

## Annex : Case Studies

### Cameroon

1. Economic imbalances. In Cameroon, agriculture and extraction of renewable and nonrenewable natural resources generated revenues for strong economic growth from the 1960s through the mid-1980s. These revenues were used to support expansion of the urban-industrial and public sectors, although the rapidly growing population remained largely engaged in agriculture. The economic crisis of the mid-1980s, fueled by falling petroleum revenues and worsening terms of trade for agricultural commodities, led to increased exploitation of natural resources, which was already occurring at unsustainable rates.
2. Introduction of macroeconomic and sectoral reforms. Structural adjustment programs (SAPs), implemented in 1989 and 1994.
3. Dual effects of price changes and a reduced role of the state. The impacts of structural adjustment reached the environment through economic pressures manifested through changes in the government budget and policy, trade, and the exchange rate. Fiscal austerity measures in Cameroon included cuts in agricultural support services and rural credit, reductions in public services and parastatals, along with cuts in social services. Government policy reforms and liberalization have limited the state's role in price setting and reduced state intervention in agricultural markets. Government subsidies for commercial fuel were eliminated. The CFA franc was devalued during the 1994 phase of the structural adjustment program.
4. Social institutions and relations are altered. The response of agriculture to structural adjustment was governed largely by the exchange rate. In contrast to most countries, Cameroon did not initially experience a shift toward export crops because devaluation, a standard component of adjustment programs, was delayed until the program was well underway. Appreciation of the CFA franc in the late 1980s squeezed the export sector and led to neglect of cocoa and coffee plantations. During the first period of SA, adjustment was achieved through domestic deflation, putting the burden on farmers and producers of tradeables.

The devaluation of the CFA franc in 1994 during the second phase of adjustment could be expected to induce an expansion of export crop production. The burden of adjustment would shift to consumers of food crops, largely the urban populations. However, the withdrawal of the state from the agricultural sector--from marketing, credit, and extension--has left a legacy of disorganized markets in which farmers have not been able to capture the benefits of export opportunities.

5. Social polarization and environmental stresses increase. In the first period of adjustment, there was a widespread increase in poverty, marked by a rising rural population and an increase in production of nontradeable food crops, often with expansion onto steep slopes and other marginal lands. Reductions in support to the agricultural sectors discouraged agricultural intensification by reducing the availability of inputs and technology, which in turn encouraged extensive land use. Rural poverty was aggravated by cuts to the public sector, including parastatals. This released workers to agriculture while reducing health and education supports. Cuts in the forestry service allowed an increase in unsupervised logging. Although the World Bank has worked actively and persistently to strengthen the Forestry Code, actual reforms in the sector have remained elusive.

Trends indicate that during the second phase of adjustment and food crop production will be driven increasingly to marginal lands. However, because two of Cameroon's main export crops, coffee and cocoa, are tree crops, and because expanded production of these crops is anticipated in response to new price signals, the shift in aggregate agricultural production may be environmentally beneficial on balance. However, other crops for export resulting from the liberalization of agriculture include damaging crops such as cotton. Elimination of government subsidies for commercial fuel has increased the use of firewood, adding to pressures on the forests.

Clearly, however, structural reforms have not alleviated environmental pressures in Cameroon. Degradation of agricultural land and forests and loss of the country's high level of biodiversity constitute the primary environmental threats. Deforestation is proceeding at 100,000 hectare per year, with slash-and-burn agriculture replacing forests, soil erosion is becoming an increasingly serious problem, and protected areas are suffering from agricultural, logging, and hunting pressures.

6. Conclusions. The Cameroon study reveals both a need for trade-offs between economic, social, and environmental goals and more promising situations in which economic and environmental benefits are both obtainable. It is evident that SA has contributed to environmental problems without resolving underlying economic problems.

Four brief case studies confirmed the need for policy interventions to mitigate adverse impacts on poverty and the environment in Cameroon. In a protected area in the North-West, little progress has been achieved in shifting from extensive to intensive cultivation because support services for intensification have declined. Fallow periods are shortening and agriculture is expanding to steep slopes. Without government intervention, encroachment on the protected area by farmers, loggers, and herders is substantial. Likewise, in the semiarid, cotton-producing region of the Far North, environmental stresses from population pressures--soil erosion and loss of soil fertility,

overgrazing, competition for land, and heavy use of firewood--are evident. Although the government's cotton monopoly has protected farmers from market pressures, cotton production has exacted a heavy environmental toll.

The cocoa farmers of the East Province have experienced negative impacts from structural adjustment in the shape of falling prices, rising input costs, and disorganized markets. The consequent neglect of cocoa plantations and the shift to subsistence farming, logging, and hunting have promoted deforestation and loss of timber species and wildlife. In the forested land of the South, logging activity has increased because prices for timber have remained strong through the structural adjustment period. Environmental damages are extensive even from selective logging, both because of immediate damage to other trees and because logging roads provide forest access to farmers and hunters.

