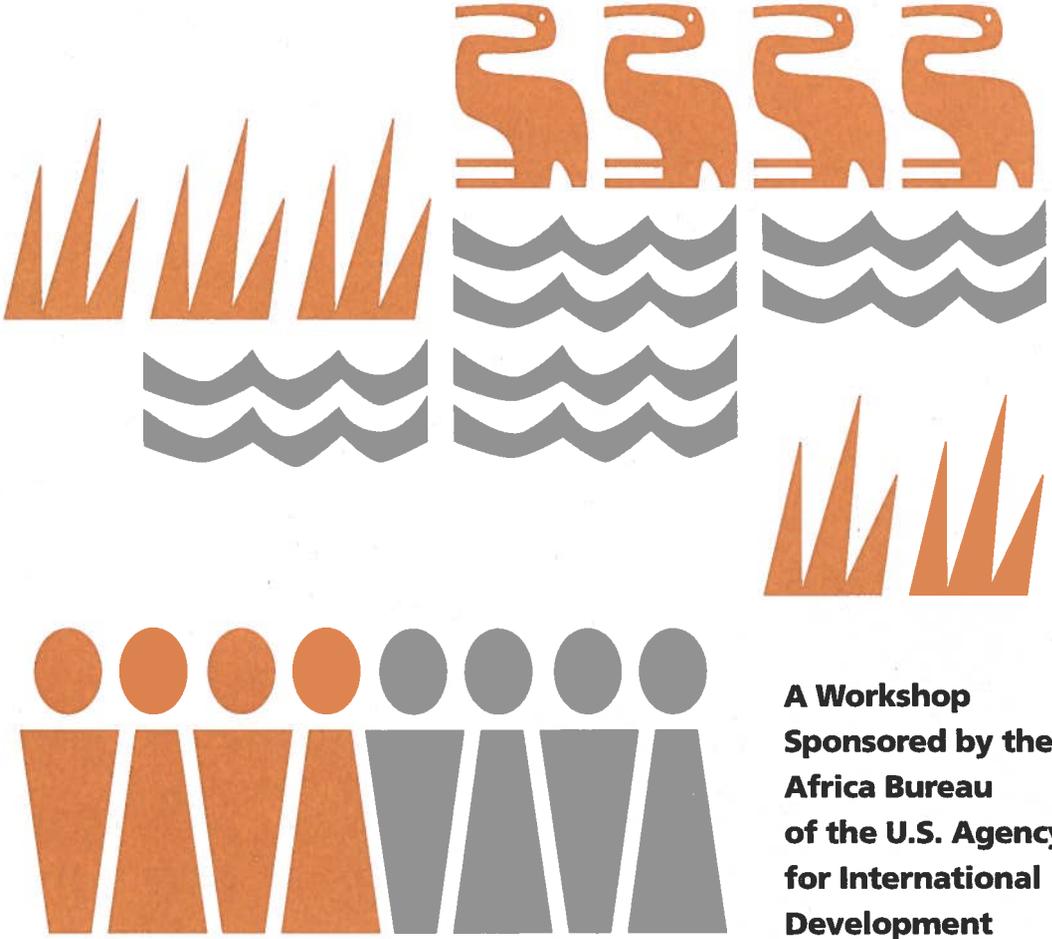

SUSTAINABLE DEVELOPMENT: Population and the Environment



**A Workshop
Sponsored by the
Africa Bureau
of the U.S. Agency
for International
Development**

SUSTAINABLE DEVELOPMENT: Population and the Environment



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**Proceedings of a workshop
on Sustainable Development in Sub-Saharan Africa
held in Baltimore, Maryland,
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EXECUTIVE SUMMARY

In May 1993, the Africa Bureau of the U.S. Agency for International Development sponsored a workshop on "Sustainable Development: Population and the Environment," held in Baltimore, MD. The 48 participants included experts on population and environmental programs in sub-Saharan Africa as well as senior USAID staff. The purpose of the meeting was to examine the linkages between population dynamics and the environment in sub-Saharan Africa and to discuss their implications for USAID policies and programs.

WORKSHOP HIGHLIGHTS

Ominous trends. With a projected doubling of its population within 30 years and accelerating environmental degradation, Africa faces daunting challenges. The time frame in which to influence these ominous trends is very short. Signs of environmental stresses are unheeded, blocked by distorted economic policies, or not acted upon due to poverty and other pressures. African governments need to pay closer attention to environmental signals and assist communities in identifying their needs and undertaking development programs.

Short- and long-term impacts. Programs designed to slow population growth or influence population distribution can prevent environmental degradation from becoming worse than it might otherwise have been. They can also affect long-term demand for natural resources and allow governments more time in which to introduce new technologies. Nevertheless, it should be recognized that it may take 15-20 years before the impact of fertility reduction programs is visible as smaller cohorts move into the labor force and establish households. Because the next generation of parents is already born, population programs cannot dramatically alter the projected population increases within the next 30 years. However, it is still important to make a considerable effort to reduce fertility because the timing of the fertility decline makes a major difference in the overall size of Africa's population.

At the same time, interventions to promote sustainable development and protect the environment should be vigorously pursued. In the short term, changes in technology offer more immediate payoffs in influencing resource use and protecting natural areas, compared with population programs.

Program priorities. Key interventions needed to achieve sustainable development fall into two categories: (1) human resource development, including female education, efforts to improve women's status, family planning, and maternal and child health care; and (2) environmental programs, including agriculture, forestry, wildlife conservation, and water. In addition, economic development programs that raise incomes among low-income groups enable them to invest in conservation measures to protect soils, forests, water supplies, and other resources.

Combining population and environmental programs is not desirable in most settings: both sectors are complex and multi-faceted; they entail changes in deep-seated attitudes and behavior; and they require specialized skills. Nevertheless, some

collaborative efforts could be undertaken at the local level if they can be worked out with the agencies and individuals involved.

Urban/rural requirements. Rapid urbanization poses special problems for sub-Saharan Africa. Within 30 years, at least half of the region's population will live in urban areas. Governments must make choices in allocating resources between urban and rural areas. These choices have far-reaching political and economic consequences.

In regard to rural development, governments must weigh the potential benefits of investing in intensive cultivation versus supporting resettlement schemes. Promoting high-yielding agricultural systems could accelerate soil degradation and fertilizer runoff and cause conflicts over land tenure. On the other hand, the number of people that can be absorbed in less densely settled areas is limited, and marginal areas could become seriously degraded. In all areas, low-cost soil conservation measures are needed to raise food production and protect farmland.

IMPLICATIONS FOR USAID

Major issues that USAID needs to consider in program planning and implementation include:

- **Strategic focus.** In view of funding constraints and changing aid priorities, USAID needs to take a closer look at program impact and facilitating factors such as policies and infrastructure.
- **Population programs.** A key to reducing fertility in Africa is to increase access to family planning services. USAID could play a constructive role in supporting national programs, including interventions for adolescents. Unwanted pregnancy among adolescents is a serious problem that has been largely neglected by national family planning programs.
- **Environmental programs.** USAID needs to give more attention to operationalizing broad environmental strategies and developing workable, effective conservation projects.
- **Program management.** USAID needs to look more closely at factors associated with effective program implementation such as community participation, training, policy reform, management, and institutional development.
- **Sustainability.** USAID should assist governments in exploring ways to meet recurrent program costs, including cost recovery, private-sector involvement, and community participation. Developing effective administrative structures and involving communities in program planning and implementation can help to control costs.

- **Lack of data.** The lack of current, accurate data on environmental and economic conditions makes it difficult to devise strategies and design and evaluate projects. USAID should support data collection efforts and should be cautious about generalizing from poor-quality data.
- **Long-term perspective.** USAID typically operates on short time-frames, yet environmental problems require long-term solutions. Similarly, politicians and governments also have short time horizons.
- **Multidisciplinary approach.** Inputs from many disciplines are needed to address population and environmental problems. USAID should encourage close collaboration between demographers, environmentalists, and other specialists.

Above all, USAID needs to encourage African ownership of development programs by involving policymakers, community leaders and members, and indigenous institutions in all phases of program planning and implementation.

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ABBREVIATIONS

AED	Academy for Educational Development
APAC	African Population Advisory Committee
ARTS	Office of Analysis, Research and Technical Support
CPR	Contraceptive prevalence rate
EEC	European Economic Community
EPAT	Environmental and Natural Resources Policy and Training Project
FAO	United Nations Food and Agriculture Organization
HHRAA	Health and Human Resources Analysis for Africa
IPPF	International Planned Parenthood Federation
IUCN	Worldwide Fund for Nature
MCH	Maternal and child health
MOH	Ministry of Health
NEAP	National Environmental Action Plan
NGO	Non-governmental organization
ODA	Overseas development assistance
PRA	Participatory rural appraisal
SARA	Support for Analysis and Research in Africa
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFPA	United Nations Population Fund
UNHCH	United Nations High Commission for Refugees
USAID	United States Agency for International Development
WRI	World Resources Institute
WWF	World Wildlife Fund



SUSTAINABLE DEVELOPMENT IN AFRICA

Introduction

JEROME WOLGIN

Director, Office of Analysis, Research and Technical Support, USAID Africa Bureau

This is the third such event that the Africa Bureau has sponsored. The first one was on lessons from Asia for Africa, and the second was on whether there is an agricultural transformation taking place in Africa. The purpose of these workshops is to bring together experts on key subjects and A.I.D. senior managers in an environment that allows us to reflect on issues that are normally superseded by the press of business.

This year we decided to look at the issue of sustainable development—specifically, population and the environment. We are trying to keep ahead of new trends. With the new administration's focus on sustainable development, we thought that it might be useful for us to look at one dimension of this topic in order to develop ideas on how it can be implemented by A.I.D. I think we are just ahead of the game. Everywhere I turn, I am seeing more and more articles and ideas about the linkage between population and environment.

We are very privileged to have as our keynote speaker Paul Harrison, who is a writer and consultant on environment and development. He has written two books pertaining to sustainable development in Africa: *The Greening of Africa*, which won a UNEP Global 500 Award, and *The Third Revolution: Environment, Population, and A Sustainable World*, which was the winner of the 1992 Population Institute Global Media Award. Both of these books are worth reading.

Keynote Address: Sustainable Development in Africa

PAUL HARRISON

Consultant on International Development and Author, London, England

It is impossible to cover the whole field in such a short time, so I am really setting the scene with an overview and a few provocative points that may contribute to the detailed discussions in the next two days. The omission of anything should not be taken to mean that I do not think it is important.

THE DOWNWARD SLIDE OF DEVELOPMENT INDICATORS

First, I will briefly review the facts on Africa, which, when you put them together, paint a very somber picture. We have had three development decades that have worked wonders for East Asia. South Asia is probably on the launch pad now, and Latin America may be coming out of the woods. But Africa has seen few or no benefits.

Poverty. Income per person dropped by over 1 percent a year in the 1980s, so that in 1990 incomes were lower than in 1970. Stagnant incomes combined with rising populations mean growing numbers of absolute poor. According to the World Bank, the number of absolute poor people in Africa rose from 184 million in 1985 to 216 million in 1990 and may grow to more than 300 million in the year 2000.

Human development. On the social side, there have been improvements in health, but in many countries educational enrollment has declined and spending on human resource development has declined as a share of GNP.

Food production. The record on food and agricultural production is even worse. Food production per person has declined by an average of 0.7 percent annually since 1965. In 1990, food production was about 17 percent lower per person than in 1965, a unique situation compared with other regions in the world.

Malnutrition. Partly as a result of this, the number of chronically undernourished has risen more steeply in Africa than anywhere else in the world—from about 100 million in 1969-71 to 168 million in 1988-90, a 68 percent increase. The only other region with a rise was Latin America, which had a 9 percent increase. In Asia, the numbers fell.

ACCELERATED PACE OF ENVIRONMENTAL DEGRADATION

Africa has a minimal impact on the global environment that all the rest of us are busily destroying. Still, Africa's own environment is probably degrading at a faster rate than any other region in the world.

Deforestation. According to a 1990 FAO survey, deforestation is running at 1.7 percent a year, double the rate in Latin America and more than three times higher than the rate that FAO reported in 1980.

Land degradation. Soil erosion is severe. According to the global assessment of soil degradation, 22 percent of vegetated land in Africa has been degraded since 1945; this level is the highest of any developing region. Furthermore, Africa has 5.2 million hectares of land that are suffering extreme degradation, which means they are beyond restoration. This land amounts to 55 percent of the world total and almost 95 percent of the Third World total of extremely degraded land. Another 120 million hectares—6 percent of Africa's land—are suffering strong degradation, which means that they can only be restored at very high expense.

Species loss. Because of deforestation and desertification, there has been a tremendous loss of biodiversity. Although the number of extinct species has not been measured, the IUCN estimates that about 65 percent of the original wildlife

habitat has been lost. In almost every village you visit, people say that there used to be antelope, gazelle and all kinds of wildlife, but there aren't any anymore. So a lot of local extinction is happening as well.

EXPLOSIVE POPULATION GROWTH

All this is happening in the context of the most explosive population growth in the world. As recently as 1950, the whole of Africa had only 222 million people—less than two-thirds the population of Europe. Today, Africa has nearly 700 million people. By the year 2025, its population could rise to 1.6 billion, which is three times Europe's population.

According to UN projections, Africa's population could reach more than 3 billion before peaking. In some senses, the problem of population growth in Africa has only just begun. The biggest numerical rises lie ahead. They will not peak until probably the second decade of the next century, so you ain't seen nothing yet. I must point out that the projection of 3 billion people may never be reached. It is based on fertility and mortality trends and does not take into account limits to carrying capacity or the consequences of environmental degradation.

THE NEED FOR ECONOMIC GROWTH

Africa faces a double challenge: (1) to raise per capita incomes and put an end to poverty; and (2) to raise the rate of agricultural production faster than the population growth rate. This latter goal has not been achieved for more than two decades. Africa must accomplish both of these goals on a sustainable basis, while minimizing deforestation, land degradation, and loss of biodiversity.

Furthermore, Africa has to achieve all of this in a very, very difficult context:

- **A doubling of its population.** Population growth will continue to be fastest in the world, even if the most superhuman efforts are made to bring fertility levels down rapidly. Even the U.N. low projection assumes a population of 1,375 million in 30 years' time, which is double today's size. Even that figure assumes a success rate in bringing growth down that would be not far short of Thailand's—one of the most rapid in the developing world.
- **Spread of AIDS.** AIDS hangs on the horizon as a threat not just to human life and welfare but also to adult labor availability in agriculture and to human resource development.
- **Unfavorable global conditions.** As if all that was not enough, the global context is extremely unfavorable. The former Communist states have priority attention for foreign aid. Africa is increasingly marginalized in the world economy as Asia is emerging as a new axis. The world economy is increasingly high technology and information-based, while sub-Saharan

Africa has levels of education, at secondary and tertiary levels, that are less than half those of its nearest regional rival.

To develop Africa is the greatest challenge, not just for Africa but for the whole development community. It is probably the second greatest challenge facing the human race, the first being to save the planet.

POPULATION AND ENVIRONMENT: A FRAMEWORK

Population and environment are at the heart of this challenge. These are probably the two most difficult and controversial topics in development. Put them together and you quadruple the difficulty of dealing with them. As we all know, the controversies can be very bitter. Debates can be utterly sterile and very confusing. They often lead us nowhere. I am sure we will avoid these pitfalls in the next two days. This evening I shall not look at population and environmental linkages in detail because I will cover this topic in tomorrow's session. Tonight I will look more at strategic points and try to offer a framework to get beyond polarization.

