, and the remainder are classified as either "colored" or "Indian." Perhaps slightly more than half of the black population is crowded into the reserves by apartheid, and most of the remainder live in segregated urban townships and illegal squatter settlements.

Overpopulation in the homelands is a political phenomenon, enforced by the white minority government. Not only are most blacks forbidden from moving out of the bantustans, but South African scholars believe

that nearly 3.5 million additional blacks were pushed in between 1950 and 1983 to help realize the state's goal of territorial separation of the races.¹⁶

Meanwhile, birth rates in the homelands are higher than anywhere else in the country. Black couples there have larger families because apartheid denies them access to education, health care, family planning, and secure sources of livelihood—the things that make small families possible and advantageous. The nation's dark-skinned population has quadrupled during this century, rising even more steeply within the reserves. Forced relocations and natural increase combine to give the homelands an average population density higher than all but three countries on the continent. White rural areas are at most one-tenth as heavily populated.»

Perhaps the most telling evidence that the black lands are overburdened arises by comparing their agricultural potential with their population. During World War I, a government commission surveyed the agricultural carrying capacity of the small reserve of Qwa Qwa and estimated that the area was already overcrowded at 5,000 inhabitants. Today, Qwa Qwa is home to more than 500,000 people. Likewise, the Ciskei has about nine times as many inhabitants as it can support in subsistence agriculture.¹⁸

Overwhelmed by population growth and land degradation in the reserves, per capita food production has fallen dramatically, so much so that the homelands are now net importers of food. In the late forties, Bophuthatswana's farmers were harvesting around 110 kilograms of maize and sorghum for each resident of the reserve. In the late fifties, they were taking in 80 kilograms per person, and in the early seventies only 50 kilograms. Today, the harvest is undoubtedly spread even thinner.¹⁹

Third, the homelands suffer a labor shortage. Seemingly paradoxical, this problem is a result of the fact that few of those present are in their peak working years. In South Africa's peculiar migrant labor system, these destitute lands provide the white economy with reservoirs of cheap black labor. Some 70 percent of homeland income is earned in the

white economy by unskilled wage earners who cram buses and minibuses for hundred-kilometer daily or weekly commutes, or who spend most of their lives working thousands of kilometers from their families.²⁰

The homelands, then, are home mostly to children, the old, and the infirm. In the sixties, when "removals" were near their peak, many elderly blacks were consigned to these areas because the government considered them, in the words of one cabinet minister, "surplus appendages." A detailed survey in one region of kwaZulu found that most inhabitants were children or elderly, and that 81 percent of working age inhabitants were women, mostly mothers who could not leave their children to work far away. These women, struggling to provide for so many youngsters and elders, are too pressed to undertake land-conserving projects.²¹

Finally poverty itself makes land conservation difficult. A decade ago, two researchers at the University of Stellenbosch ranked the 57 nations for which income distribution data were available. South Africa came in last; it is probably the most inequitable nation on earth. In a country where whites enjoy the same affluence as North Americans, half of the population—80 percent in the homelands—lives beneath the poverty line. At last tally, 95 percent of blacks earned less than \$100 a month. Meanwhile, 89 percent of whites earned more.²²

Cut out of the prosperous South African economy by law, and living hand to mouth, homeland farmers lack the cash to make long-term investments in protecting their land. With average disposable income of around \$150 a year, one-sixteenth of the white average, they simply cannot afford to buy fencing supplies to control grazing, hire laborers to help terrace sloping fields, or invest in tree planting to conserve soil and water.²³

These four elements—fragile land, overpopulation, labor scarcity, and poverty—combine to form a trap of economic and environmental impoverishment. The poor get poorer, and the land is worn down to bedrock. In South Africa, blacks are disenfranchised not only politically but ecologically.

Pillaging the Earth's Crust

More than two billion years before the Dutch landed on the Cape, a shallow sea was receding from what is today called the Transvaal, leaving behind a filigree of gold. Later, diamonds rode chimneys of molten rock to the surface from their birthplace 60 kilometers down, and later still the plants that would one day be coal spread over the Transvaal in deep, folding layers. These three events, from a geologic perspective, form the economic tripod of apartheid: they created the conditions that enabled a few million European settlers to maintain control over the native peoples far longer than was to happen in any other nation.

Today, South Africa is the Saudi Arabia of minerals. The country's thousand-odd mines and quarries scrape the earth's crust and burrow deep into it, putting the nation high on the list of major mineral producers. It is first among countries in production of gold, chromite, and platinum, second in manganese, third in uranium, fourth in antimony, fifth in diamonds, sixth in asbestos, seventh in nickel, eighth in iron ore, ninth in coal, and eleventh in silver.²⁴

Mineral production, unless carried out with scrupulous care, is exceedingly damaging to the environment and dangerous to the workers involved. For every ton of metal that leaves a mining operation's mill, about one hundred tons of wastes are left in a heap topside, where they can blow away on the winds, run off into rivers, or leach into groundwater. Mine wastes account for three-fourths of all solid waste in South Africa, according to ecologist Brian Huntley of the Botanical Research Institute in Cape Town. The nation's 450 mine dumps cover some 10,000 hectares between them and hold perhaps 20 billion tons of rocky waste.²⁵

Apartheid is linked to mining's environmental toll in three ways. First, the enormous costs to the white government and economy of maintaining apartheid have made Pretoria financially dependent on mining. Consequently, the state has given great freedom to the minerals industry, allowing it to endanger black miners and the environment while protecting it from public scrutiny. Second, as occurs all too commonly around the world, the environmental costs of mining fall onto the poor, who are, in the apartheid state of South Africa, almost exclusively dark

"Air and water near mining and smelting operations are little monitored, and what monitoring is done is not reported."

skinned. "rd, the political powerlessness of South African blacks has left them unable to counter the industry's irresponsibility.