## **El Salvador**

1. Economic imbalances. Structural adjustment in El Salvador followed years of civil war, when inflows of U.S. aid supported GDP and the government budget and outmigration reduced domestic population pressures. In the early 1980s, El Salvador underwent a brief period of expanding state involvement in markets, followed by a policy of strengthening the role of the private sector.. The period of stabilization, 1985-88, focused on fiscal austerity and export-led growth promoted through expansion of nontraditional agroexports and currency devaluation. The government deficit was brought down sharply. However, the devaluation induced inflation rather than export growth.
2. Introduction of macroeconomic and sectoral reforms. The country's structural adjustment program, begun in 1989 under the auspices of the United States Agency for International Development and supported by the World Bank and the International Monetary Fund beginning in 1991, achieved internal price liberalization, exchange rate liberalization, tax reforms, and trade and financial liberalization. Whereas in most countries adjustment takes place in a context of foreign exchange shortages, in El Salvador the adjustment process was cushioned by substantial inflows of foreign exchange from remittances, aid, and investment funds.
3. Dual effects of price changes and a reduced role of the state. The clearest impact of structural adjustment reforms has been institutional. Before the initiation of reforms in the mid-1980s, El Salvador had an effective natural resource ministry as well as effective institutions dealing with resource management in the agricultural sector. All were drastically reduced by budget cuts under adjustment. Under

structural adjustment, international funding has supported reconstruction of environmental and natural resource institutions, but with limited success.

4. Social institutions and relations are altered. The very success of structural adjustment in stabilizing the exchange rate and attracting foreign capital has disproportionately contributed to urban growth. Rather than sparking an increase in export crop production in the rural economy, growth has been concentrated in urban areas while agricultural exports declined. The rural economy has remained depressed despite high growth in other economic sectors. While coffee exports shrank and cotton exports virtually ceased, rural employment collapsed in the 1980s. The fall in grain prices also contributed to declining rural income. Moreover, short-lived land reforms have given way to more limited access to land and credit.

Growth rates in the 1990s have been high. However, with growth led by private consumption, rather than by agricultural exports or investment, economic activity has been highly concentrated in the San Salvador metropolitan area. Unfortunately, this growth exceeds the capacity of environmental sources and sinks. This urban centered growth has created a polarization of income between rural and urban areas, which has in turn propelled rural-urban migration.

5. Social polarization and environmental stresses increase. Almost 90 percent of the rural population lives in poverty. Rural survival strategies contribute to deforestation, erosion, and loss of water resource capacity. Agroexports, particularly cotton, have left a legacy of soil degradation. All these factors have contributed to increased deforestation, cultivation on steep slopes, and fuelwood collection in the rural areas, particularly the North. Coffee plantations are now regarded as forested land, so extensive has been deforestation. Deforestation and erosion are contributing to a reduced capacity for regulation of surface waters, groundwater recharge, and hydroelectric generation.

Booming urban growth is creating related environmental problems. Development is both unplanned and unregulated. The release of untreated domestic and industrial waste as well as sediments from land moving for construction into primary rivers is contaminating water resources and adding to dam siltation. Consumption of water is interfering with the natural recharge capacity of groundwater, potable water is scarce, and contaminants and sediments are affecting fragile coastal ecosystems.

6. Conclusions. Environmental degradation in El Salvador, which was problematic before the shocks of the 1980s--civil war, falling commodity prices, and economic reforms--provided further impetus to trends of deforestation, erosion, and rapid urban growth. El Salvador's economy has been reshaped by these shocks, moving from dependence on agroexports to economic growth dependent on commerce,

services, and industry; patterns of settlement have also been reshaped as urbanization continues at a rapid pace. Both the decline of the rural sector and the rapid growth of the urban sector are seriously affecting the environment.

The study examines these effects through their impacts on water resources, possibly the most important of the country's natural resources. Environmental degradation has reached the point where capacity for renewal of water is being lost because of the connection of deforestation, soil erosion, sedimentation, and contamination, limiting both the sink and supply functions of water resources. Institutional capacity to monitor, regulate, and enforce measures to counter land degradation and water contamination has been crippled.

## **Jamaica**

1. Economic imbalances. High growth rates in Jamaica were interrupted by the 1973 oil crisis, which marked the onset of nearly a decade of negative growth rates, relieved only by slow growth in the 1980s. Heavy government spending through the 1970s improved social indicators substantially but created large deficits that induced inflation and falling exchange rates. External imbalance also increased through the 1970s.
2. Introduction of macroeconomic and sectoral reforms. Jamaica has struggled with a series of structural adjustment programs since the late 1970s. A series of economic reform programs instituted in the late 1970s and early 1980s, aimed at fiscal austerity, deregulation, devaluation, and export promotion, all collapsed quickly. The 1984-85 program was more successful in reaching its targets, given a more favorable international environment, as oil prices fell, demand for bauxite rose, and tourism expanded. Measures introduced since the setback of Hurricane Gilbert in 1988, including aggressive government deregulation and privatization, appear durable. Yet, debt obligations remain an important constraint on resources for development, and foreign exchange needs drive government policy.
3. Dual effects of price changes and a reduced role of the state. The pressing need for foreign exchange has led to promotion of export-oriented economic activities, primarily the bauxite/alumina industry, and coffee production. Because of the unstable international markets and Jamaica's heavy dependence on this small group of economic activities, emphasis has consistently been on production of improved extraction facilities.
4. Social institutions and relations are altered. Frequent efforts to cut budget deficits have reduced the government's capacity for controlling the environmental

impacts of these activities. Environmental and social service institutions have been fragmented and weakened by budget cuts and layoffs. In the case of tourism, the obvious need for planning and regulation and for government participation in construction of infrastructure has remained unmet. Adjustment has substantially reduced the government's capacity to deliver social services.