Extreme positions. The problem with the population debate is that people—at least the people getting most attention—have taken fixed positions, often on the basis of political ideology or academic training or specialty. The debate has been bedeviled by polar oppositions. Probably the root of the modern controversy was the extreme statement of the population problem by Malthusians like Paul Ehrlich saying that population growth is the tap root of all our problems. An extreme statement like that naturally brings an equally extreme response, such as Julian Simon's view that moderate population growth is not a source of any problems at all and is a good thing.

The trouble is that these extremes have set the terms for the debate. Most people making their contribution feel that they have to answer one or other of these extreme positions. Often it seems as if we have only three choices: to believe that population is the number one threat to the human race; to think that it is not any kind of threat to the human race; or to decide that it is not one of the real problems but merely what some writers have called "an exacerbating factor."

Oversimplification. The second problem with the population debate is that there is a tendency to oversimplify everything, to pick out one factor as dominant and dismiss everything else as secondary. This tendency may be due to limitations of the human mind, but it is also true that the problem requires a very interdisciplinary approach. Most people are trained in one specialty and continue to work in one specialty. So we have Malthusians blaming population growth, socialists blaming poverty and inequality, economists blaming imperfect markets and common ownership of resources, and democrats blaming failures in so-called governance.

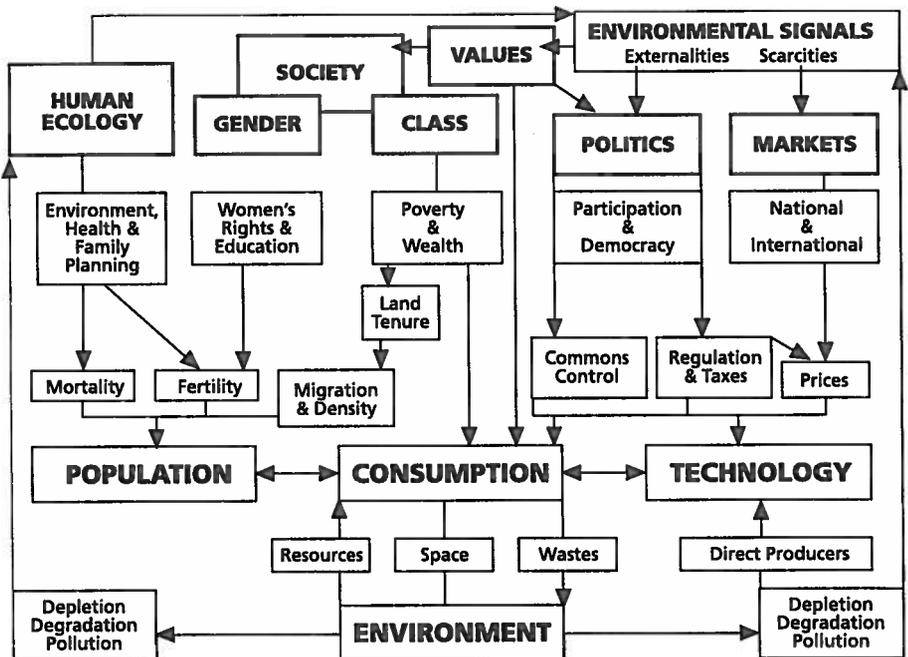
Unidirectional models. Another problem with the state of the debate is that many models do not have a feedback mechanism; they are one-directional.

To make progress, we need to move beyond the polarization. We must not think in terms of either/or, but rather we should recognize that all the factors mentioned in this debate are significant. Population is certainly an important factor in environmental degradation, but so also are poverty, inequality, landholding, imperfect markets, and absence of democracy at every level. They are all important.

Need for a systems approach. The problem is also very complex. Simplistic analyses lead to simplistic solutions that do not work or do not do enough because they leave out so many other factors. I think we need to move towards a systems approach. Many people besides myself are moving in that direction and that is very encouraging.

One amusing hobby of the people involved in the systems approach is drawing a wiring diagram. Gayl Ness knows all about this because he has selected quite a lot of good ones in his recent report. Here is a simple diagram that I developed to resolve conflicts in the debate (see Figure 1). Basically three factors—population, consumption, and technology—act directly on the environment. They are never, ever found apart. People always consume resources, even at the hunter-gatherer level. Some kind of technology is always involved. People, consumption and technology are always found together.

FIGURE 1.



Source: *The Third Revolution*, p.268

Environmental signals. This is where we come to feedback. The environment reacts to human pressures: resources become depleted, pollution accumulates, and soil degrades. These environmental signals then act through other channels such as markets or the political system. For example, local political systems control the commons. There are also economic signals working through markets. If resources become in short supply, then prices rise. But if you control the markets and the prices, those economic signals do not operate properly.

Synergistic effects. It is really pointless to pick any one factor and say that it is the primary factor or the root problem because many factors are all working together and influencing each other. Everything affects everything else. We have to get away from latching onto simplistic individual elements as being the source of the problem.

BOSERUP'S MODEL

To summarize, we need a complex approach including many factors and allowing for feedbacks. One of the earlier models that does allow feedback is Ester Boserup's model, which has important implications for Africa. In a nutshell, she says that major changes in agricultural technology such as plowing or fertilization have been driven primarily by rising population density. Rising population density produces problems, and the technology responds and changes to solve those problems. Rising population density also leads to changes in the form of land ownership, moving gradually from completely open access resources, to commonly controlled resources, to private ownership.

Boserup studies the transition from shifting cultivation to more intense forms of agriculture, which is very relevant to Africa. Rising population density leads to progressive deforestation and then declining fallow periods. Soil is exposed to rain and hardens. Weeds that were kept down by the forest begin to proliferate. Soil fertility declines so people then turn to plowing and fertilization.

Role of population growth. Economists often cite her work as showing that we actually need population growth in order to make progress, particularly in agriculture but also in other areas. Boserup does definitely assert that higher population densities are essential for agricultural intensification. But I think if we read Boserup carefully and properly, we will find very little comfort in what she says:

- **Population growth is a driving force.** First of all, she states (even more strongly than I or many population advocates would) that population growth is a major or *the* major factor driving change. It is not a minor factor, nor just an exacerbating factor. It is the driving force.
- **Population growth damages the environment.** Secondly, we should note that the problems that she says population growth gives rise to are mainly environmental problems. Deforestation leads to soil hardening and the decline of soil fertility. She is accepting that population growth causes environmental problems.

- **Adaptations entail harder work; living conditions may worsen.**

Thirdly, Boserup makes it quite clear that people only make these changes in agriculture when they are forced to, and their lives are often worse after the adaptation than they were before. For example, hunter-gatherers have really quite an easy time of it. The only village I have ever been in where I was the first one up in the morning was a hunter-gatherer village. People slept until 9 or 10 a.m. There was no need for them to be up. Also, they had a superb diet with many different kinds of wild game and roots and leaves.

When people shift over to permanent agriculture, they have to work from dawn until dusk during most seasons. Their diet is horribly boring and grinds their teeth down. Agriculture is harder work than hunting and gathering, and intensive agriculture is much harder work than shifting cultivation. Typically it may involve twice as many hours per day. This is why shifting cultivators intensify only when they have to. However, these days people can intensify under different circumstances if the market induces them to intensify; that is a way we can escape the requirement of waiting for higher population densities.

- **Acute problems lead to adaptations.** It is problems that drive the search for solutions. Things do not proceed smoothly as Julian Simon suggests. It is not utopia or cornucopia at all. The problems arise, they build up, they get bad, and then people deal with them. Boserup mentions the use of the plow and manuring as solutions that were forced by soil hardening, weed growth, and falling yields. There is a rather pessimistic corollary to this: there will usually be no search for a solution until a problem has arisen and has been perceived as a problem. One example of this is that soil erosion is very often ignored until yields have dropped very noticeably.

According to Boserup, deforestation is an essential pre-condition of agricultural development. The deforestation comes first and then when people have run out of space they begin to intensify. I think some people misinterpret Boserup or oversimplify what she is saying to imply that there is a smooth adaptation of agriculture to population growth and that yields automatically expand as population grows. But that only happens when you have run out of space. Until you run out of space, the simplest way of dealing with population growth is to extend the cultivated area into forest or some other type of wild habitat. It is only when you have exhausted that possibility that you become interested in working harder to push yields up.

LACK OF RESPONSE TO ENVIRONMENTAL SIGNALS

Boserup is talking about a feedback process: population growth produces environmental problems, technology is adapted to cope, production then often

increases, and population increases further as a result. However, it is clear that the feedbacks don't always flow smoothly. It is very easy for blockages to develop in the flow of environmental signals. As I mentioned earlier, when shortages develop, prices should rise and that should make technology adapt. But if you have a government controlling prices, they will not rise, so you have lost the signal.

There may be other blockages in the channels that lead to the responses. For example, the people who notice the environmental signals may have no power to act. Women in Africa are usually the first to notice environmental degradation because they have to walk further to get water and fuel, but usually they have no power to bring in environmental improvements without their husbands' consent.

Even if there are no blockages, there may not be any technical solutions to the problem at the time the problem arises. That is often the case with Africa. Another problem is that there may be no effective organization to implement the technical solutions.

Gradual build-up of environmental signals. I would argue that these blockages are particularly strong in the case of environmental problems because environmental signals build up very slowly. They are often not perceived until quite late. Soil erosion is so gradual that many farmers deny that it is occurring. If a big gully forms overnight, they can see that, but sheet erosion is almost imperceptible. In Burkina Faso, farmers denied it until somebody planted a ruler with markings and they noticed the next year that they had lost an inch of soil. Deforestation might not be perceived as a problem until the climate starts to dry up or the water table falls. We in the North cannot pretend to be any wiser because the ozone hole was building up there and we did not know about it. The realization burst upon us only when the hole had reached vast proportions.

Crisis-led responses. There are many interlinkages in the environmental and population fields, but humans have a low capacity for thinking about complex systems.

Because of all these special problems, we find in one field after another that environmental problems seem to have to build up to almost crisis proportions before we deal with them. Global warming is a good example. We are a little bit worried now, but we have not done anything of any significance about it yet. I think things are going to have to worsen considerably before we do because changes involve modes of energy use that we are locked into.

Short-term crises. Because of these blockages, the Boserup theory of adaptation does not always work in the short term. Boserup is looking at the long view. In the case of Europe, she is looking at development that took several millennia. Over that length of time, the theory works. But if you look at short time spans in certain areas, you find that huge problems built up. The ancient Mesopotamians had to abandon the southern parts of their land because of salinization. In 14th century Europe, there was a population/environment crisis. Europe's population had

grown a lot, rather like in Africa, a lot of marginal land had been occupied, yields began to fall, people's nutrition worsened, their resistance to disease weakened, and the Black Death found easy victims.

Africa over the past three decades is a very clear example of the limitations of Boserup's theories in the short term. It is clear that adaptation can occur in Africa and has occurred in the past. In Ibo-land, Nigeria and in many of the hill areas of East Africa, intensified, highly complex technologies have been found.

Need to remove blockages and accelerate responses. So Africa can adapt and does adapt when the circumstances are right. But at present, Africa has more blockages than any other region.

The crux is the lag between environmental damage and adaptation to it. The lag is greater in modern Africa than anywhere else. The challenge that we face in the population and environment fields is to remove these blockages so that Africa can follow its own course of adaptation.

MAJOR BLOCKAGES AND POSSIBLE REMEDIES

I will review the major blockages and suggest ways of dealing with them.

Fragile environmental conditions. The first blockage is that the natural environment in Africa may be more sensitive to damage than other regions. Both Africa and Latin America have laterite soils that deteriorate very quickly when the forest is cleared. Africa also has a large area of sandy soils that are very bad at holding water. Its best soils happen to be in hilly areas where erosion is a lot stronger. Africa is more vulnerable to drought than any other major region, which means that the water supply is critical. If deforestation in coastal areas cuts rain supply to inland areas, that can push a marginal area over the edge into a non-viable area.

Rapid population growth. Population growth in Africa is faster than any other region has recorded. Consequently, the annual threshold of change that is required is higher than anywhere else. Africa needs faster adaptation than any other region, even though it has more blockages to change than other regions.

Even within the population field there are delays in the response. In many other regions, fertility would have begun to decline by now. In Africa the decline is much slower to pick up. There may be certain special factors at work. For example, mortality is higher than in other regions, and people compensate by having more children.

Possibly because of the high mortality, the family structure is different. The extended family is found throughout the Third World, but in Africa it is probably more active and more extended than in most other parts. People are more willing to take on each other's children and to take on relatives' children—even distant relatives. This means that individuals don't always have to bear the cost of their own

childbearing. If one can pass the consequences of it onto someone else, that really is a blockage to adapting one's fertility

In this area, I think obviously the top priorities should be given to human resource development—not only accessible, good-quality family planning services but also female education, attention to improving women's rights, and maternal and child health care. The demand may appear low at the moment, but there are some encouraging examples now that where the conditions are right—reasonable female education, moderate levels of infant mortality, and accessible family planning—fertility does start to come down. Under these conditions, it may fall quite rapidly. Kenya was known as the country with the highest fertility in the world, and now fertility rates have begun to decline. Fertility is also declining in Zimbabwe, Botswana, Senegal and elsewhere.

Sparsely populated areas. In many areas of Africa population density has not really reached the levels where people will be interested in working harder to obtain better crop yields. Certainly many areas in central, southern and some parts of west Africa have not yet reached that level. They are still in a state of relative land abundance in which it is cheaper and easier to open up new land than to intensify production on old land or to conserve it.

The areas where solutions are adopted more readily tend to be those where population density has reached a higher level. In Burkina Faso people built stone lines to stop erosion and managed to restore fields that had been completely desertified. This effort was made because the desertification had created a land shortage in the area. Many villages had lost half of their land.

However, land abundance is disappearing rapidly in many places. In areas where there is increasing land shortage, farmers will adopt yield-increasing farm technologies very readily, provided they suit their circumstances. These technologies must suit their finances, their labor availability, their requirements for fodder, and their local soils. As long as what is offered to them does not perform worse than existing technologies in a bad year, they will very readily adopt it.

Some people suggest that development efforts should concentrate on high-density areas. By implication—they don't say this openly—they are saying that such efforts should neglect farmers in areas of low population density. I don't agree with that. I believe that even farmers in low-density areas will be interested in technologies that offer them higher yields of food, fodder or fuel, as long as the technology offers a good return for little extra labor or investment. Some technologies, such as improved seeds, meet these criteria. Even farmers in low-density areas are interested in a seed that resists disease better, can withstand drought and other problems, and gives a better yield than the local variety for no extra labor input.

Farmers often resist adopting soil conservation techniques because they involve a cost in labor or a sacrifice of land. Where the costs and labor needs are kept low, experience has shown that people become interested in conservation in almost every part of Africa.

The technical hurdles to be overcome to find solutions are probably higher in Africa than in any other region. The higher vulnerability to drought creates problems for seed and fertilizer packages. There are fewer irrigation opportunities. The soils have many different types of problems. The tsetse fly is an enormous obstacle and has prevented farmers from developing the mixed arable livestock systems that Europe developed in order to intensify.