Apartheid and its legions, the best-equipped and best-financed military south of the Sahara, would have collapsed long ago were it not for the billion-dollar dividends gained by scouring the earth. Directly or indirectly, the minerals industry contributes close to one-third of the republic's economic output, two-thirds of its export earnings, and more than one-tenth of its tax revenues. In 1988, South Africa sold gold worth \$9 billion, coal worth \$1 billion, and diamonds worth perhaps another \$500 million.²⁶

Profits from mining are essential to South Africa because upholding apartheid has strained the country's economy to the breaking point. International trade sanctions and divestment have lowered real consumer spending some 15 percent and cut gross domestic product at least 10 percent from what it otherwise would have been, according to Chris Van Wyk, chief executive of South African Bankorp. On top of these international penalties, apartheid itself has stifled the nation's economy. American economist Stephen Lewis recently added up the costs of maintaining separate facilities for whites and blacks and of racial discrimination in employment, education, and access to credit. The results, Lewis contends, explain why growth of the South African economy has been slowing down since the sixties and has ground to a halt in the past decade.²⁷

In these circumstances, Pretoria has been loathe to touch the mining industry. The Chamber of Mines, a confederation of major mining corporations, keeps a tight lid on information about environmental impacts, and the government shields it from criticism. While many countries have favored powerful industries with lax health and environmental regulation, South Africa has treated mining like a sacred cow, fearful of disturbing the cash flow that keeps apartheid functioning. Air and water near mining and smelting operations are little monitored, and what monitoring is done is not reported.

Excavating minerals always entails environmental risks. It involves blasting, digging, and hauling thousands of tons of ore to the surface,

then grinding it to a fine powder and washing out the metals with harsh substances like cyanide, mercury, and sulfuric acid. The well-known dangers of these materials are often exceeded by the dangers of the large volumes of "natural" chemicals that are liberated from the mountains of excavated rock when suddenly exposed to the weather. Mine wastes commonly cause acidification of ground and surface water and release toxic heavy metals such as arsenic, cadmium, and lead. The final step in extracting most metals is smelting, a process in which ore is heated to extreme temperatures in the presence of catalysts. Smelters for many minerals spew out sulfur dioxide and toxic air pollutants on a scale matched by few other industrial facilities?^a

In South Africa the extent of ecological damage from minerals extraction is massive, from poisoned streams to stripmined hillsides, and it is overwhelmingly blacks who must live with the consequences. Their townships and squatter settlements are downwind and downstream from the mines. Riverlea, a typical "colored" township near Johannesburg, for example, is centered on a massive yellow gold mine dump. Much mining is now located on the peripheries of large urban areas—Just where squatter settlements have been springing up as blacks illegally flee overcrowded homelands and townships. Because South African gold mines extract large quantities of uranium as a secondary product, the nearby black communities may also be exposed to the cancer-causing radium and radon that commonly leak from uranium mine wastes.²

These squatter settlements on occasion also suffer from outlaw hazardous waste dumping. Hundreds of barrels of industrial solvents and effluents from paint making in Pietermaritzburg, for example, have been found stacked among mud huts in the hinterlands outside that city. Not far away, a British-owned chemical company operates a mercury-waste-processing facility upstream from the Valley of the Thousand Hills, a densely populated part of the kwaZulu reserve. In the Mngweni River, which flows into the valley, mercury concentrations have been recorded at 1,500 times the level at which the U.S. Environmental Protection Agency declares materials toxic.³⁰

Blacks suffer underground as well. The mines, controlled by six major

"For every ton of gold
South Africa extracts,
a black miner dies in an accident."

corporations, employ 750,000 workers, mostly black, who labor in conditions that are among the most hazardous anywhere. The risks of old mining are so great that the all-black National Union of Mineworkers (NUM) commemorated the hundredth anniversary of the discovery of gold in Johannesburg with a report called "A Thousand Ways to Die." Half a million men descend into the gold mines each morning; on a typical day, two of them are carried out dead. Since the beginning of the century, some 46,000 workers have died underground. For every ton of gold South Africa extracts, a black miner dies in an accident that probably would not have happened in another country. Data on coal mining show that from 1978 to 1983, South African coal workers were about 10 times as likely to die on the job as their counterparts in the United Kingdom³¹

A typical example of the mining companies' recklessness is their cavalier treatment of polyurethane foam, an insulator so hazardous when it burns that the United Kingdom and West Germany removed it from mines two decades ago. In 1986, South African mines were still using it extensively. That year a spark ignited a 600-meter stretch of polyurethane a mile underground in the Kinross gold mine, the world's largest, and the deadly fumes were quickly distributed by the mine's ventilation system. This fire turned into the worst gold mining disaster in history, killing 177 miners and causing irreparable lung damage to scores of others. The government of South Africa still made only non-binding recommendations for the removal of polyurethane. It took two more years, another polyurethane fire, and seven more deaths before Pretoria would ban the substance outright³²

Although the extreme depth and heat of South African gold mines make them perilous in themselves, sociologist Jean Leger of the University of Witwatersrand attributes their high death rates more to what he terms "racial despotism." White supervisors underground, who rarely venture into the risky areas where blacks work, are paid bonuses to boost output. As a result, black miners who slow production to point out safety hazards are more likely to be punished than praised. Leger noted that "bonuses paid to white miners are earned by the risks [black] workers take."³³

Blacks have also paid the price for South Africa's production of asbestos,

a fibrous mineral that has been conclusively linked to three irreversible diseases, asbestosis, mesothelioma, and lung cancer. South Africa was the third largest producer of asbestos in the world until 1985 and remains its fourth largest exporter, according to the Montreal-based Asbestos Institute.³⁴

In the United States, asbestos exposure has been closely regulated for over a decade, and in 1989, the Environmental Protection Agency issued orders that will gradually eliminate asbestos in almost all products. South Africa, on the other hand, lacks even a legal exposure limit. The 10 operating mines and all asbestos-using factories claim to follow a self-imposed standard of 2 fibers per milliliter of air. At that concentration, workers face a risk of death from lung cancer five times higher than unexposed people. Experts on asbestos mining such as Janine Aron and Johnny Myers of the South African Labor and Development Research Unit in Cape Town believe workers are commonly exposed to levels of 10 fibers per milliliter³⁵

Even that is a dramatic improvement over earlier decades. In the mid-seventies, the health standard at the Penge mine in Lebowa was 45 fibers per milliliter. A decade earlier, black women and children were employed to pick asbestos fibers from the rock by hand; company doctors and public health officials who had reports on file showing the dangers of the substance took no action.³⁶

The incidence of asbestos-related diseases in South Africa is poorly monitored. Official statistics put the country on a par with other major asbestos producers such as Canada, but asbestosis and mesothelioma, which may take 20 years or more to develop, are notoriously undercounted in South Africa. Many miners are migrants from homelands where health services are minimal and most lung disease is diagnosed simply as tuberculosis. Between 1978 and 1983, according to a leaked report by the manager of the Penge mine, 780 of the 3,500 workers there contracted asbestosis³⁷

Where mining has run its course, black villagers live with the legacy. In late 1989, Eddie Koch of the *Weekly Mail* in Johannesburg filed this report from Mmafeke, a region of the Lebowa homeland that is famous for its rare blue asbestos:

"Aside from oil exporters and the notoriously inefficient centrally planned economies, South Africa is the most energy-intensive country in the world."