5. Social polarization and environmental stresses increase. There has been no effective environmental regulation of bauxite or coffee production, given government reluctance to impose restrictions that might lower production levels and reduce foreign exchange earnings or government revenues. In the case of bauxite/alumina production, virtually all aspects of the production cycle, from inputs to waste, are polluting. The key issue may be the exhaustibility of the resource. The government has used a bauxite levy to fund domestic consumption rather than invest in alternative foreign exchange earning activities. Coffee production is also linked with a range of environmental damages, including deforestation, erosion, landslides, and water pollution from extensive use of chemical inputs.

Other industries, including tourism, the largest earner of foreign exchange, sand mining, and the cement industry, have also been largely unregulated. Damages attributable to the tourism sector include large-scale release of raw sewage into rivers and harbors, blasting of coral reefs for channels, and dumping of solid waste. Tourist enclaves have also attracted large settlements of squatters, adding to intense population pressures in the lowland urban areas. Pressures are aggravated by the lack of housing, water, sewerage, and solid waste disposal facilities as well as poor social services and urban planning.

6. Conclusions. None of Jamaica's development strategies have taken environmental considerations or sustainable development requirements into account. Evident from this history are, first, Jamaica's great difficulty in achieving both internal and external balance in an unstable international context, and, second, the decade-long push for export promotion and budget cuts without any consideration to environmental impacts. Although this study does not prove a direct link between adjustment and environmental degradation, the long process of adjustment has not induced a substantial economic recovery that might pay for adequate environmental management. Environmental institution building is now under way, but the agency principally responsible for natural resource management remains weak. As long as economic objectives of budget cutting and export promotion are given precedence over sustainable development, environmental degradation can be expected to continue in Jamaica.

## Mali

1. Economic imbalances. Mali is among the poorest countries in the world. The population is primarily rural. Two products, cotton and livestock, account for 75 percent of exports. Pervasive environmental problems in this largely Saharan-Sahelian country include desertification, aridity, overgrazing, soil erosion and depletion, and loss of vegetation. Substantial fluctuations in GDP in recent years have been closely related to fluctuations in climate and agricultural production. Much of Mali's agricultural land is already at or near its carrying capacity. Traditional agriculture is based on shifting cultivation. This system is increasing pressure on the land because of the growing population and the reduction in fallow periods. Forests provide 90 percent of fuel, resulting in the loss of forest lands.

Development policies have supported irrigation projects and promoted cotton, rice, and livestock production over the past 30 years. The agricultural sector was used to support industrialization and import-substitution policies through the early 1980s, policies that included tight control of foreign trade and internal marketing.

2. Introduction of macroeconomic and sectoral reforms. Structural reforms were initiated in 1988, aiming to achieve fiscal balance, reform the cotton sector, and liberalize cereals markets. Some reduction in the fiscal deficit has been achieved, but it remains high. Structural adjustment in Mali did not initially include devaluation, in contrast to most adjustment programs. Mali's participation in the CFA franc zone prevented a currency devaluation until 1994, thereby complicating adjustment efforts. Overvaluation of the CFA franc in the first years of adjustment squeezed the tradables sector. Substantial agricultural reforms have been implemented.

3. Dual effects of price changes and a reduced role of the state. Under structural adjustment, international trade, domestic markets, and prices have been largely liberalized. Policy measures under structural adjustment have included liberalization of cereal markets, which has depressed prices; liberalization of farm input markets, which has lowered the quality of inputs and encouraged fodder production; and reform of rice markets and devolution of decisions to farmers, which may improve conservation and water use decisions. Related budget measures have included reduction in input and credit subsidies and drastic cuts in services to rural producers, thereby discouraging agricultural intensification.

4. Social institutions and relations are altered. Some of the effects of adjustment have been buffered for some sectors of the economy; for example, the government marketing organization for cotton continued to help support the sector.

5. Social polarization and environmental stresses increase. Social polarization and the kinds of environmental stresses varied significantly based on what was being produced. The effects of adjustment and the government's response, varied for different preproduction types. Rice production in particular suffered because of cheap imports. Cotton production for export, however, remained strong because of government support. Incentives to produce tradeable crops, particularly cotton, have improved with devaluation. Livestock exports increased with the devaluation, reducing pressure on pasture lands in the short term, although the profitability of cattle exports can be expected to boost production and pressure on grazing lands in the long term.