The lack of large livestock contributes heavily to the labor shortage in Africa. Also, African farmers have developed very complex systems of intercropping and mixing trees and fodder requirements for different animals. So there are no quick or slick answers, and there is no substitute for long and dedicated work based on strong farmer participation. We must always bear in mind the farmers' circumstances, their income, their labor availability, their soil, and their water. Learning from past practice, countries must build an effective agricultural extension service to spread the solutions that are found.

Communal ownership. Another blockage that people like Garrett Hardin have focused on is ownership of natural resources. Commons are always a potential source of environmental problems, as the proverbs teach us: no one sweeps a common hall, no one repairs a common chimney. On a global level, the atmosphere and the oceans are the hardest to protect.

Africa has more commons than most regions because pastures, forests, and arable land that elsewhere are private are often commonly owned. There is always a certain insecurity of tenure involved in communal ownership. Even where local traditions acknowledge a farmer's right to a certain patch of land, the intentions of the state are not always clear, and people are reluctant to invest in improving or conserving their land. In some cases, farmers don't have the proper control that they require. In Lesotho, after the harvest everyone's cattle graze on everyone else's stubble, trample down terrace edges, and munch up tree seedlings.

Communal ownership of land is the natural state of affairs under shifting cultivation because nobody is staying in the same place long enough. But as population density grows, occupation becomes more permanent and eventually private ownership develops. Many places in Africa would develop private ownership, but governments are still attached to the values of the communal system and resist privatization of land.

The solution probably lies in the gradual adaptation of legislation recognizing long-term rights of the farmers who are actually living there, without necessarily giving them full-scale private ownership with the right to sell the land. Later, more complete forms of private ownership could be introduced. Where land is abundant, privatization is wide open to large-scale abuse and can lead to land-grabbing by urban elites.

Some commons such as rainforests or semi-arid pastures are not suitable for privatization. Traditionally, communities had control over them, and thus had an incentive to conserve them. Individual abuse was controlled by collective regulation. When the colonial powers came in, they did not recognize communal ownership

and nationalized the commons, so the power to control its own resources was taken away from the local community. But the state, lacking funds and manpower, did not have the power to control them either, so the resource became completely uncontrolled by anybody and then began to degrade in a serious way.

Experience from many individual successful projects has shown that a measure of local control must be restored, though there obviously have to be regulations preventing total destruction. Where the use of the commons is restricted such as in nature reserves or forests, there must be measures to make sure the locals benefit.

Women's status. The situation of women is a very powerful blockage to a natural response to signals of environmental damage. If women had the power to plant trees in most parts of Africa, then trees would have been planted very much sooner and we would not have needed to wait for the development of a market in fuelwood. For example, in Kenya, I have met men who did not care in the least that their wives were walking for four hours a day to collect fuelwood. But when shortages developed and men had to pay their own hard-earned cash to buy fuelwood, they began to be interested in planting trees. Then fuelwood production took off in a very big and rapid way. However, it would have taken off earlier if women had had more power to plant trees.

So it is important to improve women's situation. It is very hard to do it from the outside, so the best strategy for improving women's rights may be to provide them with education so they can press for their own rights. And, of course, agricultural extension programs must be directed at women.

Markets. We all know about market imperfections in Africa. Some of the better aspects of structural adjustment are dealing with them through realistic exchange rates and lower taxation of agriculture.

Foreign aid. I think we should also consider to what extent the level of foreign aid and foreign intervention in Africa has been a blockage to adaptation to population and environmental problems. I firmly believe that if Africa had been totally left alone, she would have found her own path to intensification as she often did in the past. It would have taken a very different form from other regions and it would have been very varied within Africa, but she would have adapted. But Africa has not been left alone to find her own solutions. She has not been able to adapt at her own pace.

External forces intervened to influence population trends in the first place. External forces destroyed the community control over commons. The state, which took over from colonial forces, continues to preserve communal ownership of land when it would be natural in many countries for almost complete privatization to have developed.

More recently, economic and political weaknesses have given donors an immense leverage to impose solutions that have not always been appropriate. We

all know about the inappropriate technical solutions, the wonder packages that somehow did not work out as they were intended.

To some extent aid has disabled the state in Africa. I had a particularly clear view of this in Lesotho, where the king asked me to apply the principles of my book, *The Greening of Africa*, to Lesotho. It became clear that Lesotho would not undertake any new activity unless it had aid to fund it. The donors were calling all the shots and deciding the priorities. Different donors were pulling in different directions. Aid was going in fashions; there was no continuity. Lesotho is very typical of many other countries in Africa. Madagascar, for example, is being run in many key areas by the World Bank.

There is another more delicate question: at present overseas development assistance (ODA) constitutes 11 percent of Africa's gross national product. One would have to think out all the ramifications of that. Does that mean that 11 percent of the African population is being sustained by aid? If so, then it is not surprising that Africa is not self-sufficient in food. It does not need to be. It only needs to be 89 percent self-sufficient in food.

Turning to the issue of aid priorities, we know that aid for 'hard' sectors has often gone wrong in Africa. I personally believe that 100 percent of aid should go to environmental conservation, including all the natural resource sectors, and to human resource development, which stretches right from family planning through to education. At the moment the average for the Development Assistance Committee countries is 25 percent, and the United States allocated 15 percent in 1990. I think there is a strong case for raising that percentage very, very significantly.

PROGRAMS TO ADDRESS POPULATION AND ENVIRONMENTAL PROBLEMS

It is clear that efforts to reduce population growth will at least slow the increase in environmental damage and reduce the level of challenge the adaptation faces. The linkages are complex, but we should not be daunted by that. It does not mean that our plans of action and our projects have to be that complex. Just because population has a big impact on the environment does not mean that the two have to be linked in projects and programs. Since population is only one of several key factors, there is no stronger reason for linking it with environment than with linking women with environment every time.

The Case against Programmatic Linkages. To link the two trickiest issues in development together may not help either of them on three accounts:

- **Complexity and scope.** First of all, these are the two most complex issues in development. Population involves every aspect of social development; environment involves farming, forestry, pasture, wildlife conservation, and water. They are huge topics in themselves.

- **Public sensitivities and awareness.** Secondly, they are not easy topics to deal with. Family planning is not easy to spread in Africa. You often have to be very diplomatic about it and start in a very modest and quiet way. As I said, environmental problems are not often perceived immediately. If you march into a village and say, "Look, your soil is eroding and the cause of that is your very high rate of population growth. So how about it?", they will probably throw you out because they will not understand either part of that equation. That is not to say they cannot be brought to understand it in the long run, but starting your approach with this huge, broad task is taking on a tremendous handicap.
- **Technical competence.** Limiting the two sectors in service delivery is also a very difficult organizational problem, especially in Africa where trained manpower for any service is in short supply.

To continue acting separately on environment and on population will help and is not necessarily any worse than trying to link the two in programs.

Multiple points of action. My model and others describe systems, and these systems are not closed to outside influence. You can act on different aspects of the systems. If you act appropriately at any one of these points, you will help to reduce environmental damage. There is almost an infinite number of potential points of action. Of course, if you act at several points at once, you will be more effective. You do not have to link those actions very closely together.

Even within each sector we must not go for overly simplistic solutions. We know that population programs are of no use if they concentrate only on family planning, especially in Africa. It is probably more productive to begin with female education and MCH and gradually build up to family planning. We must not forget the synergy.

In environment, conservation should be very closely integrated with forestry, agriculture and livestock development. Because Africa receives low priority in foreign aid in the global context and countries have limited budgets anyway, we should be going for low-cost solutions all the time.

Highest priority If I had to give my top priority to conserve the environment and bring population growth rates down, it would be education, especially female education. It is the best way to improve women's status because women will fight for their own rights. It is the best way to bring population growth rates down. Four years of secondary education can reduce fertility by as much as two children per woman. Education increases everyone's adaptability, and it is the best foundation for further economic development.

FUTURE PROSPECTS: QUALIFIED OPTIMISM

I think I would describe my present feelings as ones of qualified optimism. The human capacity for adaptation is high. Africans proved in pre-colonial days that their innate capacity to adapt is no less than elsewhere. Their environment is so challenging and diverse that they adapted with more diverse technologies to more diverse circumstances than any other group on earth.

What is preventing them from adapting successfully in the present circumstances is the combination of internal blockages and inappropriate external intervention. If Africa and her friends do not take appropriate action, the problems will worsen and the story of the 1970s and 1980s will continue into the 1990s and into the next century. But, if we do work on this very broad front and do the appropriate actions in each area, then I am sure that Africa can meet the challenge of raising incomes sustainably and reducing environmental damage.

DISCUSSION

► JEROME WOLGIN:

Thank you very much, Paul. We have about 20 minutes for questions and comments.

► BEN GYEPI-GARBRAH: *Priorities for Foreign Assistance*

Thanks very much for your presentation. There are two comments that I found a bit inconsistent. You suggested that there is a need for an increase in foreign aid but at the same time you said that the impact of this has not been very harmonious for Africa's development. You said that issue of population and environmental linkage is very complex and yet you would link them too.

Differing perspectives. I think that one of the reasons why we have a lot of problems is that many of us went to school where we were taught or probably indoctrinated to think in a certain way. Any time you talk to economists about population, in most cases they will ask where are the effects, where are the models? Many of the top economists went to college at a time when population growth was not even a factor and so they never put population into their very complex models. As a result, it is not considered very important.

Multi-sectoral impact of population growth. I am worried about putting the highest priority on female education. Nigeria is going to add nearly 3 million people to its population next year. That is with a growth rate of nearly 3 percent. I take the position that we should try to take a handle on population because it affects many of the problems we do have—agriculture, the environment, and education. Many African schools are swamped by population growth; they do not have adequate equipment. How are we going to gather resources to build a school or repair a hospital? Let's improve education and at the same time, let's try to get a handle on population. Without that, we are going to be swamped completely.

► PAUL HARRISON: *Rethinking Foreign Aid Priorities*

I did not actually say that foreign aid should be increased. I said that the distribution of aid should be changed and should focus entirely on environmental conservation and the four things you need to do to bring population growth down—not only family planning but also female education, women’s rights, and maternal and child health care. If you neglect any one of those four, you will not have as much success.

It is certainly worthwhile spreading family planning, but it will not spread as far without these other things. So I am certainly not suggesting that you should neglect the population issue at all. Far from it, I think it should have a very much higher priority than it gets at the moment.

The fact that foreign aid in the past has damaged Africa does not mean to say that it cannot be designed in such a way that it does far less damage and, in fact, helps, particularly in the context of debt. Personally I feel that African debt should be canceled full stop because it is a tremendous burden and prevents increased funding for human resource development.

► WANGA GRACE MUMBA: *Focusing on the Community and Women*

Linking solutions to problems. You talked about the linkages between population, environment and development. Then you said that these programs should not be linked. If we all agree that these problems are linked, we must try as much as possible to find solutions that also are linked. When we keep on separating the programs to address these problems, we are confusing our community by telling them that environment is separate from population problems. If we deal with them at the same time, we can make the people we are serving realize that there indeed is a linkage. If we talk as experts here and go on researching and finding more facts that we do not carry to the community, then we cannot truly address the problems.

Women—overloaded and ignored. Everyone is saying that women are the key, but we do not know which door this key is supposed to open. People keep repeating that women don’t seem to have the power. I think we do have the power and we know how to go about it.

Women are at the center of population programs. How many men are using condoms as a means of family planning or child spacing? There are very few in African society. Most women do not know that they can space their children better and decide on how many children they want to have. Women need information to be aware of what is available, how it works, and whether they can afford it.

Where environment is concerned, it is not that we do not know how to plant trees. Women are the very closest of friends to the environment. In her daily life, an African woman depends on the environment to survive. She has to go to the bush to get wild fruit, vegetables, and energy for her family. We have no markets to buy these things. Women need to know how to conserve the environment. For them, the problem is that they don’t have time. Each woman has a lot of things to do. As

a result, she cannot find five minutes to plant a tree after getting firewood. African women never used to cut a fresh tree for energy. They used to pick only dry branches for firewood, but this has changed. We have run away from our traditions, and it is the environment that is suffering.

Community-based research. We have to look at a lot of other issues. When we do research, it is better to go back to the community. Instead of conducting a survey, I would rather observe the community life to come up with true facts. If we get results, it is better we go back to that community and tell them what we found out because that is where the need is. If we keep our results in our offices or in the skyscrapers in New York, the community will not know what problems we have found. If we go back to tell them the findings, they will be very much willing to do something with us in order to correct that problem.

► **PAUL HARRISON:** *Program Linkages at the Village and National Levels*

I agree with most of what you have said. As far as the linkage of environment and population, I think that you can point out the linkages, but in the African context, it will not prove a very strong argument in making women or men have fewer children. People have the number of children that seems right for them in their own circumstances. Telling them that they are causing deforestation if they have eight children will not change their mind.

Perhaps I was a little too skeptical about linkage. You can link population and environment at the village or national level. These two problems encompass almost every aspect of development. They can be linked at the village level as long as there are some kind of village institutions where people can talk about how all the problems interrelate. But even then I am a little bit skeptical as to whether people would start having fewer children. Community education will help, but female education and the availability of contraceptives will help a lot more.

At the national planning level, I think it is important to link population and the environment, if only to make leaders aware of the urgency and importance of dealing with them. But there again, they must beware of dealing with them in a simplistic way. Those countries that just focused on improving family planning have not done as well as the ones that also gave priority to women's education. Bangladesh spends more on family planning in relation to its GNP than any other country. It has made some progress, but if it had put similar efforts into female education as well, it would have seen much faster progress. We have to move on a broad front.

► **JEROME WOLGIN:** *More to Come*

Let me just add that this is the first word of these two days. One of the outcomes of this meeting will be to answer in more detail the question as to whether it makes sense to integrate these solutions and projects.

► MICHAEL FURST: *Political Leaders Share the Blame*

First of all, let me congratulate you on trying to cover a huge, complex subject in a very short time. I was a little surprised when you said that the World Bank is running Madagascar. I thought that political leaders, not donors, have been running African countries. The donors work under tremendous political constraints in trying to provide the kind of assistance that will eventually be useful. Only recently are African governments beginning to change. With democratization, countries can perhaps determine their own fate. In most countries where I have worked, the villager was disregarded much more by the government itself than by the aid donors. Both political leaders and donors share the blame for the damage done in Africa over the past 30 years. Hopefully this meeting will look ahead to what we can do to integrate programs and provide a better dose of foreign assistance than we have thus far.

► PAUL HARRISON: *Donors and Leaders Share Responsibility*

I mentioned Madagascar as an example because the World Bank calls the shots on economic policy. Madagascar's conservation policy is essentially Bank-driven. One has the impression that the country went along with it to get the funds that went with it. But I did not mean to imply that political leaders were blameless. Since the donor community is largely represented here, I did not see much point in slagging off African political leaders.

► CHARLES FINCH: *Better Living Conditions in the Past?*

Historical demography. A Senegalese demographer, Louise-Marie Diop-Maes, is the only person that I know of who has studied Africa's population prior to the slave trade and colonialism. Her work suggests that Africa's population 500 years ago was somewhere between 500 and 600 million—close to what it is now. If that work is corroborated, it would suggest that 500 years ago people lived in a kind of a homeostasis with the environment, without destroying it in the manner that we see today. Therefore, a relatively high population density in Africa, or anywhere really, does not have to mean that the environment is automatically going to be destroyed. I am not sure that population growth is linked to environmental degradation in Africa; there seem to be some other factors that come into play.