20

Most of the abandoned mills and uncovered dumps are still there. At a ... village called Mantlhane children play on a vast heap of waste next to their homes. Some of the highest dust levels in the area-more than a hundred times the amounts that would require immediate government action in the United States-have been recorded by the local health workers at a densely populated settlement called Gemini. The playground of the biggest school in Mmafefe is still littered with small heaps of blue dust. The health project has scrupulously documented the number of buildings made of asbestos brick and plaster. These include 603 out of the 1,724 houses in the village, 7 of the 12 schools, the local post office, the offices of the tribal authority and many of the churches.... Preliminary indications are that each family in the village could have at least one member with an asbestos-related disease³⁸

All along the trail from producer to consumer, asbestos endangers the lives of blacks, from the miners who unearth it to the workers who load it onto freighters. Labor unions describe factories that use asbestos a's choked with the dust. And, perhaps most disturbing, much of the nation's own consumption of the substance goes into the cement walls "of township housing projects."³⁹

What share of South Africa's neglect of worker safety and environmental protection is directly attributable to apartheid is impossible to determine. Nonetheless, it seems likely that the most egregious problems would be avoided if the government were not so pressed for funds to sustain apartheid and if the majority of the population were represented in policymaking.

A State of Siege Energy Policy

The geologic luck of South Africa's whites is to possess both precious minerals *and* abundant coal reserves to power their mining efforts. But this economic foundation of apartheid would not stand were it not for the strength of the republic's legion of captive laborers. A unique political creation, this dispossessed work force has little choice but to toil for the wages offered.

Apartheid has distorted the nation's pattern of energy use as dramatically as its pattern of land ownership. Suppressed wages for miners keep coal inexpensive and so promote wasteful use and, therefore, excessive pollution. International censure of apartheid has led the government into a quest for energy independence with dire costs for the environment: coal-based electricity is used wherever possible, the state has created the world's largest coal-to-oil synthetic fuels program, oil imports are assured by linking them to coal exports, and nuclear power has been pursued for both energy independence and military security reasons.

Some 85 percent of the nation's commercial energy comes from coal-a share exceeded only in North Korea. (See Table 1.) The nation is more than twice as dependent on coal as is typical for either rich or poor nations. Given South Africa's lack of conventional energy alternatives, an above-average degree of coal dependence would be expected in any event, but the extremity of South Africa's coal dependence can only be explained by apartheid. United Nations South Africa expert Paul Conlon writes, "There are many other regions in the world with an abundance of coal which did not develop such a deviant pattern of energy utilization. It was the added factor of low-cost, easily mistreated labor that produced this peculiar result." South African coal, in effect, is subsidized by the sweat of the 85,000 blacks who labor in the coal fields; they earn about one-tenth what coal miners do in the United Kingdom.⁴⁰

Cheap coal means cheap electricity-some of the cheapest in the world-which means profligate energy consumption. Aside from oil exporters and the notoriously inefficient centrally planned economies, South Africa is the most energy-intensive country in the world. (See Table 2.) The nation uses twice as much energy to produce a dollar of economic product as the United States and four times as much as Japan. Only a share of this energy intensity is accounted for by the nation's dependence on mining, a highly energy consumptive process⁴¹

South Africa's extreme degree of coal reliance is only necessary because of apartheid. Confronted with oil-exporting nations in Africa, the Middle East, and elsewhere that are vehemently opposed to the white

Table 1: Coal Dependence, Selected Countries, 1987

| country | Share of Commercial Energy Derived from Coal |
|----------------|---|
| | (percent) |
| North Korea | 86 |
| South Africa | 85 |
| China | 82 |
| East Germany | 74 |
| Australia | 43 |
| United Kingdom | 34 |
| Soviet Union | 27 |
| United States | 26 |
| Colombia | 19 |
| Zaire | 14 |

Source: United Nations, *1987 Energy Statistics Yearbook* (New York: 1989).

government's policies, South Africa has based its energy economy almost exclusively on coal. One environmental result has been accelerated exploitation of coal seams through strip mining⁴²

A second environmental result of the reliance on coal has been worsening air pollution. The nation's coal is centered in an area called the Eastern Transvaal Highveld, a plateau covering 3 million hectares east of Johannesburg. The region's 12 mammoth coal-fired power stations generate 80 percent of the nation's electricity. Additional plants are planned or under construction, including the six-unit Kendal station which, when completed, will provide 4,000 megawatts, placing it among the largest coal-fired power plants in the world. Lacking sulfur-removing stag scrubbers, these generators produce some of the worst air pollution anywhere.⁴³

South African power plants give off about 1.2 million tons of sulfur

Table 2: Energy Intensity, Selected Countries, 1986

| Country | Energy Intensity |
|---------------|-------------------------------------|
| | (megajoules per 1980 dollar of GNP) |
| Poland | 88 |
| Oman | 63 |
| Yemen | 58 |
| Hungary | 50 |
| South Africa | 41 |
| United States | 21 |
| Indonesia | 14 |
| Japan | 10 |
| Nigeria | 5 |

Source: World Resources Institute, *World Resources 1988-89* (New York: Basic Books, 1988).

dioxide and 400,000 tons of nitrogen oxides per year. In the Eastern Transvaal Highveld, annual emissions of sulfur dioxide total 31 tons per square kilometer, according to the government's main research body, the Council for Scientific and Industrial Research (CSIR), or as high as 57 tons, according to two independent air pollution analysts. In East Germany, infamous for its coal-polluted air, annual emissions are only 30 tons⁴⁴