6. Conclusions. The study makes a case on environmental grounds for restoration of fertilizer and commercial fuel subsidies, eliminated under structural adjustment. Fertilizer subsidies may reduce extensive growth of agriculture by promoting intensification; subsidies for commercial fuels should reduce pressures on forests. Three case studies reveal the mechanisms through which structural adjustment has affected the environment.

In the cotton-producing region of Koutiala, the relative security of cotton markets and prices ensured by the government marketing organization--in contrast with other commodity markets--led to an increase in the area under cultivation. The rise in input prices increased incentives for extensive rather than intensive expansion of production despite the fact that the region is already suffering land degradation and soil erosion, short fallow periods, heavy use of marginal lands, and stagnant cotton yields. Moreover, there is increasing competition for land because poor conditions in the North have induced immigration to the region.

In the rice-producing region of Niono, intensive rice production methods have been implemented, successfully boosting output. Market liberalization prior to the devaluation threatened the economic viability of the sector because imports became relatively cheap, but devaluation will favor domestic production. On the environmental side, irrigation projects necessary for rice production have led to waterlogging, salinization, and rapid depletion of groundwater supplies. Production appears unsustainable.

In Sikasso, a livestock and agricultural area, livestock populations have been growing because of emigration from the North and because cotton profits are invested in cattle. Cattle serve not only as a form of investment and as an export product but also as draught animals and a source of fertilizer. Whether the damage caused by cattle, including degradation of pastures and expansion of cultivated area, is balanced by this contribution to agricultural intensification is uncertain. As in Koutiala, incentives for



producing cotton in conjunction with the rise in input prices can be expected to lead to more extensive production on land already threatened by aridity.

## **Pakistan**

1. Economic imbalances. Government instability has prevented full implementation of most economic reforms. Military spending and interest payments have dominated the budget at the expense of social services and infrastructure. Although Pakistan enjoyed strong economic growth in the 1970s and 1980s, rapid population growth has meant that the benefits have been spread thinly, and budget deficits and balance of payments problems have been persistent.
2. Introduction of macroeconomic and sectoral reforms. The most recent, and most stringent, round of structural reforms was begun in 1989 and renewed in 1994.
3. Dual effects of price changes and a reduced role of the state.
4. Social institutions and relations are altered.
5. Social polarization and environmental stresses increase. Population growth and poverty are exerting pressure on the environment through land degradation, deforestation, and urbanization. Urbanization has occurred rapidly; Karachi is now one of the world's largest cities. Over one-quarter of the urban population lives in illegal settlements, without water and sewerage. In addition to domestic waste, industrial pollution, particularly from the leather and textile industries, is extensive.

Although agriculture's share in the economy has been shrinking, it remains the single largest economic sector. Three-quarters of the population live in the Indus Valley, which accounts for less than one-half of Pakistan's territory. Environmental degradation countrywide is associated with overgrazing, inappropriate farming techniques for drylands, and fuelwood extraction. Almost 80 percent of agricultural land is irrigated, but irrigated areas suffer widely from poor water management, waterlogging, and salinization.

6. Conclusions. This study employs four modeling exercises to forecast the effects of these structural reforms, given certain assumptions about the impact of economic growth on the shape of the economy. The combined results of a long-run economic growth model, a computable general equilibrium (CGE) model, a tax policy simulation model, and an agricultural model suggest that reform will have both positive and negative consequences for Pakistan's environment.

The long-run growth model examines the effect of economic growth. Results are based on the unconfirmed assumption that countries experience increasing pollution

with economic growth up to a certain level of GDP per capita, and above that level, economic growth generates increasing demands for improved environmental quality and pollution levels fall as environmental policy is strengthened. Several cross-country studies have suggested the existence of this environmental curve for some pollutants. In this model, rapid economic growth, induced by structural reform, will eventually lead to environmental improvement. But even with rapid growth and a slowdown in population growth, it will take about 50 years to reach the environmental turning point.

Economic growth will promote further urbanization. The long-run model assumes that access to water and sewerage always increase with economic growth. Likewise, the creation of solid waste always increases with economic growth. Without corrective policy measures, the benefits of improved water access and sanitation will be offset by the environmental degradation associated with solid waste, congestion, and air pollution.

The CGE and tax models examine the allocation of capital, labor, and spending under alternative fiscal and tax policies. In isolation, economywide reforms--namely, devaluation, changes in the tax structure, and falling interest rates--are expected to increase pollution because they boost outputs without reducing sectoral distortions. Tax reforms are predicted to worsen poverty, at least in the short run, by raising food prices and taxes. Unless increased fiscal revenues are used for social and environmental programs, the burden of reform is likely to be borne by the poor and the environment.

Sectoral reforms that increase economic efficiency--such as removal of subsidies for textile production and energy consumption--are found to be environmentally beneficial. Prereform pricing systems promoted inefficient use of land, water, and other inputs. Sectoral reforms will lead to a shift of resources away from large-scale industry and into agriculture, small-scale manufacturing, and construction. The shift away from large-scale manufacturing will not necessarily be environmentally beneficial. Small-scale manufacturing is more difficult to monitor and regulate than large industry and is less prepared to invest in pollution abatement technologies. In agriculture, removal of input subsidies, particularly for water, will lead to more efficient use. But the expansion and intensification of agriculture may increase problems of waterlogging and salinization and lead to deforestation of new areas.