Mortality trends. My own work suggests that prior to the colonial episode, Africa was not the sort of a place where people died like flies. The mortality rates of today's Africa may not have always been so high.

We make an assumption that the things that are true of Africa now have always been true. When you look at the situation from a close historical perspective, that does not necessarily hold up. There is reason to believe that in the great urban centers of pre-colonial Africa—the great civilizations—life expectancies and overall

health statistics were not unrespectable by any means. The idea that people had to have 10 or 12 children all the time in order to make up for high infant mortality comes from our recent experience in Africa. It does not necessarily mean that it has always been the case.

Traditional birth spacing practices. This whole business of how you control populations in Africa or how the population should reach some homeostasis needs to be reexamined. A cultural, historical study of Africa shows that traditional African peoples have always had their natural birth spacing techniques. Many women would not engage in conjugal relationships with their husband for anywhere from two to three years after a birth. This enforced two to four-year birth spacing was a natural part of their customs, cultures and tradition. In itself it created a kind of homeostasis with the environment in terms of its population.

Finding indigenous solutions. My feeling is that there are a lot more solutions within African traditions and local resources than we have allowed ourselves to believe. In my limited experience with USAID projects, particularly in West Africa, I have not seen much of that involvement—bringing in the supposed beneficiaries to help us make decisions that are affecting their lives. I think one of the things that we might find is that they have as much or more to teach us as we think we have to teach them.

► PAUL HARRISON: *Homeostasis and Population Density*

I heartily endorse that last remark. As for the references to homeostasis, I did state that it was external intervention that began the ball rolling of things getting out of balance. I must say that I would be very surprised to hear that the figure of 500 or 600 million stood up. Even if it did not, it would remain the case that Africans were in balance with their environment before the Europeans came along. That is certainly true, and that is what I was trying to say. I do not think that one has to prove any particular figure for a previous population to continue believing that they were in homeostasis. But one indication that population density was lower than today was the fact that shifting cultivators were widespread. That is always an indication of low population density.

► RICHARD FORD: *A Broader Array of Institutions*

Historical research. It's difficult to estimate the population of the entire continent. But a Norwegian researcher, Helge Kjekshus has argued that in pre-colonial Tanzania the number of livestock and people was greater than today and that tsetse flies were limited because of traditional control methods.

Development fostered by myriad institutions. I would urge a stronger focus on the institutional dimensions. Africa at the moment is locked into the state. Do we necessarily have to rely on the borders of the state as the only means to

organize development associations? We need to liberate our thinking about appropriate institutions. Many traditional organizations can transcend the nation state as well as work within it.

► PAUL HARRISON: *Importance of Institutions*

I agree 100 percent and fall back on my earlier disclaimer that the fact that I did not mention something does not mean that I do not think it is important.

Synthesis: Sustainable Development in Africa

WORSENING CONDITIONS

During the 1990s, sub-Saharan Africa faces an uphill struggle to combat poverty and hunger while coping with worsening environmental conditions and all-time high levels of population growth. The record of the previous two decades is not encouraging: per capita income and food production plummeted; the ranks of absolute poor and malnourished people soared; deforestation, soil erosion, and wildlife losses accelerated; and the region's population grew by 80 percent. Today, forests are being cleared faster in Africa than in Latin America, one-fifth of Africa's vegetated land is degraded, and about 65 percent of its wildlife habitat has been lost.

Compounding the difficulty of raising income levels is the need to promote sustainable development—raising living standards while preserving natural resources needed to support future generations. While promoting intensified agricultural production and other income-generating enterprises, Africa must minimize deforestation, conserve farmlands, and protect indigenous plants and animals. Even more daunting, Africa's population will at least double within 30 years and could reach 3 billion—the world's entire population in 1960—by the year 2125. Furthermore, Africa must contend with the AIDS epidemic, heavy demands on donor funding, and a world economy requiring high levels of education to achieve competitive advantage.

STEPS TO SUSTAINABLE DEVELOPMENT

Sustainable development can only be achieved by taking concerted action on both population and environmental issues. These two issues each have their controversial aspects; people often do not recognize the effects of their own behavior on their surroundings. The impact of population growth on the environment is often discounted because people tend to over-simplify causal factors and adopt polarized positions. In reality, a complex constellation of multiple factors—including population, consumption and technology—interact with each other to produce environmental degradation.

Environmental stresses accumulate until they give off signals, such as depleted or degraded resources or excessive pollution, that indicate the need for a response to mitigate the damage. However, in many cases the signals are blocked—either distorted by economic policies such as price controls or not acted upon, as when women lack the power or time to adopt conservation techniques. When environmental damage reaches a crisis level, people eventually take corrective action. Often there is a considerable time lag between the environmental damage and this action, which only worsens the situation.

To attain sustainable development, African governments and donors need to: pay closer attention to environmental signals; respond more rapidly to environmental threats; and remove blockages that prevent timely responses. Factors causing blockages include fragile environmental conditions such as weak soils and vulnerability to drought, rapid population growth, low population density, communal ownership of natural resources, women's low status in society, and the influence of foreign donors.

PRIORITIES IN FOREIGN ASSISTANCE

In Paul Harrison's opinion, foreign aid should be redirected to support only debt relief, environmental conservation and human resource development. Key interventions within these categories include: female education, efforts to improve women's status, family planning, maternal and child health care, and environmental programs, including agriculture, forestry, wildlife conservation, and water. Harrison does not believe that it is necessary to link population and environmental programs; both sectors are very complex and multi-faceted; it is difficult to change attitudes and behavior; and most areas lack trained workers. Nevertheless, combined programs could be done at the national planning level to make leaders aware of the importance and urgency of dealing with these issues and at the village level if there were institutions that can explain linkages. Still, creating awareness of population problems is unlikely to influence individual decisions regarding family size.

Africans have adapted to changing environmental conditions in the past and can do so in the future, if appropriate actions are taken.

THE DEMOGRAPHIC CHALLENGE

QUESTIONS POSED TO THE PANELISTS

1. What are the past and projected trends in population growth and distribution in Africa?
 2. What are the prospects for fertility decline in the next few decades? How effective are family planning programs in Africa?
 3. Are there "safety valves" such as migration that countries can deploy to avoid the "demographic trap"?
-

MODERATOR: Timothy Bork, *Deputy Assistant Administrator, USAID Africa Bureau*

Overview of Population Trends, Alternative Population Projections, and Factors Affecting Fertility in Africa

ALENE GELBARD

Director of International Programs, Population Reference Bureau

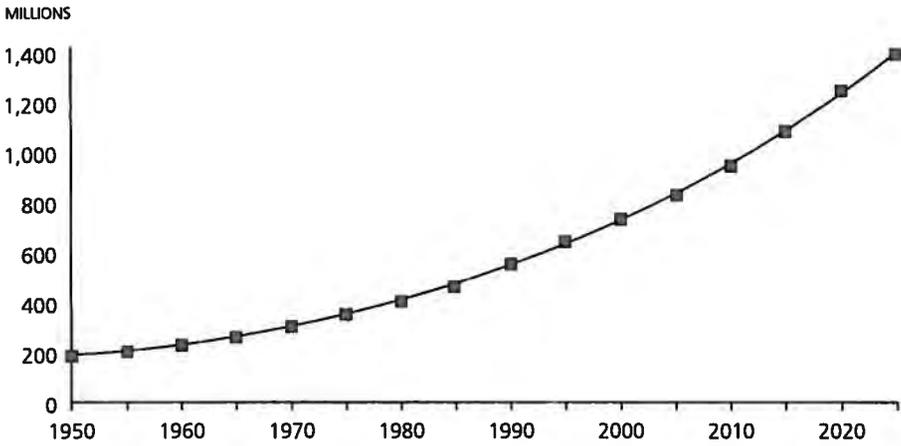
First, I will discuss population trends in sub-Saharan Africa since 1955 and projections for future growth through the year 2025. Then I'll discuss the factors that are contributing to these trends, focusing primarily on fertility, which is the driving force behind Africa's rapid population growth. Finally, I'll briefly review some of the lessons learned about ways to address population problems.

POPULATION TRENDS

Population density and arable land. Compared with other regions, Africa has a relatively low population density—less than 50 inhabitants per square kilometer of land in most countries. However, when we look at the relationship between population and arable land, the picture changes quite dramatically. Most countries in the region have more than 250 inhabitants per square kilometer of arable land. Countries with more than 1,000 people per square kilometer of arable land are: Congo, Ghana, Guinea, Kenya, Liberia, and Mauritania.

Rapid growth. Africa's population is growing at the most rapid rate in the world—3 percent a year, which implies a doubling time of 23 years. U.N. projections show that sub-Saharan Africa will have 1.4 billion people by the year 2025 (see Figure 2). Despite the pandemic of AIDS, Africa's population will continue to grow, even in the hardest-hit countries—mainly in central and east Africa.

FIGURE 2. Estimated and Projected Population, Sub-Saharan Africa, 1950-2025



Source: *United Nations, World Population Prospects, The 1992 Revision (medium variant)*. Population Reference Bureau, Inc.

Between now and the year 2025, Africa's population growth rate is projected to decline to 2 percent annually, which implies a doubling time of 35 years. This rate is comparable to that recorded in 1955, when Africa's death rate began to decline. Until today, the birth rate remained high; it is just beginning to decline now. Even with lower birth rates, Africa's population is projected to grow rapidly because by 2025 death rates are expected to reach the levels observed in developed countries today.

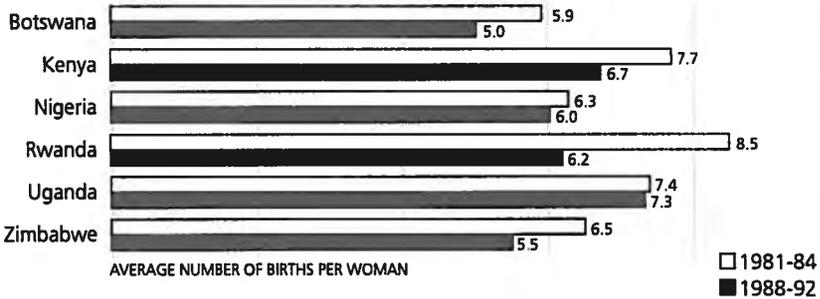
Large annual increments. Despite a slower growth rate, the region's population will continue to grow rapidly because of the large numbers of people being added to its population each year. Currently, sub-Saharan Africa adds about 17 million people per year to its population of 550 million. By 2020 nearly 30 million people will be added annually.

Because of the large number of women of childbearing age (15-49), the region's population will continue to grow even if younger generations of women have fewer children than their predecessors. Between now and the year 2025, the number of women aged 15-49 is expected to nearly triple, from 120 million to almost 350 million. Even if fertility declines from more than 6 children per woman in 1980 to just under 3.5 children per woman by 2025, Africa's population will still double within three decades. In the extreme case, if fertility were to fall immediately to about two children per woman (the number needed to replace the two parents), Africa's population would still grow by some 250 million people by the year 2025—a 45 percent increase. The timing and magnitude of the fertility decline will make a big difference in the overall population size, but it must be recognized that considerable population growth is almost inevitable.

FACTORS INFLUENCING FERTILITY DECLINES

In four African countries—Botswana, Kenya, Rwanda, and Zimbabwe—fertility has declined by roughly one child per woman during the 1980s (see Figure 3). In addition, Nigeria and Uganda had small fertility declines during this period.

FIGURE 3. Trends in Total Fertility Rates

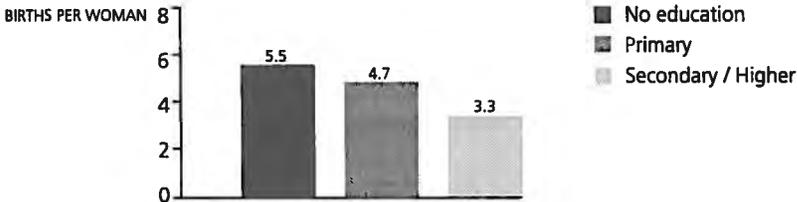


Source: *Demographic and Health Surveys*. Population Reference Bureau, Inc.

The major factors associated with fertility declines are:

- **Family planning.** Those countries that have experienced the largest fertility declines in the 1980s were also those with the highest use of modern contraceptives as well as the largest increase in contraceptive prevalence between 1981-84 and 1988-92.
- **Female education.** Female education is consistently associated with lower fertility and higher contraceptive use. For example, in the Sudan women with no education had about two children more than women with secondary or higher education in 1990 (see Figure 4). Similarly, in Madagascar, 57 percent of the women with a secondary or higher education use contraception, compared with only 3 percent of those with no education.

FIGURE 4. Total Fertility Rates by Level of Education, Sudan DHS: 1990



Source: *Demographic and Health Surveys*. Population Reference Bureau, Inc.

- **Urbanization.** Nearly all countries show a consistent pattern of lower fertility in urban areas than in rural areas. Contraceptive use is also higher in urban areas, where family planning services are generally more accessible.

Declines in infant and child mortality are also associated with lower fertility.

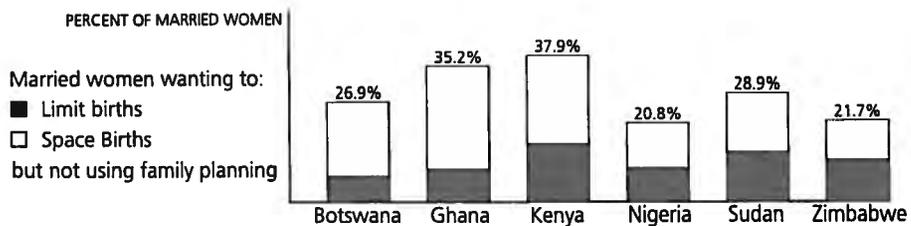
In most African countries for which survey data are available, young women aged 15-19 want 2-3 children fewer than women aged 45-49. These young women, who tend to be more highly educated than older women, state that they want between four and six children on average. It is true that older women may state a higher ideal family size because they already have this number of children. Still, today's young women want fewer children than women of the same age wanted a decade ago. For example, Kenyan women aged 15-19 wanted about six children in 1977-78, compared with fewer than four children among those surveyed in 1989.

Surveys in many African countries have revealed a growing interest in using family planning to meet family size goals. At the family level, couples are reconsidering the benefits of large families. Various social and economic factors are contributing to a grassroots desire to plan family size, including the erosion of traditional practices that support higher fertility, the rising cost of education, the growing number of educated women and women-headed households, and urbanization.

UNMET NEED FOR FAMILY PLANNING

In most countries, a sizeable proportion of women are prime candidates for family planning education and services, since they indicate a desire to space or limit births but are not using contraception. In six African countries with recent national surveys, between 21 and 39 percent of the married women stated that they want to space or limit births but are not using contraception (see Figure 5).

FIGURE 5. Unmet Need for Family Planning



Source: *Demographic and Health Surveys*. Population Reference Bureau, Inc.