Dispersion patterns in the highveld are such that much of the pollution is trapped in the area, though some of it is apparently carried long distances higher in the atmosphere. To the north, forests along the great escarpment stretching from the Natal state border to the north of the Transvaal are showing signs of the air pollution-caused damage familiar in North America and Europe, and CSIR believes crops across the region could be endangered. To the south, the Natal Parks Board has documented traces of acid rain in 16 of its nature reserves. Prevailing

"On a per person basis, white South Africans are the world's worst greenhouse offenders."

winds could well be carrying acid precipitation into Lesotho, Mozambique, Swaziland, and possibly as far as Zimbabwe and Botswana, though no data are available.⁴⁵

Most troubling, however, is the fact that the Eastern Transvaal Highveld is not only the power plant of the nation, it is the forestry and agricultural heartland, and a critical watershed as well. Some air pollutants have been found to lower crop yields and make forests highly susceptible to a variety of natural ailments, while acid rain can traumatize freshwater ecosystems. Huntley and his colleagues note, "Over half of South Africa's high-potential agricultural land and half of its forest resources are concentrated in the ETH [Eastern Transvaal Highveld].... The river basins draining the ETH and the adjoining Natal catchments provide up to 25 percent of the country's surface water resources."⁴⁶

Coal's dangers are not limited to power plant emissions. Townships such as Soweto, where apartheid crowds blacks into cramped quarters, are choked with air pollution from coal stoves. Medical studies show that Soweto's children suffer more asthma and chest colds, and take longer to recover from respiratory diseases, than do youngsters elsewhere in the country.⁴⁷

Nor are the environmental effects of South Africa's under-priced coal limited to southern Africa. Cheap coal also means cheap exports. Conlon writes, "It is almost an article of faith in the international coal industry that only the low cost of labor makes South African coal exportable at all." And as the NUM said in a 1987 report, "South African coal has been the cheapest in the world market because the wages of black coal miners are some of the lowest in the world." As the third largest exporter of coal—the fuel provides 10 percent of the nation's foreign exchange—its artificially low prices are an incentive to wastefulness everywhere.⁴⁸

Moreover, apartheid's coal dependence accelerates global climate change. According to the U.S. Oak Ridge National Laboratory, emissions of carbon from South Africa in 1987 were 77.5 million tons, a pal-
2 sum compared with larger nations. But because apartheid has in-
2 ect created two countries in South Africa—a small industrial country

of whites and a large Third World country of blacks—a more revealing measure of climate damage is carbon per white.⁴⁹

On a per person basis, white South Africans are the world's worst greenhouse offenders. In 1980, the last year for which data are available, 65 percent of national income went to whites and 25 percent went to blacks. Assuming that income disparities narrowed somewhat during the eighties, as occurred in the seventies, the white share of income may have been 60 percent during 1987. If energy consumption patterns mirror income distribution, as is likely, the white population's per capita carbon emissions stood at more than 9 tons in 1987. For comparison, Americans released 5 tons each that year, and the world average was 1 ton. (See Table 3.) Apartheid's carbon dioxide impacts, if they could be fully calculated, would also have to include the extra emissions in other countries resulting from consumption of under-priced South African coal.⁵⁰

The use of coal, the most polluting of fossil fuels, extends further than heating and electricity generation. The weak link in the South African energy infrastructure is in the liquid fuels—gasoline, diesel, and jet fuel. Along with the intricate bus and minibus network necessary to keep its migrant laborers moving, the country has the largest fleet of automobiles in Africa. In fact, while the black population crams daily onto buses and minibuses, all the whites in the country could sit in their private cars at the same [time.sl](#)

The government has bought a pair of deep-sea oil exploration rigs and drilled a hundred-odd test holes on the coastal shelf, but no oil has been found. How, then, to fuel all these vehicles? The quick solution is coal. Starting in the fifties, and then with vigor in the seventies, South Africa raced to become the largest producer of synthetic transportation fuels in the world, turning coal into gasoline through an expensive and ecologically disastrous process called Fischer-Tropsch indirect liquefaction. The idea is to heat coal (by burning other coal) until it turns first into a gas and then, after treating it with certain chemicals, into a liquid resembling oil.⁵²

The basic technology has been around since the thirties, when Germany

Table 3: Carbon Emissions, Selected Countries, 1987

| Country | (tons per capita) |
|-----------------------|-------------------|
| South Africa (whites) | 9.3 |
| United States | 5.0 |
| Soviet Union | 3.7 |
| South Africa (all) | 2.4 |
| Japan | 2.1 |
| China | 0.6 |
| Zimbabwe | 0.5 |
| Brazil | 0.4 |
| India | 0.2 |
| Kenya | 0.1 |

Source: Greg Marland, Oak Ridge National Laboratory Oak Ridge, Tenn., private communication and printout, July 6, 1989; carbon figure for white South Africa is a Worldwatch estimate.

used it to fuel its war machine. Outside of South Africa, no country has seriously considered the process since: it uses five barrels of water to make a barrel of fuel (water is none too plentiful in the South African coal fields) and costs about \$75 per barrel of crude oil equivalent. Moreover, because only 40 percent of the energy in the coal ends up in the liquid fuel, it wastes coal that could simply have been sold to buy a larger quantity of oil. It also greatly increases carbon emissions per unit of fuel. ³

Besides the energy inefficiency and carbon dioxide emissions involved in turning coal into oil, synthetic fuels production has a high direct environmental cost. The ecological damage done by a synfuels plant exceeds that of a similarly sized coal-fired power plant by an order of magnitude. In addition to the familiar litany of coal plant ills—sulfur and nitrogen oxides that cause acid rain, dangerous hydrocarbons, carbon monoxide, and fly ash—synfuels processing creates concentrated

hazardous wastes: a "who's who of toxic chemicals," in the words of one U.S. conservation organization.