The agricultural model looks at the impact of price reforms on cropping patterns, fertilizer use and runoff, groundwater levels, and salinization in the Indus Valley. The model confirms that reforms will lead to expansion and intensification of agriculture in new areas and in irrigated areas. Reclamation of areas degraded by salinization will become more profitable. When product prices are increased, water prices could also be

raised, inducing more efficient use. Nevertheless, the study indicates that government investments in drainage infrastructure are essential to prevent further salinization problems and should precede or accompany any economic reform that will increase agricultural production.

Given the effects of reform on pollution and agricultural production as well as its distributive effects, the study recommends that public sector social and environmental programs be incorporated into the design of adjustment programs. Such investment conflicts with fiscal control in the short-run. In Pakistan, a change in the pattern of government expenditures is needed to release funds for environmental and social goals.

## **Tanzania**

1. Economic imbalances. The economy of Tanzania is primarily agricultural despite insufficient rainfall and poor soil in many regions. A wide range of food and cash crops is produced, giving some diversity to the economy. The population is concentrated in the favorable agricultural areas, and much of the country is covered by grazing lands and forests. Protected areas account for 25 percent of Tanzania's land, and important wildlife populations are found there. Tanzania's major environmental problems are deforestation, agricultural expansion, and related soil erosion in addition to threatened wildlife habitats. Twenty-five percent of Tanzania's forest area was lost between 1980 and 1993. In the areas most severely affected by erosion, 55 tons of soil per hectare are lost annually. Tanzania's environmental problems, namely deforestation and soil erosion, are attributable to several factors, including structural adjustment programs.

Radical self-reliance policies of the 1960s and 1970s, including nationalization, price controls, and forced institution of community property, gave way to market-oriented policies. Under self-sufficiency policies, food- and export-crop security strategies relied on large agricultural parastatals and disrupted traditional resource use patterns.

2. Introduction of macroeconomic and sectoral reforms. Structural adjustment programs were implemented in 1986 and 1989. Under structural adjustment, economic policy has focused on restoring growth in income and output through liberalization and reductions in government intervention and spending. The balance of payments deficit was to be reduced with liberalization of the exchange rate (devaluation) and export incentive schemes. Production of food and cash crops has been encouraged with better prices and marketing structures for products and inputs. As a result, structural adjustment policies have often conflicted with sectoral policies aimed at sound resource use.

3. Dual effects of price changes and a reduced role of the state. Environmental pressures have been exacerbated by market liberalization and exchange rate devaluation under structural adjustment. The first adjustment program had little success in controlling inflation or privatizing government enterprises. The second program also had mixed results. Although production of nontraditional crops rose, producer prices failed to improve and input prices rose dramatically. Moreover, the dismantling of state marketing structures has left some areas isolated from markets. Furthermore, there was a decline in extension services and loss of subsidies for credit and agricultural inputs. Structural adjustment is responsible for both the rise in input prices and the incentives to increase outputs. Population growth and poor enforcement of logging laws also bear responsibility for deforestation, the latter being a result of diminished state capacity.

4. Social institutions and relations are altered. Price changes induced by devaluation under adjustment have favored cash crops over domestic food crops. Cash crops are planted by better off farmers in response to rising prices. Production of cotton, an erosive crop and the most extensively produced cash crop, has been bolstered by price incentives to exports.

Commercial farmers and timber exporters are benefiting from strong markets while the poor are disadvantaged by the reduced availability of inputs and credit. Poor farmers have been more likely to plant food crops, partly as a safety net and partly in response to falling yields (which may be attributable to the removal of agrochemical subsidies).

5. Social polarization and environmental stresses increase. Expansion of agricultural lands is cheaper than intensification under current market conditions. The area planted in major cash and food crops has increased 17 percent since implementation of structural adjustment, with 80 percent of the increase attributable to erosive crops. Both large and small farmers are expanding the area under cultivation rather than intensifying production because of high input costs. A return to traditional farming practices, combined with the decline in extension services and loss of subsidies for credits and inputs, are leading to new cropping patterns. These cropping patterns are resulting in soil erosion, which is difficult to quantify but is considered problematic by many farmers.

Deforestation has become a significant problem, resulting from land clearing, energy pricing changes which increase the demand for fuelwood, and increases in tobacco production and timber exports, which are all tied to structural adjustment policies and have increased the demand for wood. Land clearing for agriculture accounts for 40 percent of deforestation while extraction of wood products, largely for firewood and

charcoal, accounts for 60 percent of deforestation. Firewood provides 90 percent of fuel. Expansion of tobacco operations, which require fuel for curing, is another erosive export crop. Another indirect affect of adjustment is a boom in construction accompanying the economic upturn. Finally, external market liberalization has spurred the wood extraction for timber exports, although this remains a small percentage of the reason for deforestation. Funding afforestation has been limited by tight government budgets.