MORE FAVORABLE GOVERNMENT ATTITUDES

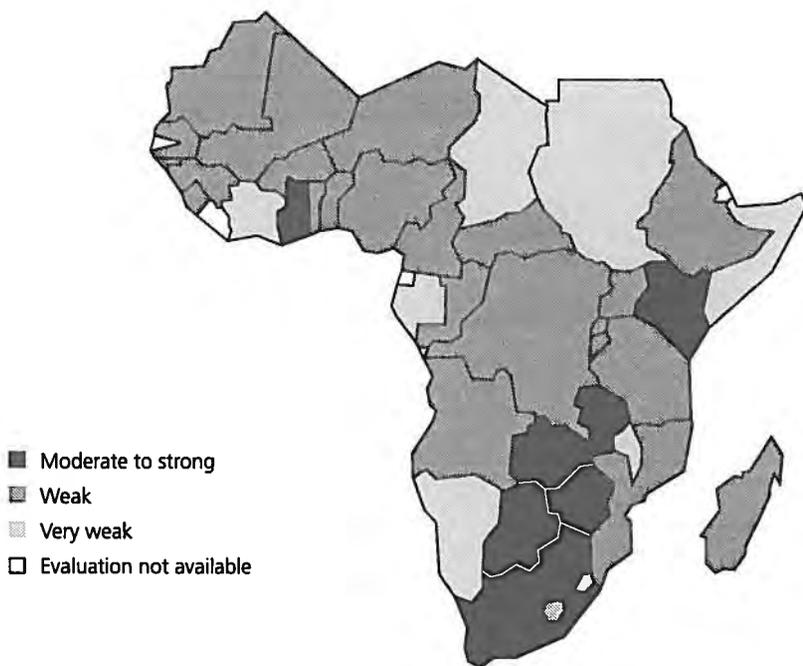
Governments in sub-Saharan Africa are becoming increasingly concerned about their population growth rate. Whereas 30 percent of the governments polled in 1976 considered their rate of population growth too high, 60 percent of the governments took this position in 1991. Today, 33 African countries view their

growth rates as too high. Even governments that are not concerned about population growth are supporting family planning as an important component of maternal and child health care.

STRENGTHENING FAMILY PLANNING PROGRAMS

Much can be done to improve family planning programs. A recent study by the Population Council found that family planning programs in most African countries are still weak (see Figure 6). Programs in only six countries—Botswana, Ghana, Kenya, South Africa, Zambia and Zimbabwe—were rated “moderate to strong.”

FIGURE 6. Status of Family Planning Programs in Sub-Saharan Africa, 1989



Source: Population Council (1992). Population Reference Bureau, Inc.

Key factors associated with effective family planning programs in the region include: strong, consistent political support; dynamic programmatic leadership at all levels; close attention to client attitudes and needs; a wide variety of service delivery outlets; well-planned information, education and communication programs; and community participation in program formulation and implementation.

By the year 2000, \$1.5 billion will be needed annually to meet family planning needs in sub-Saharan Africa. Meeting this goal will require substantial increases in

both government and donor support. In 1990, African governments spent about \$169 million, while the donor community spent about \$150 million.

Governments should seek to expand private-sector participation in family planning programs, both to diversify funding sources and to extend services to needy groups such as unmarried women. Demographers believe that women of all ages, married and unmarried, will seek family planning services once the transition to lower fertility takes hold in sub-Saharan Africa. In contrast, in other regions older women who had achieved their desired family size were the first to control their fertility.

In conclusion, the need to strengthen political commitment is greater than ever, but it is equally important to determine how and where to spend available resources most effectively.

Implications of Rapid Population Growth in Rwanda

JOHN MAY

Demographer, Senior Associate, The Futures Group

Today, I will focus on Rwanda, which is a “beyond the limits” case in Africa. Within the next few decades, other African countries or sub-regions may be in a similar situation.

POPULATION PRESSURES

Africa's densest country. Rwanda is the most densely populated country on the continent of Africa, with 7.5 million people crammed into an area that is about the size of Maryland. All areas are densely populated, with two exceptions: (1) the eastern province containing the Akagera national park, which is infested with tsetse flies and has poor land; and (2) the Nyabarongo valley in the south, which could be colonized and cultivated, although it has a fragile environment.

Agriculture-based economy. More than 90 percent of all Rwandan workers are engaged in traditional, subsistence agriculture. Farms are held by families and parceled out to sons as they reach the age of majority.

Migration and agricultural intensification. Rwanda has coped with rapid increases in its population in recent decades through a tremendous colonization and intensification of agriculture. Because of population pressure, people have started to use marginal lands—mostly the tops of the hills but also the swamps in the valleys. People also decreased the fallow period and converted pasture and forest lands into croplands. These practices have led to soil degradation, which worsens the problem of population pressure and requires families to look for additional lands.

Compounding the problems resulting from colonization and intensification in agriculture is the fragmentation of land holdings. On average, each Rwandan family

has less than one hectare to farm. But family farms are scattered in many different plots, sometimes up to seven places.

FERTILITY TRENDS

Decline from record levels. Until recently, Rwanda's fertility level was among the highest in the world. In the past decade, average fertility has dropped dramatically, from 8.5 children per woman in 1983 to 6.2 in 1992, according to national survey data (Demographic and Health Survey).

Transition to lower fertility. The available data indicate that Rwanda is now experiencing a transition from high to low fertility. Furthermore, the pattern of childbearing is changing: women are having their first birth later and older women are limiting births. Two major factors are responsible for the fertility decline:

- **Later age at marriage.** Women in East Africa have always married relatively late, compared with other regions of Africa. Still, the age at marriage in Rwanda has increased by about two years because young people lack land and economic opportunities. Couples delay marriage until they can acquire a plot of land.
- **Increased contraceptive use.** Women are using contraception in greater numbers. About 13 percent of women in union aged 15-49 are now using modern contraception, mostly injectables and pills. Virtually all the women surveyed in 1992 had heard of a modern method. More than 90 percent of the women surveyed knew where to obtain contraceptives. But only about 25 percent of the women surveyed had ever used contraception. However, given the high levels of knowledge of contraceptive methods and sources, one would have expected more women to have used contraception.

Mixed reviews. Looking at recent fertility trends in Rwanda, one would say that the bottle is half full, half empty. On the positive side, use of modern contraception has taken a quantum leap since the 1980s. Nevertheless, fertility remains high and contraceptive use is relatively low. Rwanda's population growth rate is about 3.1 percent, which is equivalent to a population doubling time of 23-25 years. Although Rwanda has been very successful in family planning, especially for a Francophone country, it has probably done too little, too late to solve its population problem.

POLICY RESPONSES

As population pressures have grown in Rwanda, four types of policy responses have been adopted:

1. **Migration to neighboring countries.** The government encouraged people to migrate to Uganda, Zaire, and other neighboring countries. This policy appears to have had little effect on population pressure.

2. **Agricultural colonization and intensification.** To meet the demand for more food, the government endorsed efforts to increase food production and also encouraged population redistribution. Many families settled in less densely populated areas, put new land under cultivation, and converted pastures and forests to farmland. This policy raised agricultural production above the population growth rate for about two decades, and therefore must be considered a successful response at the time.
3. **Promotion of family planning.** Eventually government leaders recognized that efforts to cope with population growth were inadequate and that population issues needed to be addressed directly. In 1981, the government established a national family planning program. This program, which concentrates on providing family planning services and public education, is beginning to show results. Donors, especially USAID, have provided considerable support.
4. **Adoption of a national population policy.** The government adopted a national population policy in June 1990. One aspect of the population policy is to create stronger demand for a smaller family size.

The first two responses serve to accommodate the consequences of population growth. The third and fourth responses seek to deal with the population growth itself.

FUTURE OUTLOOK

What's going to happen in Rwanda? They are literally pushing the country to its limits: almost all resources have been used up, and most of the land is under cultivation. The prospects for balancing population size and distribution with available resources are limited. The government has tried resettlement schemes and has boosted agricultural production. It is now addressing population growth directly. But these measures take time to show a demographic impact, and Rwanda's population is expected to double within three decades.

Population pressures are likely to continue, even in the face of three possible mitigating factors:

1. **Lower fertility.** The fertility decline has started, but it is not forceful enough to really solve Rwanda's population problem in the short term.
2. **Resettlement.** The few remaining frontiers will not last long. I calculated that if each family received one hectare of land, moving people to the Nyabarongo valley would solve the current problem of land shortages. The bad news is that this land would also be used up within five months.
3. **Higher mortality from AIDS.** Some Rwandans say that family planning is not needed because many people are likely to die from AIDS, thereby eliminating the population problem. I made two projections for Rwanda,

one assuming that average fertility would fall to about 4.4 children per woman by the year 2021, and the second one projecting 2.6 children per woman by the same year. The first (higher fertility) projection assumes that HIV prevalence reaches 10 percent among adults. The second (lower fertility) projection assumes that HIV prevalence rises to 30 percent of adults, which is a very high level. Even with fertility less than half of today's level and extremely high rates of HIV infection, Rwanda's population would still continue to grow rapidly. So AIDS may slow Rwanda's population growth somewhat, but it will not appreciably change future demographic trends.

Malthusian trap. Some observers fear that Rwanda may become stuck in a Malthusian trap—so overwhelmed by population growth that it cannot overcome poverty and other social conditions that perpetuate high fertility. At present, Rwanda is an extreme case, but other African nations may be in this plight within the next several decades.

Rwanda is a prisoner of its destiny and geography. It's a very small country, locked into arbitrary borders determined by the colonial powers. Its two major ethnic groups, the Hutus and the Tutsis, are currently in the midst of a civil war. The only solution to its present population stresses may be to think in regional terms, rather than adhering to its present borders.

Rwanda's National Population Office has a cartoon that attempts to answer those who say that the country's fate is in the hands of God. The cartoon points out that God had only one son and suggests that Rwandans should try to follow his example. It is a controversial message in a highly traditional country dominated by the Roman Catholic church. But it may be the key to Rwanda's escape from its demographic destiny.

Population Distribution, Migration and Refugees in Africa

PAMELA DELARGY

Research Associate at the Carolina Population Center, University of North Carolina

MIGRATION OFTEN OMITTED FROM THE POPULATION AGENDA

First of all, I'm happy to see migration on the agenda here because very often when people discuss population and environmental interactions, migration somehow gets lost. For example, when I was working in the Sudan with the National Population Council in the 1980s, a massive famine produced tremendous dislocation. More than 1 million Ethiopian and Eritrean refugees entered the eastern Sudan. Over a two-year period, Khartoum also grew by probably a million people who were internally displaced. During this time, USAID was supporting the development of a population policy. This process involved sending Sudanese policy-makers to observe family planning programs throughout the world. But many Sudanese

were saying, "Wait a minute. Migration is our most important demographic issue. We recognize that our growth rate is higher than it should be, but we're having to cope with a real migration problem. We would like to look at some examples of countries that have either succeeded or failed in promoting new settlements, slowing rural to urban migration, or integrating large numbers of refugees into their agricultural areas." However, the A.I.D. Office of Population would not provide funds for migration-related activities, saying that they only concentrated on fertility. We were left in a bind because the demographic problem as perceived by the Sudanese, who were in the best position to know, was a migration problem, but no one was willing to deal with migration.

Reasons for Neglect of Migration. Why are population agencies reluctant to become involved with migration issues? I think there are several good reasons for this:

- **Migration seen as a natural process.** Particularly in Africa, migration has been seen as a natural process and an equalizer that should not be interfered with. People use up land in one place and move to new land. When they need to trade or obtain employment, they go to other areas.
- **Political sensitivities.** Restricting mobility is often seen as a highly political issue. Many donors don't want to get involved in political issues.
- **Lack of information.** Migration is very, very poorly understood. There hasn't been as much research on migration in Africa as there has been in fertility or even mortality, which is also another neglected area. Fertility specialists may take the perspective that urbanization is beneficial in the long term because urban people have smaller families.

Despite all these good reasons, I'm going to make the case that addressing migration issues is important to both population and environmental programs.

CAUSES AND OUTCOMES OF MIGRATION IN SUB-SAHARAN AFRICA

The simplest definition of migration is "a strategy that a household adopts to allocate labor over space or over time to ensure survival." There are many different types of migration. For instance, in western Sudan one person would migrate to the city and send remittances back to his rural family, or during some seasons the whole family might move to larger agricultural schemes. The patterns of coping mechanisms there were complex.

Out-migration from rural areas. Many factors lead people to migrate from rural areas. The "push" factors include inability to earn a living, poor harvests, conflicts, fear for personal safety, oppression, and bigotry. The "pull" factors include hope for a better life, employment opportunities, family ties, better access to communication facilities, amenities such as piped water and schools, and cultural attractions.

In many areas of Africa, declining agricultural production has been related to some kinds of environmental degradation, such as loss of topsoil from wind or water erosion and lack of fertilizers. Sometimes deforestation itself has a direct impact on soil fertility; when fuelwood supplies run out people use animal dung as a fuel source rather than as a fertilizer.

Often the response to declining agricultural production is to send someone to the cities or other agricultural areas to work and send remittances. Or if there is land available (as in the Sudan), people just move onto new areas. But in many countries there aren't many new areas to move to; people are moving onto increasingly marginal lands which just cannot maintain them for any length of time.

What happens when people move from their original areas? Migration can have positive effects by relieving pressure on common property resources and increasing incomes through remittances. However, on the negative side, migration can also mean labor shortages at critical times during the agricultural season. In rural areas of the Sudan and Ethiopia in the 1980s, people could not make a living year-round and migrated to cities or other countries. There weren't enough workers for weeding and harvesting, and as a consequence food production declined, thus contributing to more out-migration.

RESETTLEMENT PROGRAMS

In terms of rural-to-rural migration, African governments have sponsored or condoned many programs for new land settlement. However, new land settlement is becoming less and less feasible in many African countries.

Ethiopia has tried two types of resettlement programs that did not work:

- **Moving to new areas.** Over a two-year period, the Ethiopian government moved about 800,000 people from the northern highlands to the southern and eastern areas of the country. This influx of people had very devastating environmental consequences for the resettled areas. Of those who were resettled, an estimated 500,000 have now returned to their original areas.
- **Villagization.** The Ethiopian government promoted village living, reasoning that it would be easier to provide services to people living in villages rather than widely dispersed throughout the mountains. But villagization has resulted in serious environmental degradation around the village sites. To avoid walking long distances to their fields, village residents farm the area closest to the village very intensely. There are also problems with sanitation.

The Ethiopian government has reversed these policies in recent years, and many of the settlers have simply moved away.

RURAL-TO-URBAN MIGRATION

Highest urbanization rates in the world. Africa contains 16 of the 20 countries with the highest rates of urbanization in the world. Many African countries have cities that are growing at 5, 6, 7, or even 10 percent per year. Urbaniza-

tion is especially severe in those countries with civil disturbances, such as Mozambique and Angola, but it's also happening in Kenya, Tanzania, Burundi and other areas.

Environmental impact. Urbanization has serious environmental consequences, including high energy needs and problems of sanitation, traffic, and air and water pollution. Cairo and Lagos are good examples of cities that have outgrown their infrastructure.

Policy responses. How have governments tried to deal with rural-to-urban migration? Some countries have tried to restrict internal migration, but this is notoriously difficult to do. Very few countries, with the exception of Tanzania, have made an effort to improve life in rural areas in order to discourage this rural-to-urban migration.

Other migration. Out-migration from urban areas takes two forms:

- **Urban-to-urban migration.** Migration from one urban area to another is particularly common in West Africa.
- **Urban-to-rural migration.** Some urban-to-rural migration occurs, mainly in times of crisis. For example, in Zaire people are finding it increasingly difficult to survive in some cities; if they have any access to land at all, they return to their village.