As to the specific environmental damage caused by the South African program, only speculation is possible; Pretoria treats the entire undertaking as a national security secret. In 1977, for example, a team from the U.S. National Institute for Occupational Safety and Health visited a facility run by SASOL, the South African synthetic fuels corporation, and found that no long-term worker health records were kept. Nor could they make any judgments for themselves: they were barred from seeing much of the plant. ⁵⁵

One suggestive piece of evidence comes from the 1986 findings of health researcher A. M. Coetzee of Pretoria University, who found children in one town to be more prone to lung disorders than children elsewhere. Because the area, known as the Vaal Triangle, has a great number of industrial facilities, it is impossible to pinpoint the cause of this town's troubles, but its name is suggestive enough: Sasolburg. ⁵⁶

The U.N.'s Conlon estimates that South Africa's two operating synthetic fuels plants consume 32 million tons of coal each year to produce 75,000 barrels of petroleum a day—one-fourth of the country's consumption. That gives the nation some fuel security. But SASOL fails one crucial test: it produces very little diesel fuel. And diesel is indispensable to apartheid in two ways. First, it is needed by the massive fleet of buses that shuttle the millions of black urban workers to and from their dwellings in the far off reserves and townships. Besides the obvious human toll (some workers never see their homes during daylight) and the economic burden (bus subsidies are often the largest line items in homeland "development aid" from the government), forced busing on such a massive scale requires gross overconsumption of fuel and increased air pollution. ⁵⁷

Second, the military and police forces of the republic exert their power more through the force of arms than through troop numbers. According to the International Institute for Strategic Studies in London, they have 250 battle tanks, 1,500 armored cars, and 1,500 armored personnel carriers—most of which run on diesel fuel. ^m

Apartheid needs diesel fuel, which means it must import oil, and to do so it must evade a United Nations-declared oil embargo that has been in force since 1975. Sad to say, South Africa has generally had few difficulties finding outlaw suppliers, though it must pay a little extra-what the oil industry calls a "pariah penalty" of about \$5 per barrel. Interestingly, as throughout South Africa's energy economy, coal plays a critical role in the oil trade. One way South Africa guarantees its oil supply is to link coal exports to oil imports. Major energy companies such as British Petroleum and Shell that want to load up with cheap South African coal at the massive port of Richards Bay first have to agree to bring oil in exchange.⁵

In addition to apartheid's tendency to increase South African reliance on coal, the republic's security concerns have led it into the nuclear realm. South Africa has the continent's only uranium conversion and enrichment facilities, its only two nuclear power plants (along with plans for a third), and its only atomic weapons. The power stations are part of South Africa's effort to build an energy fortress, invulnerable to lack labor unrest in the coal fields. The reactors may also have been part of a strategy to gain sufficient knowledge for weapons construction, something Pretoria achieved the capacity to do in 1981, according to U.S. intelligence agencies⁶⁰

By now, according to nuclear proliferation expert Leonard Specter of the Carnegie Endowment for International Peace in Washington, D.C., the state, which has yet to sign the nuclear non-proliferation treaty, could have as many as 20 nuclear weapons. Furthermore, a U.S. Central Intelligence Agency report made public in late 1989 revealed that South Africa has developed, in cooperation with Israel, a missile capable of carrying nuclear warheads to targets as far away as Tanzania⁶¹

South Africa's overreliance on coal, and resort to nuclear power, stand in contrast to the likely pattern of energy development had the nation not sought to separate the races. With a major oil exporter just up the coast in Angola, and another further on in Nigeria, the country would have been expected to use more petroleum and less coal. A more balanced mix of fossil fuels would still have created environmental problems, but not in the extreme forms now evident in South Africa.

Destabilizing Neighbors, Destroying Environments

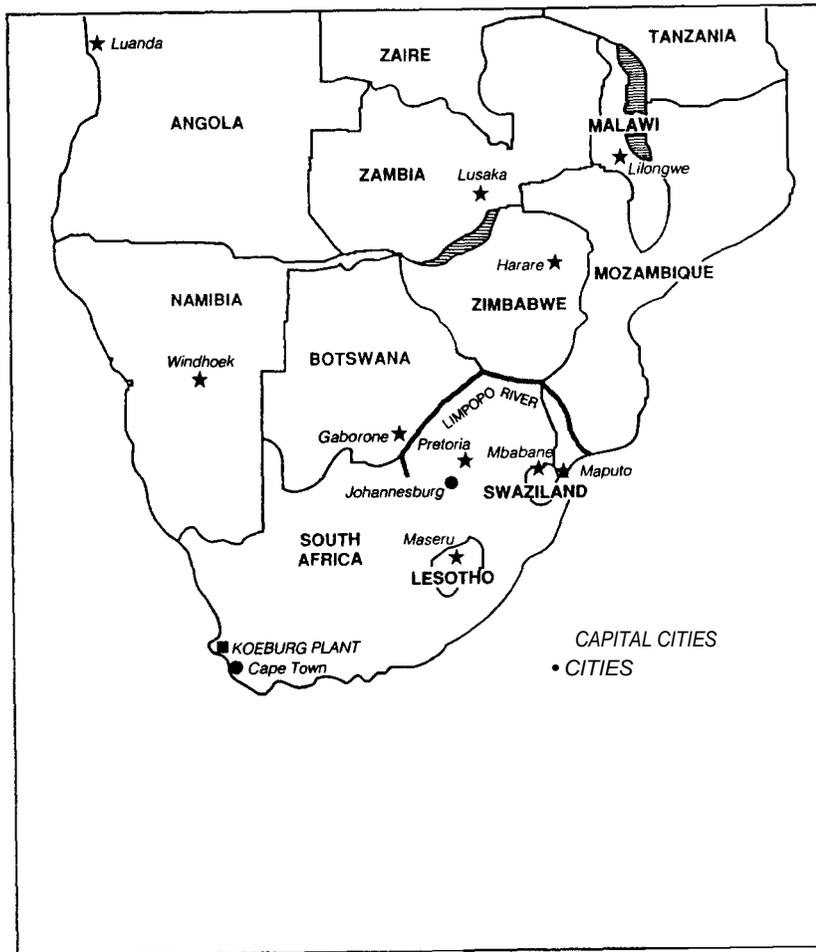
Apartheid's toll on neighboring societies has also been dire. Since Angola and Mozambique achieved independence from Portuguese colonialism in 1975 and adopted socialist development models, South Africa has acted like a cornered animal, lashing out against them ferociously. What is politely termed South Africa's "destabilization" of the frontline states-Angola, Botswana, Mozambique, Tanzania, Zambia, and Zimbabwe-has cost those nations 1.5 million lives and \$60 billion just since 1980, according to the United Nations Economic Commission for Africa (UNECA). The United Nations Children's Fund estimates that every four minutes a child dies somewhere in the frontline states because of destabilization. (See Map 2.)⁶²