6. Conclusions. In sum, rates of deforestation and soil erosion have been affected by economic reform to the extent that internal and external adjustment increased the cost of fertilizer, reduced the availability of credit, changed cropping patterns, increased timber extraction, and reduced spending on afforestation. The study indicates that deforestation and soil erosion are likely to continue at current high rates and rural poverty is likely to increase, absent a policy change. Recommended policy changes include improvement of land tenure, enforcement of forestry laws, strengthened wildlife protection, better access to credit and inputs, greater security of agricultural prices, and research on alternative energy sources. Although encouraging resource exports to reduce the balance of payments deficit is likely to lead to unsustainable resource use, promotion of sustainable resource use in the immediate term will limit imports and economic growth.

## **Venezuela**

1. Economic imbalances. The Venezuelan economy has been dominated by the oil sector. The availability of oil revenues has reduced incentives to exploit other resources, and consequently Venezuela has maintained much of its diverse environment. Oil revenues supported moderate growth and high employment through the late 1970s. The boom in oil prices in the 1970s, rather than improving Venezuela's international economic position, led the country to invest in capital-intensive projects funded by heavy foreign borrowing. Appreciation of the exchange rate based on oil revenues worked to the detriment of other sectors, in a classic case of Dutch disease.

2. Introduction of macroeconomic and sectoral reforms. Despite oil earnings, however, the economy reached a crisis that necessitated implementation of a structural adjustment program (SAP) in 1989. The 1989 SAP was implemented after a decade of economic decline. The standard package included price deregulation, domestic and foreign trade liberalization, privatization programs, and renegotiation of the foreign debt. The Venezuelan adjustment process, unlike many earlier adjustment programs, was accompanied by a compensatory social program (CSP) of direct transfers to offset the effect of adjustment on the poor.

3. Dual effects of price changes and a reduced role of the state. Through 1993, there was considerable success in improving macroeconomic indicators; then political and social conflicts began to emerge and vulnerable populations experienced rapid drops in income. Economic problems of the adjustment program, became apparent when a commercial banking crisis in 1993 was followed by a rapid devaluation. This led to the imposition of exchange controls and partial price controls. By the end of 1994, many economic indicators had improved little since the 1950s.

Poverty has become Venezuela's principal environmental problem. The compensatory social program was insufficient to offset the 72 percent drop in income that hit the poor in the first years of the program. Although it was intended as a temporary program, the CSP has become permanent, probably at the expense of other social service programs.

Venezuelan environmental institutions and laws have been in place since the mid-1970s. But the laws and regulations are severely weakened by legal deficiencies and loopholes. Institutions, monitoring, and enforcement have been further weakened by adjustment-related budget cuts. The environmental ministry lost one-half its technical and professional staff and one-half its budget under structural adjustment austerity. The ministry now depends largely on fees from licenses for resource exploitation for its funding, raising a serious conflict of interests issue. Other handicaps include the low priority given to environmental matters in recent years, the virtual autonomy of the oil industry, and the lack of environmental data.

4. Social institutions and relations are altered. Budget cuts under the SAP reduced several social programs, with worsening health, nutrition, water supply, education, and basic needs indicators as result. The slowdown in living standards improvements in the 1980s became a deterioration in standards under adjustment. There have been obvious differences in the way in which adjustment policies have affected urban and rural populations. The interlinked problems of poverty and environmental degradation have intensified, particularly in urban areas.

Venezuela has perhaps as many as 200 environmental non governmental organizations (NGOs) that have played a substantive role in increasing environmental awareness and preventing environmental damage. A particularly interesting finding of the study regards the effect of structural adjustment on the NGOs. Under the economic pressures of adjustment, not only have the organizations lost funding but they have also lost internal cohesion: economic divisions and disputes over scarce resources have divided people and poverty-related problems have become more pressing. The decline of these groups forebodes the loss of an important advocate for environmental improvements.

5. Social polarization and environmental stresses increase. In the rural sector, there have been a number of effects of adjustment. Rural employment has declined and incomes have fallen. Venezuela's national park system, which covers 14 percent of its territory, has also suffered because of adjustment policies. First, budget cuts have reduced management capacity at the same time that the land area has been increased by 50 percent and tourism is up tenfold. Second, pressures from agricultural encroachment, illegal logging, fishing, and hunting have increased with worsening poverty. Commercial pressures for mining and oil exploitation have also increased. Expansion of gold and diamond mining concessions under privatization measures is expected to have a significant environmental impact.

In urban areas, squatter settlements have spread rapidly. Increasingly they occupy land previously used for small-scale agriculture; expansion in the Caracas metropolitan area consumes 1 hectare of agricultural land daily. The growth of these settlements has intensified problems of overcrowding, overuse of facilities, and health risks. The general decline in the quality of life is marked by declines in water supplies, waste collection, urban sanitation, public safety, and health.