PASTORALISM

Pastoralism is mainly found in the Sahelian region. Pastoralists have been some of the hardest hit people in Africa over the last decade, due to possible climate changes as well as environmental degradation resulting from overgrazing. Also, settled agriculture has been extending onto areas previously used for grazing and is a tremendous problem across the Sahel.

What have governments tried to do about the dislocation of pastoralists? The standard response is to resettle them. Yet, resettlement has not been very successful, and there is some question about whether this is an appropriate response. In many cases, pastoralism is an ecologically sound lifestyle, whereas the types of settlements that have been adopted have not been.

IMPACTS ON FERTILITY AND HEALTH

Migration and fertility. The relationship between migration and fertility is very understudied, and there are many competing ideas about it. One issue is that migration often determines whether girls are in school. If one asserts that female education is critical for reducing fertility, then it must be recognized that some stability of a population is important to ensure that girls are able to attend school.

Migration and health. The health implications of migration are also important. Because of migration, malaria has spread to areas that never had it before. Also, there is a close, but not yet clearly determined relationship between HIV and population movements.

INTERNATIONAL MIGRATION

Half of the world's international migrants. The World Bank estimates that international migrants in Africa make up probably one-half of the total international migrants in the world. Reasons for this large movement include:

- **Arbitrary boundaries.** Africa has many small countries; people can move only a short distance, but still cross an international boundary. Some boundaries divide ethnic groups.
- **Political issues.** Many countries are in the midst of political turbulence and internal unrest and their citizens have fled to other countries.
- **Employment.** Many Africans migrate seasonally or permanently in search of work.

Little data exist on international migration or even migration within nations in Africa.

The invisible stream. Governments have tended to overlook the impact of migration until it becomes a major political or economic issue. The migration from West African countries to Nigeria was slow and steady for decades. No one knew how many foreigners had entered the country. When almost 2 million people were expelled from Nigeria in 1983, it came as a major shock to many observers. Major consequences of international migration include the brain drain and impact of remittances sent from abroad to support families left behind.

Refugees. Refugees pose a special problem, because they often move in large numbers and very quickly. Such large movements can be devastating to the natural environment, not to mention to the health and well-being of both refugees and the host population.

During the 1984-85 drought, as many as 3,000 people daily crossed the border from Tigray, Ethiopia into Sudan. The reforestation programs that had been supported by FAO, UNDP, and many NGOs for more than a decade were decimated within three months. It was impossible to provide services to an influx of 300,000-400,000 people and still maintain the natural environment.

One interesting aspect of the refugee problem is that displaced persons are often unable to obtain family planning services, even though they are one of the most needy groups. In the Sudan, both the family planning agencies and the UNHCR refused to take responsibility for providing family planning services to refugees.

WAR AND ENVIRONMENTAL DEGRADATION

Lastly, I would like to mention the issue of war and environmental degradation in Africa. We often give little attention to the many wars going on in Africa and their implications. Among the harmful effects of wars are:

- **Displacement of large numbers of people.** Wars cause thousands of people to leave their homes. Many of them are pushed across borders, creating great social and environmental burdens for host countries.
- **Environmental damage.** Wars sometimes directly affect the environment. For example, in northern Ethiopia there has been heavy defoliation, brush clearing, widespread setting of land mines, and destruction of water sources. Also, large concentrations of soldiers are creating pressures on surrounding areas in Angola, Mozambique, Liberia, Ethiopia, Somalia and other countries.
- **Lack of funds for conservation.** Because so much money has been spent on war in many African countries, there are few resources for conservation or environmental rehabilitation.
- **Conscription of men.** In Ethiopia (and other nations with civilians), men were conscripted into the army, leaving women in the countryside with increased responsibilities for agriculture and no commensurate increase in access to credit, inputs such as fertilizer, and agricultural extension, or even legal access to land.
- **Repatriation and demobilization.** In many countries, repatriation of refugees and demobilization of armies have become major problems. Africa has an estimated 4.5 million refugees. Although repatriation of refugees is considered the best solution to refugee problems, few repatriation programs have been successful in Africa. Furthermore, few countries have the funds to support large-scale repatriation programs. It will be a major challenge either to reintegrate refugees into agricultural areas or provide employment for them in urban areas. The 500,000 Ethiopians in Sudan have very little resources to return to their country, and their ability to earn a livelihood there is uncertain. The areas they came from are already densely populated, and there is no land for them.

Clearly, migration and related issues have a major impact on both population trends and environmental quality.

African Policy Responses to Population Problems

BEN GYEPI-GARBRAH

Secretary of the Africa Population Advisory Committee

OVERVIEW OF APAC

The African Population Advisory Committee (APAC) is a collaborative venture of the UNFPA, IPPF, and the World Bank, with the technical support of the World Health Organization and the African Development Bank. It receives funding from the governments of the Netherlands, Denmark, Norway, Sweden, France, and Germany. Recently, it has received support from the USAID-funded HHRAA project to produce a status report on population programs in Africa.

The impetus for establishing APAC came from African specialists at the World Bank, who believed that a review of population programs in Africa was needed in order to learn from past programs and develop new initiatives. Because population is a political issue and most population programs are donor-driven, the founders decided that the most effective approach would be to ask highly respected African leaders to define the issues and develop their own population agenda and program.

The Committee consists of 18 senior African policy-makers, ministers, administrators, and academicians, who have expertise in population, development, law, women's issues, and the environment. Their work is supported by a joint secretariat located in the Population and Human Resources Division of the World Bank's African Technical Department.

The actual work is done by the country team, which is comprised of influential people who are committed to population programs. The country team is usually chaired by the director of population programs and includes managers of family planning, environmental, and women's programs as well as community leaders. The country team is key because the secretariat just provides them with guidelines and they decide what needs to be done. At the moment APAC has country teams in place in six African countries—Burkina Faso, Cameroon, Ghana, Kenya, Nigeria, and Senegal.

APAC'S AGENDA FOR THE 1990S

APAC has launched a new initiative, known as the "Agenda for Action to Improve the Implementation of Population Programs in Sub-Saharan Africa in the 1990s." The main purpose of this initiative is to develop a mechanism for community participation and to build a consensus and a commitment to population and development activities. We believe sincerely that the problems of Africa are Africa's. Africans have to take the leadership position and try to court donor support.

APAC's Agenda for the 1990s has two major components:

- **Development and implementation of national population policies;**
and
- **Improvement of family planning programs.**

Although APAC looks at population issues from a very broad perspective, this presentation will address only family planning issues, since family planning is a key intervention. Not only can it be done and done well, but also its impact can be measured.

Never before has there been such a collective awareness and rich history of policy improvement experiences to draw on in order to support the region's new initiatives. In 1970, only two countries in continental Africa—Ghana and Kenya—had population policies. Today, 33 sub-Saharan nations consider their fertility rates to be too high. Seventeen countries have adopted national population policies—the majority of them since 1990.

In 1982, 14 percent of African countries had national family planning programs. By 1989, this proportion had risen to 43 percent. Although family planning services and supplies are available in most African countries, organized programs are considered weak. An expert assessment conducted in 1989 designated only two countries—Botswana and Mauritius—as having strong family planning programs. Programs in five countries—South Africa, Kenya, Zimbabwe, Ghana and Zambia—were rated moderate. Programs in the remaining countries were classified as weak or very weak. Clearly, much can be done to invigorate and upgrade family planning programs.

STRENGTHENING FAMILY PLANNING PROGRAMS

To date, most family planning programs have concentrated on the supply side—making family planning services more accessible and affordable. The biggest challenge we face is in the demand side. How do you get people to support family planning programs? Many initiatives are being planned and implemented.

Following are some of the major areas that APAC is addressing:

- **Developing broad consensus.** At the country level, APAC works with public officials, community leaders and private-sector NGOs to build consensus on population issues and to generate support for community initiatives.
- **Providing models for program planning.** APAC has a reference book that discusses the integration of population variables in planning and provides a model for integrated family planning programs. It should be helpful to many countries that are now grappling with these problems. APAC is hoping to develop an appropriate model that would integrate the population, environment and agriculture nexus, since we don't know how to do it. For example, in Ghana, many people lack water, transportation, nutrition, health care, and family planning programs. Ghana has developed an integrated family planning program with community participation. Agricultural extension officers work with family planning staff, with input from community members.
- **Promoting community participation.** APAC is developing a model prototype for reviving the African community development spirit, which was destroyed by colonialism. In one region of Ghana where I worked, people would provide funds for power plants, road repair, and other

projects if government support was not forthcoming. Today, these donations have stopped because people fear that tax inspectors will come looking for them. Also, I agree with Wanga Mumba that when we obtain information, we must go back to the communities and inform them about what is happening.

- **Encouraging greater male involvement.** Where are the men with respect to family planning? How do we share this information? If you go to any family planning delivery center, there's no mention of men as part of maternal and child health and family planning. Men don't want to queue with the pregnant women and children at family planning centers. We don't want these nurses to talk to us about family planning because we have some things we want to hide from them. Men would like to have an alternative delivery mode in which men provide family planning information.
- **Countering negative media reports.** What can be done to respond to negative articles in the national press about family planning issues in other countries? APAC is encouraging the establishment of a national committee of people working in communication and policy to develop appropriate responses in each country.
- **Publicizing program successes.** We need to learn from successful programs such as the Danfa Comprehensive Health Program, which was conducted in Ghana in the 1960s and 1970s. It was an excellent program, but there was no follow-up. It wasn't internalized by the people, and nothing remains today. Such experiences can help in planning future programs and making the best use of donor funds.

POPULATION TRENDS

Record-level growth rates due to declining mortality. Population growth rates remain high in sub-Saharan Africa because infant mortality continues to fall. Fertility remains high, although some countries have experienced modest reductions. If you take migration out, the rate of natural increase is even higher today than it was during the 1960s and 1970s. Unfortunately, we don't have any safety valve for migration as the Irish did after the potato famine in the early 19th century.

Prospects for fertility decline. Sub-Saharan Africa has made a lot of great progress on the fertility front. Prospects for fertility decline are very good. Family planning programs continue to improve. My former professor, John Caldwell, believes that the transition to lower fertility will be led by single women; this view is controversial. In any case, the timing and speed of the fertility transition remain uncertain.

At the Third African Population Conference, held in Dakar in 1992, there was a consensus that the contraceptive prevalence rate (CPR) will have to be increased to 20 percent by the year 2000 in order to slow population growth rates. Some of us think that this level is inadequate and that a CPR of 44 percent by 2000 is

needed and doable. Zimbabwe and Botswana have the potential to do it. Mauritius did it. That's why I say that prospects are very good.

NEED FOR GREATER GOVERNMENT COMMITMENT

Reliance on foreign donors. Progress has been slow. Why? Because governments take little interest in population programs, and most communities do not appreciate their importance. Government officials know that foreign donors will provide funds for population programs, and therefore they do not give much attention to population issues.

Until recently, African governments were not very serious about addressing population issues. For example, many African officials have not been very keen on obtaining loans for population programs. Between 1974 and 1984, only one country in Africa had a World Bank loan for population activities. But in 1985-89, 23 African countries had World Bank-financed population and nutrition programs. This number grew to 31 countries in 1993.

Funding requirements outstripping donor resources. New initiatives are being developed that need to be nurtured and sustained by the countries themselves with the support of the donor community. By the year 2000, Africa will need \$1.5 billion to support family planning programs, according to the Global Coalition for Africa. Donors cannot fund all of this; governments will have to make up the shortfall.

INNOVATION, EFFICIENCY, AND INSPIRATION

So what is the challenge? We must come up with innovative and more efficient ways of doing things. We must share stories of successful and unsuccessful experiences. How do you do it? We need to tap community resources and talent.

DISCUSSION

▶ **TIMOTHY BORK:** *African Ownership Given High Priority*

With respect to African ownership, Mr. Hicks gave that as the highest priority for the Africa Bureau in his testimony to Congress. So we certainly are going to look very closely at your model and keep working on that challenge. I would like now to turn the program over to the audience to ask questions.

▶ **FATHY SALEH:** *Land Ownership and Social Programs as Incentives for Large Families*

The presentations so far have put the emphasis on family planning and education of individuals. To me, family planning is a maintenance action, not a real cause. Has there been any effort to address the real causes that lead to population growth in Africa?

As an example, my native country of Egypt had a private land ownership system before 1952. Most of the farmers were working for land owners, and consequently they introduced technology. Family size was maintained based on

supply and demand. After the revolution, the land was divided into five acres per family. For those families who could not afford mechanization and technology to cultivate their land, it became very attractive to them to increase the size of their family in order to have the children cultivate the land manually. In addition, newly introduced social programs, from free education to free health, to almost free food, provided another incentive for couples to have more and more children. In recent years, the World Bank has been putting the squeeze on Egypt to remove subsidies and to eliminate some of the social programs, and people have felt the crunch. Average family size is smaller, and the rate of population growth has gone down drastically.

It seems to me that we need to look for and address the underlying reasons for larger families. Could any of the panel members comment on educating governments on what works and what doesn't work to limit population growth?

► **BEN GYEPI-GARBRAH:** *Rationales and Target Audiences for Population Programs*

If you look at the history of family planning and population programs, the original rationale was to improve maternal and child health. Nobody quibbles about health. The initial push also emphasized the macroeconomic benefits of limiting population growth. Now that population programs have matured, there is a need for us to go beyond these rationales.

In APAC's initiative, we target the country team because these people make decisions regarding resource allocation. We particularly focus on ministers of finance because they are the major decision-makers regarding budgetary allocations. In the final analysis, civil servants are the ones who will transform policies into programs and support directives from the ministers.

► **ALENE GELBARD:** *Poverty and Women's Status*

When you mentioned the real problem behind population issues, I assume you are talking about poverty and the challenges to economic development. I think it is very important to make the point that family planning is one of many mechanisms to address poverty at the individual level and at the national level. It enables families to space births and provides breathing space for governments to address many of the other problems that are exacerbating poverty.

One of the key factors affecting population growth in Africa and elsewhere is the status of women. Family planning, the status of women, and female education are interlinked. The evidence from the three African countries with the greatest fertility decline so far—Kenya, Zimbabwe and Botswana—shows that lower fertility is associated with high levels of female education. Education gives women alternatives to having large numbers of children. Other factors—a strong family planning and health program, urbanization, and low infant mortality—are interacting to promote smaller families.

Family planning yields visible, measurable results. Many of us recognize that family planning is not the only mechanism that influences fertility. As Ben said

earlier, it is an intervention that generates visible, measurable results. You can see what you've put into it and what you get out of it. That's one of the reasons that it is discussed so heavily in the context of ways to achieve lower fertility.

► PAMELA DELARGY: *Multiple Rationales for Family Planning*

In terms of government policies, there are traditionally three rationales for family planning:

1. **Health.** The health rationale argues that family planning saves lives by reducing maternal and child mortality.
2. **Population pressures.** The demographic rationale looks at population growth in relation to rural development, agriculture, education, and food supplies.
3. **Women's rights.** Another rationale is the reproductive rights of women.

There is tension between these three rationales, and many governments are having trouble finding a balance among them. In some cultural or religious settings the reproductive rights rationale is totally ineffective. In fact, it might cause some backlash. In some settings, the health rationale is the only acceptable one.