The logic of South Africa's "total strategy," first developed in the seventies, was to safeguard apartheid by fomenting chaos and economic dependency in its adversaries' camps. The goal was to make the cost of opposing apartheid unbearable and the enticements to collaborate irresistible. As UNECA writes, "It is not South Africa's objective simply to militarily destabilize those states which have the geographical misfortune to share its borders, but rather to use destructive methods or 'disincentives' as well as 'incentives' to 'persuade' them that their interests lie with Pretoria, rather than in opposition to apartheid."⁶³

South Africa adhered to this design with pernicious tenacity until very recently. The republic's security elite tied most of the region to the nation's rail and port network by destroying alternatives, and killed thousands of civilians during military sorties into many of its neighbors, ostensibly to attack base camps of African National Congress (ANC) rebel forces. The primary weapons of destabilization, however, are surrogate armies. The South African Defense Forces have armed, trained, advised, and in some cases directly commanded the anti-government forces of UNITA in Angola and RENAMO in Mozambique⁶⁴

South Africa's direct military involvement in Angola has wound down during the last two years in conjunction with a U.S.-brokered peace accord and a U.N.-sponsored transition to independence in Namibia, but covert support for UNITA is unwavering. RENAMO, for its part,

"In southern Malawi, where hundreds of thousands of Mozambicans have sought haven, the land is stripped of trees."



Map 2: Southern Africa

has massacred so many Mozambican civilians-100,000 according to the U.S. State Department-that even Pretoria has been forced to disavow the movement. Clandestinely, though, South African patronage endures, as the State Department confirmed as recently as mid-1989

Outnumbered and overwhelmed in fire power, UNITA and RENAMO avoid regular troops and attack health posts, schools, and agricultural cooperatives, fighting scorched-earth wars against their governments. UNITA goes so far as to plant land mines in peasants' fields to cut off food supplies to the cities. Predictably, warfare in the hinterlands has driven millions off the land. At least 4 million people, and perhaps twice as many, have fled into camps on urban fringes or across borders.⁶⁶

Concentrated there, the refugees live in utter destitution, left no choice but to pick the earth bare for fuel and shelter. Around Maputo, Mozambique's capital, the deforested "fuelwood ring" is 55 kilometers wide, and in southern Malawi, where hundreds of thousands of Mozambicans have sought haven, the land is stripped of trees. Refugees in Zimbabwe and Zambia have started to create similar problems.⁶⁷

Scorched earth also means havoc for wildlife populations, which rebel forces hunt for food, sport, and profit. Kathi Austin, an American journalist who toured southern Angola by jeep and small plane in late 1989 during a hiatus in the warfare here, described the landscape as virtually devoid of wildlife. In Mozambique, RENAMO has used national parks as base camps, living as machine-gun toting hunter-gatherers: buffaloes and antelope are killed for food and zebras for skins⁶⁸

The greatest wildlife tragedy of South Africa's aggression, however, has been the slaughter of elephants. Since 1984, investigative reports by South African newspapers and conservation groups have shown glaring discrepancies between figures on legal imports and exports of ivory. In 1988, for example, South Africa exported 50 tons of ivory, of which only 14 tons could be accounted for from legal sources. Speculation about the origin of the remainder has centered on UNITA and RENAMO, which are widely believed to pay for their arms with ivory.⁶⁹

In September 1988, the *Weekly Mail* described a gift that UNITA leader Jonas Savimbi sent to then President P W. Botha: "An exact replica of an AK-47 assault rifle, each of its components intricately carved in ivory." The gift was emblematic of ivory's central role in the Angola war. For years, allegations of ivory poaching have swirled around Savimbi, but little could be confirmed because few observers were allowed in the war zone. The flow of ivory became undeniable in September 1989, though, when authorities in Namibia interdicted the world's largest illegal shipment-almost 1,000 tusks-in a truck leaving UNITA territory.⁷⁰

Two months later, official secrecy was broken by Colonel Jan Breytenbach, a decorated South African paratroop commander who had lived and traveled with UNITA during extended periods. Recently retired, Breytenbach spoke out, frustrated that the reports of poaching he had sent to top military leaders were ignored. He told the *Johannesburg Sunday Times*, "Elephants were mown down indiscriminately by the tearing rattle of automatic fire from AK-47 rifles and machine guns. They shot everything-bulls, cows, and calves-showing no mercy in a campaign of extermination never seen before in Africa." Breytenbach insisted, furthermore, that UNITA had no way of moving the ivory out of Angola without the assistance of the South African military.⁷¹

The situation in Mozambique is little better. While proof is less conclusive than across the continent in Angola, there are abundant indications that RENAMO has liquidated the nation's elephant herds. Mozambique's chief wildlife conservation officer, Robert Zolho, says the country's elephant population fell from about 55,000 in 1979 to no more than 17,000 in 1987 and may be half as large today. According to Phyllis Johnson and David Martin of the Southern African Research and Documentation Center, in Harare, Zimbabwe, former RENAMO members have reported that South African supply planes fling into RENAMO bases with loads of arms leave with loads of ivory.?

Ivory is not the only ecological contraband that South Africa has helped market to pay for its agents' arms. Horns from the endangered rhinoceros are equally valuable, and commonly found in shipments of ivory. African rhinoceros populations have fallen from 60,000 in 1970 to

about 3,500 today. Economist Bradley Martin, a specialist on trade between Africa and Asia, believes South Africa is the largest exporter of the horns in the world, contravening a complete ban on horn trade under the Convention on International Trade in Endangered Species.⁷³

Tropical hardwoods are also a form of reimbursement acceptable to the apartheid state. In April 1984, the *Windhoek Observer* in Namibia noted the presence of "hundreds of tons of super teak" piled at a railhead in the north of the country. "The trunks [are] so heavy and so aged, that they are not from South West Africa [Namibia]."⁷⁴