6. Conclusions. Ongoing trends of increasing poverty, urban expansion, and environmental deterioration have been aggravated by 5 years of adjustment programs. Today poverty-related environmental problems in Venezuelan urban areas are serious, and cuts in funding for parks threaten natural protected areas. Although the country's resources should amply support sustainable development, environmental deterioration has become acute in some areas.

A modeling exercise carried out in the context of this study suggests that the standard structural adjustment package of free-market reforms is unlikely to promote conservation or adequate environmental management. The model points to the necessity of improving capital inflows from oil and investment if indeed there is to be investment in environmental resources. Even with the addition of poverty-alleviating measures, the orthodox adjustment program of 1989-93 was linked with environmental degradation.

## **Vietnam**

1. Economic imbalances. Vietnam has undergone a dramatic economic shift in recent years, from a command economy to a largely market-based economy, far exceeding the scope of change in most structural adjustment programs. Central planning, price setting, collective farming, and extensive measures to direct economic activity were standard before 1986. Faced with slow growth and poverty, rising budget

and balance of payments deficits, inflation, and the withdrawal of Soviet aid in the late 1980s.

2. Introduction of macroeconomic and sectoral reforms. Vietnam adopted reforms intended to attract foreign capital and promote growth, known as *Doi Moi*, in a 1986 economic reform program. This program included elimination of monopolies in agriculture and forestry, the introduction of short-term land rights, devaluation, liberalization of foreign investment, and an opening to tourism. As the crisis worsened in 1989, a more aggressive reform program was instituted, including further devaluation, trade liberalization, removal of most price controls and subsidies, and cutbacks in public expenditures and credit.

3. Dual effects of price changes and a reduced role of the state. Since 1989, considerable stabilization and liberalization have been achieved and economic growth rates have increased markedly. Yet the shortage of natural, physical, and financial capital in Vietnam and the population's heavy dependence on agriculture threaten further resource degradation if environmental policies are not integrated with economic reforms. The immediate effect of liberalization of agricultural and forestry markets has been increased pressure on the resource base because environmental costs have not been incorporated in prices and land tenure is insecure. In 1993, a new land law was introduced, and has slowly taken effect, improving land security in rural areas. Reductions in state employment have not been accompanied by job creation elsewhere, leading to increased pressure on natural resources. With 70 percent of the labor force in agriculture and forestry, employment-generating policies are needed to relieve pressures on agricultural land and forests.

4. Social institutions and relations are altered. Instead of focusing on labor-intensive activities, the government has focused on large-scale, capital-intensive investments, which often damage the environment directly, and certainly do not create employment opportunities that relieve such pressures. Moreover, subsidies and price controls remain in place for fuel, coal, and electricity. Because resource extraction, with the possible exception of the new oil industry, cannot be used to fund capital investment and social services, Vietnam must turn to other export-oriented activities. This implies that there is a significant transformation underway where the rural sector is largely subsidizing urban-based development.

5. Social polarization and environmental stresses increase. In the absence of strong reforms in the rural sector to support small-holder agriculture, income inequality between urban and rural sectors is increasing. Natural resources--agricultural land, forests, and fisheries--have provided Vietnam's primary productive assets. However, attempts to introduce policies which effectively manage, rather than mine, what is left of the natural capital in rural areas have been of limited effect.



Environmental degradation is becoming increasingly widespread, given a growing population, the lack of economic alternatives, and a virtual dearth of environmental controls and incentives. Soil erosion and degradation are common: land is scarce, plots are small, the country is hilly, and initial soil quality is poor. Erosion is compounded by deforestation, which is proceeding at about 2 percent per year. Deforestation and erosion are contributing to sedimentation of dams, reservoirs, and other water supplies; loss of wildlife and biodiversity, including endemic species; and destructive flooding. Water resources are abundant but are increasingly contaminated by sediments, human and industrial wastes, and agricultural runoff. About 40 percent of the agricultural land is irrigated, and overuse of water is common because there are no charges for use. Pollution is also increasingly threatening the abundant marine and inland fisheries. Timber exports were banned in 1991 in an effort to preserve forests; the results have been mixed. Although logging for timber exports has decreased, the use of fuelwood has increased with falling timber prices. Increased freedom of internal migration is putting pressure on forests.

In urban areas, drainage is poor and water treatment facilities nonexistent; open drains for sewage are common. Facilities for solid waste and hazardous waste disposal are also poor, and landfill leakage is polluting water sources. Air pollution is also increasing as a result of industry and transport. Levels of many pollutants are above World Health Organization standards, and related respiratory ailments are common.

6. Conclusions. A computable general equilibrium (CGE) model was used to explore the environmental impact of macroeconomic and sectoral policy reforms under *Doi Moi* and the economic impact of environmental feedbacks from those reforms. Policy reforms tested in the model include liberalization of commodity trade, removal of agricultural subsidies, improvements in agricultural and forestry property rights, promotion of labor-intensive activities, and subsidizing reforestation with a logging tax and with an energy tax.