Differing perceptions of the demographic rationale. The demographic rationale can backfire as well. At the environmental conference in Rio de Janeiro there were many women's groups saying, "Whoa, this is an anti-woman thing. People are talking about controlling women's fertility for demographic and economic purposes. We don't think that this is taking into account women's rights and status." So there is not a generic way to think about this from a policy point of view. Furthermore, in many African countries family planning services are offered by a variety of non-governmental organizations and religious groups. Consequently, there are different decision-makers in different settings.

► CHARLES FINCH: *Relationship between Fostering and Family Planning*

Fostering has been mentioned twice so far. Were you saying that fostering has to be discouraged as a way of achieving family planning or population control?

► ALENE GELBARD: *Decline in Fostering Linked to Desire for Smaller Families*

Fostering has been a very positive practice in Africa. It is eroding for a variety of reasons, such as pressures on the family and the increase in women-headed households. No one is discouraging it, but its decline is changing the way families are structured. Some people say that fostering has facilitated large numbers of children per woman. I'm not sure about that. I mentioned the decline in fostering as one of the factors that seems to be contributing to a desire among many African women to have fewer children.

► CHARLES FINCH: *Fostering Does Not Lessen Parental Responsibilities*

In my experience, African parents don't generally raise their own children. Children are given to relatives—aunts, uncles and grandparents—to raise for a time. But then the parents reciprocate for younger relatives. It doesn't necessarily mean that parents have no childbearing responsibility because that responsibility comes back at a later time from other relatives. Ultimately the net effect is a wash.

► JEROME WOLGIN: *Does Rwanda's Fertility Decline Have Lessons for Other Countries?*

It seems to me that this Rwanda experience is unprecedented in some ways. It's not a country with particularly high levels of female education, or high levels of urbanization, or particularly low rates of infant mortality. Do you know the causal relationship for this dramatic decline in fertility? Are there lessons for other places in Africa? Or is it particular to the environmental and agricultural pressures that take place in Rwanda?

► JOHN MAY: *Rwanda's Fertility Decline a Return to Previous Levels*

First of all, in recent decades Africa has experienced an increase in fertility, which was caused by a decline in factors that inhibit fertility such as breastfeeding and postpartum abstinence. Currently, fertility is no longer controlled by traditional birthspacing factors, but neither is it yet fully controlled by the use of modern contraception. In this interim period, there has definitely been an increase in fertility, especially in Eastern Africa.

Rwanda's fertility level in 1983, which was 8.5, was a transitional level. In the late 1950s and early 1960s, it used to be 5.5. Now it is going back to pre-rise levels. Some scholars refer to this as the pre-decline rise in fertility, that is preceding the fertility transition. So the recent fertility decline needs to be put into perspective.

Furthermore, many traditional ways to control fertility are eroding due to modernization, westernization, and the mass media. Those mechanisms were used by African societies to ensure that the largest possible number of children would survive. There was tough social control on parents who had a child too soon after the previous one. Kwashiorkor, a disease caused by acute malnutrition in children, means "the one born too soon." As traditional childspacing measures fall into disuse, some new mechanisms, including modern family planning, have to be introduced. One of the major arguments for family planning is that it is just reinstating the traditional mechanism of birthspacing.

Rwanda an extreme example of population pressures. Africa is changing in many respects—socially, demographically, and in terms of the status of women and agriculture. The philosophy of my work on Rwanda is to take an extreme example of population pressures. Rwanda is a land-locked country with fixed borders. Its living conditions are so pleasant that people don't want to leave. They prefer to have a meager living in Rwanda than a so-called plentiful living in Tanzania. But it's

an extreme case. Similar stresses could emerge in other parts of Africa such as eastern Kivu, southern Togo, or Senegal within the next two decades.

Factors affecting Rwanda's response to population pressures. The Rwanda case is a bit extreme because of three key factors:

- **Rural dominance.** Rwanda is one of the least urbanized countries in the world. It's a countryside without villages. Housing is scattered everywhere.
- **Conservative religion.** Its Catholicism is traditional, conservative and unique to Rwanda. The Catholic church is very influential.
- **Low literacy.** Female literacy is very low; this may change.

Rwandan society, like many others in Africa, is changing—probably more rapidly than we think. Fertility might be even lower than recorded because the survey results reflect a situation 2-3 years old.

My presentation showed how the Rwandans have responded step-by-step to population pressures. It's human nature to avoid tackling problems until they become acute. Paul Harrison made this point forcefully yesterday. My point was that population problems do not lend themselves to last-minute responses.

► **WILLIAM WEBER:** *Awareness of Land Shortages Affects Fertility Behavior of Rwandans*

I've worked on Rwanda for the last 15 years and lived there for 6 years. Regarding Jerry's question on the causes of fertility change, what I have experienced and what showed up in my research was a perception that there is a very clear lack of land in this predominantly rural country. The surveys I did in 1978 and 1979 on attitudes towards wildlife and wilderness found that almost everyone was very aware that Rwanda has a land shortage. When I asked about solutions to that problem, the predominant response was, "We'll go someplace else." In the past, people had gone across the borders to Zaire.

But when I did a follow-up survey in 1984 to see how people were looking at the same set of issues, migration as a solution dropped from something like 55 percent of responses down to about 12 percent. People clearly saw that there wasn't someplace else to go anymore, particularly within the country. For political reasons, there weren't too many areas outside of the country either. In my follow-up survey, people started to mention intensification of agriculture. Mention of family planning as a solution went from 2 percent to about 22 percent. The land constraint has become overwhelming for people, as they try to buy land so that they can marry. I think that has had a huge effect on this change.

► **JOHN MAY:** *The Time Lag in Effecting Demographic Change*

It is extremely important to recognize that there is a time lag between promotion of family planning and visible changes in the rate of population growth. It takes a very long time to achieve results. To take a hypothetical example, even if

Kenya were to reach replacement-level today, its population would continue to grow for 65-70 years and would double during this period. The reason for this continued growth is that 49 percent of its population is under the age of 15. The next generation of parents is already born.

Changes in the demographic cycle take place over two or three generations, which is equivalent to perhaps 60 or 90 years. In contrast, program cycles last about five years, and political election cycles only 6-12 months. On the other hand, environmental cycles—the time needed to restore damaged or depleted areas to their original state—might be 1,000 years for some ecological systems. The challenge is to put all these time cycles together somehow. The clash—because there is a clash obviously—occurs because different time cycles hit each other at the same moment. If we started thinking in those terms, we could clarify the debate.

► DIRCK STRYKER: *Holistic Policies*

How can we identify points where policy can deal with the whole series of problems in Africa? For instance, it seems to me that in the long run Rwanda has got to move away from agriculture towards other kinds of activities, particularly labor-intensive industry geared to a regional market. According to recent data and surveys, Rwanda is already beginning to export manufactured goods to its regional market in return for imported food products.

Some people are saying that in order to move in the direction of more manufacturing, more urbanization is needed. It has also been well documented that fertility rates decline with urbanization. But do they decline because of dense settlements, or because people are better educated in urban areas? Would women's education be a more direct policy variable in influencing fertility rates than urbanization? This issue is very complex but vitally important when it comes to designing strategies for approaching not only the problem of population growth, but also ways to support larger numbers of people, since many of them will be there regardless of decreases in the fertility rate.

► JOHN MAY: *Variety of Approaches Needed to Address Fertility and Migration Problems*

You raised an excellent point. In the case of Rwanda, I try to use a holistic approach, looking at the whole set of policy responses to reduce population pressures. I believe that there is no quick fix in Rwanda. No single answer is going to bring the solution. Family planning will not solve the problem, although it may alleviate the problem. Agricultural intensification may also alleviate the problem. But we may have to think in other terms such as fertilizers and regional markets and to revisit some of the early responses like migration. I think it's absurd to believe that Rwanda is going to be able to absorb a doubling or quadrupling of its population in the next two generations.

Ben made the very interesting comment that we ask Africa to do its fertility transition, but we ask them to stay in Africa. We don't want them elsewhere. Even in the 19th century when Europe was undergoing its demographic transition, its

population growth rate was 2 percent a year at most. Various responses were put into place—late marriage or no marriage whatsoever, and heavy emigration. About 52 million Europeans came to the United States.

Governments must address both fertility and migration. Are we going to have a fertility transition in Africa with no migration movement whatsoever? I don't believe so. There is a migration transition that is linked to the demographic transition. The migration components of the demographic transition have been largely overlooked. It's possible that the problem of high fertility could resolve itself rapidly. In two or three decades there could be sharp, rapid declines in fertility all over Africa. However, a steady progression to replacement-level fertility is by no means assured. The fertility decline could stall for a while. In any case, governments still have to address other problems such as a sustainable environment, economic opportunities, food, security, and migration within and outside of Africa.

► **ALENE GELBARD:** *Community Involvement and African Traditions Are Keys to Effective Programs*

Urbanization brings with it a lot of things. It's difficult to do multivariate analyses that identify the variables that have the greatest effect.

In terms of a policy response to these complex problems, I think that working with local communities is essential. Community residents need information on how these issues are linked. We need to respect the way they see things because development programs are about improving their quality of life. Ultimately, program effectiveness depends on sharing information with local communities and letting them use that information to define and achieve their own objectives.

Many solutions may be found in African traditions, and this area needs more attention in the future.

Synthesis: The Demographic Challenge

(Based on Timothy Bork's summary)

POPULATION TRENDS

Population trends will have a major impact on Africa over the next several decades. Sub-Saharan Africa is projected to have 1.4 billion people by the year 2025, according to U.N. projections. This growth will occur despite the AIDS pandemic and the growing use of family planning.

Even with a decline in fertility rates, Africa's population is likely to double within 30 years due to the large number of young people about to enter their childbearing years. For example, 49 percent of Kenya's population is under the age of 15. If Kenya were to reach replacement-level fertility (a two-child family average) today, its population would continue to grow for at least 65 years, while doubling in size.

Six African countries (Botswana, Kenya, Nigeria, Rwanda, Uganda and Zimbabwe) have experienced fertility declines during the 1980s, mainly due to family planning, female education, and urbanization. In recent decades, fertility has increased in some countries due to a decline in traditional birthspacing practices such as breastfeeding and postpartum abstinence. As these practices recede, they must be replaced by contraception or fertility will rise.

MIGRATION

Population distribution and migration have been largely neglected by researchers and donor agencies, and yet they will have a major impact on Africa's future. Europe eased its own demographic transition by exporting millions of people; some 52 million went to the U.S. alone. Yet prospects for international migration are limited today. Africa is expected to undergo the demographic transition without any emigration.

Africa is urbanizing rapidly. It contains 16 of the 20 countries with the highest rates of urbanization in the world. Urbanization has serious environmental consequences because of increased resource consumption and waste disposal problems, although it is also associated with lower fertility.

Africa contains half of the world's international migrants. Causes of this large movement of people include arbitrary boundaries, political turbulence, and employment opportunities. Refugees pose a special problem because of their large numbers and rapid movement. Africa currently has an estimated 4.5 million refugees. Problems of demobilization and repatriation of refugees in Africa are likely to grow. USAID assistance will be needed. Also, refugee assistance agencies need to ensure that refugees have access to family planning services.

For many people, migration is a means of ensuring household survival when families can no longer eke out a living from available land. In Africa, environmental degradation has contributed to reduced agricultural productivity. Migration has positive aspects—relieving pressure on resources and increasing incomes through worker remittances—as well as negative consequences, such as causing labor shortages at critical times during the growing season.

The impact of migration on fertility and health has not been well studied. Migration often determines whether girls are in school, and can contribute to the spread of malaria, HIV, and other diseases.

RWANDA: A CASE STUDY OF POPULATION PRESSURES

Rwanda clearly shows the linkage between population pressures and environmental degradation. A densely populated, rural country with an agriculture-based economy, Rwanda may become stuck in the classic Malthusian trap—so overwhelmed by population growth that it cannot overcome poverty and other social conditions that perpetuate high fertility. Policy responses to date have included migration, agricultural intensification, family planning, and adoption of a national population policy. These actions have been too little, too late. Even taking into

account fertility declines, resettlement, and mortality resulting from AIDS, Rwanda's population is likely to grow rapidly. Other African countries could be in a similar situation within a few decades unless they take concerted action to address population issues.

POLICY RESPONSES

The African Population Advisory Committee has launched a new initiative to improve population programs in Africa. The Committee, which consists of African leaders from diverse disciplines, emphasizes African ownership and leadership in addressing population problems. Country teams have been established in six countries: Burkina Faso, Cameroon, Ghana, Kenya, Nigeria, and Senegal.

Since 1990, 17 African countries have adopted national population policies. Many countries now have national family planning programs or permit private-sector services and sales.

In identifying possible intervention points to influence fertility, participants agreed that family planning, female education, urbanization, and improved child survival were the most commonly cited. Family planning generates visible, measurable results while meeting felt human needs, according to two panelists.

FAMILY PLANNING PROGRAMS

The unmet need for family planning is substantial in Africa. In six countries with national surveys, more than one in five married women expressed a desire to space or limit births but were not using contraception.

An expert assessment conducted in 1989 found that only two African countries (Botswana and Mauritius) had strong family planning programs, and programs in five countries (South Africa, Kenya, Zimbabwe, Ghana and Zambia) were rated as moderate. The remaining programs were classified as weak or very weak.

Much can be done to strengthen family planning programs. Key initiatives include: ensuring consistent political leadership, promoting community participation, paying more attention to clients' needs, involving the private sector in service delivery, and encouraging greater male involvement in family planning. Several speakers stressed the importance of building on cultural traditions and involving communities in programs.

Expanding family planning services and education to meet client needs will require \$1.5 billion annually by the year 2000. African governments and donors spent about one-fifth this amount in 1990.

THE ENVIRONMENTAL CHALLENGE

QUESTIONS POSED TO THE PANELISTS

1. What are the key environmental problems in Africa?
 2. What are the major factors that cause environmental degradation, and how can governments address them?
 3. How would you rate current environmental programs in Africa? How could they be improved?
 4. What are the social, political, economic and institutional barriers to efforts to address environmental problems in Africa?
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MODERATOR: George Lewis, *Deputy Director of the Office of East African Affairs, USAID Africa Bureau*

Overview of Major Environmental Problems in Africa

TOM FOX

Director of the Center for International Development and Environment, World Resources Institute

Rather than giving you a great number of statistics, I will provide a broad brush of some key environmental issues for Africa and then will discuss factors such as the capacity and capability to deal with them.

Lack of environmental data. As anybody who has studied this field knows, there is a woeful lack of data about environment conditions in Africa. We know some things about some issues, but very little to properly generalize across countries. The meager information that does exist is not usually easily accessible to any but the most dogged researcher.

KEY ENVIRONMENTAL PROBLEMS

Soil degradation. I'm going to repeat some of the statistics about soil that Paul gave last night because I think they are particularly striking. A study commissioned by the United Nations Environment Program concluded that some 17 percent of arable land worldwide—a land mass the size of India and China put together—has been degraded since 1945. Africa's rate of land degradation—22 percent—was dramatically higher than the global figure.

Eighty percent of Africa's land mass is fragile. About 46 percent of Africa's land is too dry to sustain rain-fed agriculture. These are startling figures for a continent that clearly depends on agriculture and rural livelihoods more than any other area of the world.

Deforestation. As Paul said, the deforestation rate is higher in Africa than anywhere else, largely due to slash-and-burn agriculture, but also logging in some areas. Deforestation is particularly high in areas with relatively easy access to the forests, as in the Ivory Coast, which not surprisingly has the highest deforestation rate in Africa. I think we have to worry about what might happen when Central Africa's forests become equally accessible.