After hinting that the wood's source was Angola, and UNITA its loggers, the *Observer* wrote, "There are some ugly rumors ... some of them so ugly that only the fate of being incarcerated in a cell of the Windhoek Prison stops us from telling the public what we know." Namibia's South African administrators ignored the allegations, and not long afterward they closed down the newspaper. The charges are borne out, however, by occasional statements of UNITA commanders over the years, and more strikingly by satellite images that show the devastation of teak forests in the UNITA-controlled areas of southern Angola.⁷⁵

With the general softening of apartheid in the past year, South Africa's assault on the frontline states has diminished in intensity, but destabilization is far from dead. The most apt symbol for apartheid's continuing external toll is a lethal, 3,500-volt electrified fence that stretches along its border with Mozambique. The "snake of fire," as it is called, aims at dissuading Mozambican refugees from crossing into South Africa. The fence, according to the South African Catholic Bureau for Refugees, kills nearly 200 refugees of war each year-many of them unable to read the warning signs-along with an unknown number of animals. As Pretoria has continued its clandestine support of a savage guerrilla force, it has sealed the victims in with a band of electrified steel.⁷⁶

Black, White, and Green

Today, the apartheid system is crumbling at the edges. Since the election of President Frederick W. de Klerk, racial separatism has been on

"A negotiated transformation now seems possible where a year ago only bloodshed could be expected."

the retreat, and the prospects for real discussion and change have grown. History reminds us, of course, that apartheid is like a chameleon: it has changed its colors endlessly to blend with international opinion. In official parlance "apartheid," for instance, was replaced early on by "separate development," then "separate freedoms," "plural democracy," and "vertical differentiation."

This year's changes, though they have yet to touch the superstructure of apartheid, are real. The security apparatus has been weakened, most public places desegregated, political prisoners freed, political organizations unbanned, funding shifted from the military to black social welfare, and a \$780 million trust fund created to finance participatory housing and education projects in cooperation with black anti-apartheid groups. A negotiated transformation now seems possible where a year ago only bloodshed could be expected. Although the path ahead is tortuous, South African society, divided as it is, has begun the journey. What remains to be seen is how quickly it will travel--will one year pass or ten?--or if it will turn back.⁷⁸

The very pillars of apartheid are up for negotiation: the Land Act of 1913 and the mock-independence of the homelands; the Population Registration Act, which requires every citizen to be racially classified at birth; the Group Areas Act, which keeps blacks segregated in cities; and the denial of black suffrage. Abolishing these will have some environmental benefits that are essentially automatic; it will also leave some of apartheid's environmental problems for a new government to grapple with.

An example of the former involves urbanization. Any industrialized economy can be expected to attract large numbers to the cities. In South Africa, much of that migration to the cities has been pent up by laws that keep blacks from moving into town. And, though the infamous Pass Laws that kept blacks out have been repealed, Pretoria's declaration of independence in four homelands has made residents of those regions aliens in white South African towns. The likely movement toward denser settlement if apartheid ends will automatically reduce transportation energy needs by ending the profligate migrant labor system. Without enlightened policy, though, it will exacerbate the existing

lack of housing and infrastructure in squatter settlements. Developing land-use patterns and participatory housing programs through equitable community planning could make South African cities models of sustainable urban design. The key to this process, in South Africa as elsewhere, will be to contain urban sprawl and ensure that both blacks and whites have ready access to schools, jobs, and social services.

If apartheid ends, universal voting rights and democratic access to environmental information should strengthen pressure on the government to address the worst domestic environmental problems, such as toxic contamination of drinking water from mining, polluted air in poor urban areas, and acid rain precursors billowing from smokestacks. This pressure could, of course, be overwhelmed by the resistance of vested interests or the popular demand for economic gains at any cost, but democracy remains the environment's best friend.

Likewise, if apartheid is uprooted, greater political clout for miners will almost certainly improve their working conditions and raise their wages, indirectly raising the price of coal. This will be a powerful incentive for more efficient use of energy in South Africa and to some extent abroad as cheap exports disappear. A post-apartheid government would be left to wrestle with the existing balance of fossil fuels. Their likely short-term course will be to include more oil imported from other African nations, an environmental benefit when compared with coal but not an ultimate solution. In the longer run, they would have the opportunity to turn to the sun for energy, an option for which South Africa is ideally suited, according to the Energy Research Institute in Cape Town.⁷⁹

Reconciliation with the community of nations will automatically end the ecological devastation unleashed by warfare in the frontline states. It will also offer a new South Africa the chance to confidently close down apartheid's energy apparatus of nuclear generators and synthetic fuels, to trim its armed forces, and to discontinue its development of nuclear weapons. Cooperation with the frontline states, meanwhile, could eliminate whatever traffic in endangered wildlife products is not halted directly by ending support for surrogate armies in Angola and Mozambique.

"The bantustan system leaves South Africa with a **pattern of land ownership more skewed than any on the seven continents.**"

"The most-intractable environmental problem that apartheid has created is the deterioration of the land. Already the homelands structure is beginning to tremble. A coup d'etat in Ciskei in March 1990 pushed out a back leader loyal to Pretoria and replaced him with a group of officers who call for an end to the sham of independence that has made Ciskei residents foreigners in their country of birth. The news of their power grab brought throngs of celebrators into the open in the towns and villages of the reserve.

Days later in Bophuthatswana, Gazankulu, and Venda, tens of thousands marched through the dusty streets and went on strike demanding the resignation of their pro-Pretoria's leader and reintegration with South Africa. In Transkei, where an anti-apartheid coup took place in 1988, a referendum is to be held in 1990 on whether to apply for incorporation into the republic.⁸¹

If democracy comes to the nation, the fiction of homeland self-rule will no doubt go by the wayside; the question will then be how best to reverse the 300-year trend toward concentration of land ownership in white hands and thus begin the slow process of repairing the land. The rural segregation of the bantustan system leaves South Africa with a pattern of land ownership more skewed than any on the seven continents. As former *New York Times* correspondent James Lelyveld writes, "50,000 white farmers have 12 times as much land for cultivation and grazing as 14 million rural blacks."⁸²

Swift and just redistribution of the nation's land would attack the central inequity that drives rural decline. But land reforms are exceedingly difficult to carry out, as the experiences of Zimbabwe and Namibia, where land distribution patterns are similar to that in South Africa, clearly show. Early on, Zimbabwe's African farmers were pushed onto the rocky soils of "communal lands" that cover 42 percent of the nation. Ever since, these areas have been in a spiral of ecological and economic decline. When majority rule came to the country in 1980, a negotiated independence agreement conceded to the nation's white farmers a condition against expropriation of private land. Though the government still set an ambitious goal of resettling about half of the 330,000 land-hungry families, lack of funding limited the program to providing for only 52,000 of them.⁸³