Several policy requirements stand out from the model's results. First is the need to promote labor-intensive, environmentally benign activities, such as light industry and tourism, which will relieve both poverty and pressure on natural resources. Trade liberalization without such job creation and full-cost resource pricing will lead to further resource exploitation. Second is the need to improve property rights and tenure for agriculture and forestry resources in order to promote conservation measures, sound resource use, productivity, and better incomes. Third is the need for appropriate pricing policies to internalize environmental externalities. Net gains can be achieved through resource taxation if the revenues are reinvested in the environment. In order to prevent environmental deterioration during the transition to a market economy, some command-and-control standards for the environment may

need to be tightened. Macroeconomic stability and secure property rights are preconditions for effective integration of environmental and economic policies. The study suggests that growth, poverty alleviation, and environmental improvements can be mutually reinforcing if this integration is achieved.

## **Zambia**

1. Economic imbalances. Zambia enjoys extensive natural resources and a low population density. The climate is suitable for a range of cash crops, and water resources are relatively abundant. Zambia is the world's fourth largest producer of copper, and 40 percent of the population lives in urban centers or mining towns. Nevertheless, the country experienced negative economic growth over much of the past decade and environmental problems have developed. Heavy dependence on copper exports created substantial economic problems when the international price of copper collapsed in the mid-1970s. Agriculture has been hampered by inefficient state operations in input supply and marketing as well as by land tenure laws that have created localized land pressures. High government deficits and debt accumulation in the 1970s and early 1980s fostered inflation and negative growth.

2. Introduction of macroeconomic and sectoral reforms. A structural adjustment program begun in 1983 has continued intermittently since then. Positive economic growth was not achieved until 1993. Under structural adjustment, considerable progress was made in economic deregulation. The aim of the structural adjustment program in Zambia has been standard: to reorient the government toward the market economy and reduce the budget and balance of payments deficits. Mechanisms have included reduction of state control of the economy, foreign exchange and trade liberalization, elimination of food subsidies, demographic decentralization to increase agricultural production and exports, and diversification of exports away from copper. The large share of the economy previously controlled by the government has been privatized. Food subsidies were removed in 1991 and further steps toward liberalization of agricultural markets were taken in 1993.

3. Dual effects of price changes and a reduced role of the state. Removal of food subsidies in 1991 has increased food prices but has not promoted a significant return to rural areas. Markets collapsed or were severely disrupted because many areas were not served by private traders and much of the 1993 harvest was wasted. Export diversification has been insignificant; moreover, copper exports have fallen substantially because of poorly maintained production facilities and exhaustion of some reserves. Foreign exchange liberalization has contributed to domestic inflation as trade liberalization induced a flood of imports. The continuing external deficit has

made the budget deficit difficult to control. Formal sector employment fell substantially with the contraction of manufacturing and the civil service. Nor has the informal sector been able to absorb everyone.

4. Social institutions and relations are altered. Most of the environmental costs of structural adjustment have fallen on the rural population. Declining rural incomes reflect not only long-term neglect of the sector but also the recent removal of fertilizer subsidies, the withdrawal of marketing services, and the failure to replace food subsidies with adequate safety nets.

5. Social polarization and environmental stresses increase. Zambia's primary environmental problems are loss of wildlife, deforestation, loss of soil fertility, and urban water pollution. Structural adjustment has encouraged poaching insofar as it has contributed to rural poverty and urban unemployment and has accelerated the reduction in funding for the administration of parks. However, the liberalization of foreign exchange markets has reduced the incentive for the smuggling of trophies. The loss of big game species has reached dangerous levels in recent years. Rhinos have been driven to near extinction and elephant populations have fallen dramatically, primarily as a result of poaching for trophies.

Deforestation has also accelerated in the years of structural adjustment. Although 45 percent of Zambia's land area is still forested, deforestation is averaging 2.6 percent annually. Land clearing caused by both commercial agriculture and shifting cultivation is largely responsible. Traditional agricultural practices and current land laws, under which there is no private land tenure, encourage extensive agriculture. Structural adjustment has contributed to agricultural land clearing by increasing the rural population. While in many countries elimination of fertilizer subsidies has led to extensive agriculture developments, fertilizer use has never been extensive in Zambia, and most soils require long fallow periods even with fertilizer application, suggesting that the impact of subsidies was minimal. Less than 10 percent of deforestation is attributable to fuelwood collection; still, the study suggests that support for electric cooking stoves could reduce this use substantially.

Given that 60 percent of Zambia's population is urban and annual population growth is about 3 percent, urban water pollution problems have developed. Urban access to water and sewage facilities deteriorated in the early years of structural adjustment, markedly increasing waterborne disease, but it has improved substantially in recent years.

6. Conclusions. If structural adjustment policies continue without modification of their social and environmental impacts, expansion of small-scale shifting agriculture is likely to continue while farmers try to maintain production in the face of

declining inputs. This expansion will be aggravated by the continuing movement of unemployed urban dwellers back to the countryside. Increasing rural poverty has forced people to turn to natural resource-intensive activities, including charcoal making and beer brewing, both of which contribute to deforestation.