Zimbabwe has vastly improved agricultural services, crop prices, and facilities, however, helping communal land farmers boost their production dramatically. Unfortunately, most of the gains have been in the relatively fortunate regions of the communal lands; those in the infertile regions most similar to the South African homelands need more than agricultural support—they need land

In Namibia, a South African colony from World War I until March 1990, the homelands policy concentrated blacks, 90 percent of the population, onto 40 percent of the land. Livestock overgrazing soon became rampant there, as human and animal numbers swelled. Until the U.N.-supervised elections of November 1989, the South West African People's Organization (SWAPO), whose leader Sam Nujoma became president of Namibia, called for land reform. Since then, plans for redistribution have been overwhelmed by opposition from powerful economic interests. Namibia's new constitution rules out fundamental land distribution, just as did Zimbabwe's independence agreement ⁸⁵

The obvious political difficulty of righting a grossly unjust land ownership pattern does not diminish its importance. In South Africa as in Zimbabwe or Namibia, large public investments in agricultural assistance, primary health care and family planning, soil conservation, and agroforestry can only slow the downward slide of the black reserves; only redistribution of white-owned farms can reverse it. In a time of tight budgets worldwide, international funding to buy and redivide white-held property is unlikely. If a political solution is not found, the land will be lost.

The potential environmental benefits of an end to apartheid spread over all of southern Africa. If apartheid is dismantled, South Africa's industrial might and scientific infrastructure, which already make it the core of the regional economy, could be tapped to make it a positive force in the area.

The region's abundant natural riches, from the minerals of Zimbabwe and South Africa to the fertile soils of Mozambique and Angola, could be integrated in a complementary way that would improve human welfare without degrading the environment. Commercial forestry planta-

tions that are soaking up precious water resources in the arid Transvaal Highveld could be shifted onto the coastal plains of Mozambique. Hydroelectric potential in Angola and Mozambique could replace South African coal. Surplus maize production in Zimbabwe could ride a refurbished rail system to help feed the region. The resilient and creative people of southern Africa may soon have the opportunity to create just and sustainable societies out of the ashes of apartheid.

Thoughts of a greener future are optimistic, but they are not idle speculation. There are reasons for hope, including the recent growth in environmental awareness in the republic. The white population experienced an environmental awakening in 1989 similar to that in Western democracies in 1988. It culminated in 300,000 people signing a petition to stop a proposed mining scheme in the delicate estuary of St. Lucia, which harbors rare plant and animal species and has been recognized under the Ramsar Convention, an international agreement for the protection of wetlands.⁸

Significantly, the white environmental movement is beginning to blame apartheid for the nation's ecological problems. Earthlife Africa, a new activist organization with a small but growing black membership, sees the creation of a post-apartheid democratic society as, in the words of member Henk Coetzee, "a precondition for clean and healthy living conditions for all South Africans."

Concern for an environmentally sound economy is now voiced more frequently in the black liberation movement as well, though more quietly. In Soweto, the National Environmental Awareness Campaign fights for clean air. In Natal, the South African Chemical Workers' Union is reportedly planning to pressure chemical firms for a phase-out of ozone-depleting chlorofluorocarbons. And the Back Mining Construction and Allied Workers' Union has been calling for an asbestos ban for the last five years.⁸⁸

At the national level, Max Sisulu, head of the African National Congress's Department of Economics and Planning and son of ANC leader Walter Sisulu, issued a major statement in November 1989 on the black political body's environmental priorities. Sisulu decried the pol-

lution of South Africa's air and water, and pointed to the way apartheid has exhausted the land in the reserves. He called for the elimination of nuclear power and the promotion of solar energy, and accused Pretoria of "poaching and smuggling in Angola and casting a blind eye to illicit trading in these items rhinoceros horns and elephant tusks] within South Africa."

Sisulu emphasized the ANC's commitment to sustaining the environment: "The present generation has a responsibility to future generations to preserve the environment.... The ANC believes environmental reconstruction constitutes a major task of a free and democratic post-apartheid South Africa."

Increasing recognition among blacks and whites of the importance of ecological decline remains new and untested; it should not be overestimated. Bold words are easy for those out of power: there is no guarantee that a majority-ruled government will move toward sustainability. By dismantling apartheid, though, they will automatically put an end to many of the sources of environmental degradation-overcrowding in the homelands, overreliance on coal, production of synthetic fuels, and scorched-earth warfare against neighboring countries. The environmental challenges left to a post-apartheid government will include onl those-and all those-confronting nations everywhere, from ground water contamination to ozone depletion. For South Africa, as for every country, democracy is a precondition to sustainability.

Around the world, inequality and injustice between people of one generation have a way of exacting a toll on future generations as well. In innumerable ways, both overt and insidious, inequality is found everywhere, and it drives the degradation of the planet. Apartheid is the most extreme and explicitly codified form of social injustice, and as such displays this truth with exceptional potency.

Dispossessed farmers in wide regions of the world move onto fragile, marginal lands, putting rain forests to the torch and hillsides to the plow. Subordinated women, denied education and property rights, deplete common woodlots. Powerless workers and poor communities accept toxic assaults on their lives in exchange for any livelihood at all.

Most critically, the gaping chasm that divides First and Third Worlds-like South African apartheid-perpetuates the environmental ills of affluence and of poverty alike.

The vibrant hopes that have swept southern Africa since February 1990 may be a harbinger of a future where the politics of black and white resolve themselves into a politics of green. For all the violence and injustice that has stained the nation's history, there is one quiet theme that cannot be suppressed: the love the South African people have for their land.

The emancipation of that land may have begun-with the emancipation of the people-on February 11, when Nelson Mandela was released from prison in Cape Town. That day, he lamented, "Apartheid's destruction on our subcontinent is incalculable." The experiment in racial injustice that has run roughshod over the tip of the African continent these past four decades has left the beloved country a scarred and broken land-a land to be healed only after a flowering of equality.⁹¹

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