Water resources. Africa has highly variable rainfall. In selected areas all across the continent, rainfall varies by as much as 40 percent from year to year. Other water resources are showing signs of stress. Lake Victoria has captured considerable attention and is likely to become the subject of even greater inquiry, given its central position in a part of Africa that is so popular with outsiders. But other lakes and river systems are experiencing similar problems.

Urbanization. As any of you who have visited the slums of Nairobi or Lagos know, urbanization is causing an environmental crisis. Still, environmental problems are not yet exacerbated by substantial industrialization, so African cities don't have the same kind of air pollution problems found in Santiago, Chile or Mexico City.

But clearly, environmental problems will worsen over time. The Economic Commission for Africa predicts that by the year 2010 Africa will have 30 cities with at least 1 million people. The environmental consequences of this growth will be very difficult to deal with. Much of urban population growth is due to massive migration, primarily caused by the inability of the land to sustain livelihoods.

Population growth. Finally in this quick list of environmental problems, we have to talk about the prominence of the dominant species—humans. As mentioned before, the United Nations medium projection states that there will be 1.4 billion people in sub-Saharan Africa by the year 2025. Man as a species is clearly a critical environmental issue all in himself.

RETHINKING OUR APPROACH TO ENVIRONMENTAL PROBLEMS

I want to make two principal points about this list of environmental problems:

- **Resources are economic assets.** First, they are best described not as environmental problems, but as economic problems. These are natural resource issues, and each one can or at least should be measured in terms that emphasize their relationship to either short- or long-term livelihoods and economic progress or lack of it.

Water, soil and vegetation are all assets. We must learn to talk about them in that way, rather than as so-called environmental problems, which seems too squishy to many people. This is particularly true in Africa, where such an overwhelming majority of the population depends on the natural resource base.

Both the health and the depreciation of the resource base have to be calculated into our national income accounting. The whole broad area of environmental economics or natural resource economics is an understudied field. Still, it is important to stress that the environmental question is an economic question and must be viewed that way, not only by development specialists but also by African policy-makers.

- **Global issues also have economic implications.** Secondly, there is now an unhealthy distinction drawn between natural resource issues and what are called global environmental issues. I think the distinction is too simple and somewhat destructive. Global environmental issues such as the loss of biological diversity and the likelihood of global climate change are economic issues. They may be harder to measure or more difficult to predict right now, or may have a longer-term impact, but they are nonetheless economic issues that will have similar impacts to shorter-term issues such as soil erosion or water loss. For instance, it's very difficult to persuade a Gambian that the predictions about climate change and the concomitant rising oceans coming up the Gambia River are not an economic question. Similarly, biological diversity loss in Kenya is obviously an economic question. Even when we can't now measure the biodiversity health, as is the case in Madagascar, it still has economic implications.

CAPACITY FOR ENVIRONMENTAL PROTECTION

I want to spend the rest of my time talking about what Paul described as blockages, or put differently, some of the capacities that exist to deal with these problems.

Community successes in resource management. On the positive side, many communities all over Africa are doing an exemplary job of managing their own local resource base without any stimulation or outside assistance and encouragement. Some groups are trying to capture some of these good news stories and to assess their implications for policy-makers. The vibrancy of local communities and their success should be a starting point for environmental programs.

Demonstration projects. Many demonstration projects supported by external donors have been effective. Their scope ranges from land reclamation in the Sahel to ambitious reforestation projects. A.I.D. has seized the issue and has done considerable work in natural resource management under the Development Fund for Africa.

Government initiatives. African governments as well as the donor community have organized themselves in different ways to address the interaction of environmental and economic issues. For instance, national environmental action plans have been started or implemented in some way in well over 25 African countries. In the last five years, the number of African countries that have at least put environment in the name of some ministry has dramatically increased.

Limiting factors. On the other hand, there are all kinds of sobering pieces of news about capacity to deal with these environmental questions:

- **Fragile natural endowment.** The fragility of the natural environment is a terrible obstacle to Africa's dealing with these environmental issues.
- **Institutional constraints.** Within the governance structure of central governments throughout Africa, attention to environment is frequently marginalized. Sometimes environment is linked with tourism or mines and minerals. Almost always it is among the weakest of the ministries in a given government.
- **Lack of integration into development planning.** Seldom are environmental issues centrally integrated into an analysis of the whole planning and economic development of a country. Too often environmental issues such as biodiversity or forest health are dealt with only as a single sector, and not as part of the integrated whole.
- **Weak policy directives.** The policy framework that comes from central governments is terribly problematic in dealing with natural resource management issues. For instance, Kevin Cleaver's paper focuses on the inadequacy of existing land tenure laws. Many other policies have direct and troublesome effects on the health of a natural resource base, including logging concessions and the relationship between people and protected areas.
- **Poverty.** Most people in Africa live in almost dire poverty, leading them to make "selfish" choices out of desperation. Individuals have little choice but to exploit the resource base in order to meet their immediate need for survival. Furthermore, individuals have no incentives to assist them in contributing to the health of the resource base through reforestation, agroforestry or some other means. Incentives and the capacity to provide incentives are woefully lacking throughout the continent.
- **Limited training facilities.** Finally, training and education opportunities are inadequate throughout Africa. Other speakers have highlighted the need for such education and training for women, but the generalization is valid across the board.

Political structures. I was very struck by Paul's mention of another blockage—a failure to either understand or heed what he called environmental signals. I want to draw two points from that:

- **Lack of mechanisms to convey community concerns.** Often the environmental signal is not heard because the infrastructure or the political structure does not allow it. The central government does not choose to listen or is not capable of listening to the local community.
- **Lack of democratic freedoms.** The broader problem has to do with the relationship between government, particularly central government, and individual citizens. Much of our current discussion about the need for democratization is directly relevant to our ability to encourage heeding environmental signals.

The U.S. environmental movement has flourished because the U.S. is a democracy and the concerns of citizen's groups and individuals regarding environmental conditions are heeded. It is no surprise that the extent of environmental damage in Eastern and Central Europe is becoming known now that individuals and groups are able to express themselves more openly than under communist regimes. Similarly, in Africa there is a direct relationship between government support for environmental protection and democratization.

Short time frames. Foreign assistance programs are dominated by impatience. And yet resolving issues of natural resources management requires more patience than in almost any other single field. For example, the fastest growing tree takes 10 years before it can be commercially useful. Typically donor agencies don't have that kind of patience when assessing the results of various interventions.

EDUCATION: THE FUNDAMENTAL INTERVENTION

These various points can be tied into an oversimplified statement that what is needed most is a sophisticated understanding or awareness of the interaction between economic development and what are called environment factors, including demographic factors. This oversimplification is always going to lead us back to the need for education, training, and capacity building—at the government level, among NGOs, and at the community level.

Agriculture

KEVIN CLEAVER

Director of the Technical Department for Africa, World Bank

Actually I'm going to expand a bit from agriculture, and look at the linkages between environmental degradation, the agricultural problems of Africa, and the lack of demographic transition. I will extract a few points from the book that Gotz Schreiber and I wrote, entitled *The Population, Agriculture and Environment Nexus in Sub-Saharan Africa*. In this sense, nexus is not a hair spray. It refers to linkages between the three issues. Our data came mainly from the World Resources Institute and the World Bank Economic and Social Data Bank, as well as the World Wildlife Fund, so one of the problems here is the rather in-grown nature of the data source. I'm not going to repeat what Tom Fox said because the data are nearly the same.

AGRICULTURAL PRODUCTION

The data on agriculture are of slightly better quality than those on environmental topics, although still bad. Agricultural production in sub-Saharan Africa has grown at an average of about 2 percent per annum. In many countries, per capita food production has actually declined. There have been very wide variations between countries, and therein lies some lessons that I'll discuss later.

Extensive malnutrition. Data on per capita calorie consumption data are not good, but what we have suggests that it has stagnated at very, very low levels. The latest figures suggest a very substantial proportion of Africa's population is food insecure. Possibly up to 40 percent of its population has inadequate food.

Soaring food imports. One of the best indicators of the food production problem is food imports, which have been increasing very substantially. One estimate found that food imports increased by about 190 percent between 1974 and 1990. Food aid increased even more than that.

Widening food gap. If it's true that the food gap (requirements minus production) is actually increasing despite that fantastic increase in food imports, it does suggest that the production side is doing very badly.

Reduced rainfall. One very interesting study on rainfall changes in the Sahel concluded that population pressure led to a change in vegetative cover, which actually caused a reduction in rainfall by about 200 millimeters on average. The study, by Professor Jagadish Shukla of the University of Maryland, has generated much discussion. If this change can be determined empirically, it has larger implications for Africa and the rest of the third world.

POPULATION GROWTH: LITTLE SIGN OF THE DEMOGRAPHIC TRANSITION

In regard to population growth, the available data suggest that outside of a few countries there is very little sign of the demographic transition occurring in Africa yet. Africa's total fertility rate has stayed remarkably stable for the last 25 years—at about 6.5 to 6.7 children per woman. It is true that things are beginning to change in Kenya, Zimbabwe, Botswana, Mauritius, and possibly Ghana, and therein might lie some hope. But we have to focus on the reasons for that rigidity in total fertility rate.

DEMOGRAPHIC, AGRICULTURAL AND ENVIRONMENTAL LINKAGES

Synergistic linkages. The thesis of our book is that Africa's demographic, agricultural and environmental problems are very closely linked and mutually reinforcing. For example, traditional land use and forest exploitation practices have become, with increased population density, the major direct cause of environmental degradation and resource depletion in sub-Saharan Africa. When population densities were low, most of these traditional practices were very well suited to people's survival needs while preserving Africa's fragile resource endowment. However, these traditional practices came under increasing strain in many countries with the rapid acceleration of population growth that began when mortality rates started to dip sharply in the 1950s while birth rates remained high.

Reduced yields slow economic growth. In many African countries the stagnation or even decline of crop yields, especially food crops, has retarded agricultural growth and contributed to slow economic growth. These in turn have impeded the onset of the demographic transition in Africa.

Shifting cultivation and pastoralism. Some of these traditional practices are interesting, especially shifting cultivation and transhumant pastoralism. All of the literature suggests that shifting or long-fallow cultivation and transhumant pastoralism were extremely appropriate under conditions of slow population growth, abundant land, limited capital, and limited technical know-how. The ecological and economic systems were in equilibrium with these practices. But the key to maintaining this equilibrium was mobility. People shifted to a different location when soil fertility declined or forage for their livestock was depleted, and this allowed soil fertility to be restored through natural vegetative growth and decay.

Evolution into intensive systems. As long as the land was abundant and populations grew slowly, more land could be brought into the farming cycle. Where population density increased slowly (and this is the interesting thing), these extensive production systems gradually evolved. There are places in Africa such as Rwanda and Burundi where the traditional mechanisms have evolved slowly into more intensive systems. These evolved systems include soil conservation and fertility management, various forms of agroforestry, and integration of livestock into the

farming system. Africans respond to population pressure, and you see this in the eastern highlands of Kenya and parts of northern Nigeria.

The problem is that the scope of further expansion of cropland has drastically narrowed in much of sub-Saharan Africa. Hans Bingswanger did a very interesting study looking at population densities versus agricultural carrying capacity of the land. He concluded that on average Africa actually has a higher population density vis-a-vis carrying capacity than Bangladesh.

In recent decades, the rate of population increase has been too rapid for this natural intensification to keep pace with it. Populations are simply overwhelmed when they are confronted with rates of population increase in the 3-4 percent per annum range. Human beings, including African farmers, have a natural tendency to respond to an exogenous shock on their environment. But this tendency has been overwhelmed by the speed of population growth. That's the thesis of our book. Rapidly growing rural populations increasingly degrade and mine the natural resources of the rural environment to insure their own survival.

HIGHLIGHTS OF ANALYSIS

To test these ideas, we undertook a very extensive set of statistical tests. We spent a lot of time and money collecting large quantities of statistics. Our major findings are discussed in our book and the summary paper. Following are some of the highlights.

Crop yields and population density. We looked at cereal crop yields over time and between countries and their relationship to population density on the land and the general characteristics of a production function—fertilizer, rainfall, and policy. We found that as population density on the land increases, people will naturally respond by intensifying the land. The Boserup hypothesis in fact holds.

We also found a very significant correlation between crop yields and population density. However, the coefficient is less than 1. That is, a 1 percent increase in population density is related to an increase in cereal crop yield, holding all other factors constant, but the crop yields increase at a speed of less than 1 percent. Therefore, population growth all by itself is stimulating people to intensify, but not fast enough.

Production variables. As expected, we found a positive relationship between crop yields and fertilizer. The relationship with rainfall is positive (of course). We found a significant inverse relationship between cereal crop yields and the rate of deforestation. Probably deforestation can serve as a proxy for rates of environmental degradation, since data on this variable are scarce.

Policies. We found a positive relationship to policy-related indicators. Interestingly enough, we found a very high and very significant correlation in these regression equations with farmer education. In fact, as someone with a background in

agriculture, it was an unpleasant surprise to see that farmer education was perhaps more important than all of the variables mentioned so far, with the exception of rainfall.

One caveat: the statistics are poor. I'm not going to pretend to you that, despite all our efforts, this is the definitive study. But it does suggest some statistical support for this hypothesis that Africans are simply being overwhelmed by the current rate of population increase. They respond, but they can't respond fast enough.

Women's time constraints. We also did a literature search on women's time and their role in rural production household maintenance. There is a lot of anecdotal material from site-specific situations. Without a doubt, the time constraint on women is increasing generally in Africa. It's quite remarkable the average number of hours that are spent on not only agricultural production, but also collection of fuelwood and water, as well as family maintenance. These constraints are increasing with the deterioration of the natural environment. Simply the fetching of fuelwood and water at greater and greater distances seems to be a generalized problem.

Women are increasingly the food producers, as men either migrate to rural towns and cities or seek off-farm or non-agricultural employment. However, because of time constraints women are less able to respond to changes in the agricultural sector by intensifying. In many ways, the time constraints force them to maintain traditional shifting cultivation, and this has become a problem.

Land tenure systems. In our very extensive literature search, we found that traditional tenure systems with communal land ownership in fact provided considerable tenurial security on land farmed by community members.

There is nothing wrong with traditional tenure systems. Similar to traditional farming and livestock systems, they were developed in response to an economic and environmental situation. With slow population growth, these systems were able to evolve and accommodate emerging needs to move to de facto permanence of land rights assignments. However, they have not evolved at the same pace as demographic change. The speed of response of people in changing these traditional tenure systems has not kept up with the speed of population growth. Accordingly, there is increasing strain, even where traditional mechanisms have been permitted to continue.

Those of you who work in the Sahel know of the conflicts between the herders and farmer settlers. In many traditional systems, owners of trees are different from the traditional owners of the land. This division worked relatively well when population densities were low, but today there are conflicts between these two groups, because of increasingly limited land per person. Rural in-migration is causing conflicts over land ownership because different communities have different tenure situations. When they are mixed together, conflicts arise.

Many governments have responded to these emerging problems by nationalizing the land. In many of the Francophone countries of West Africa, de jure

ownership of the land is bestowed to the government by the government. Very often the government recognizes de facto customary land allocation but only when it suits their interest.

When a donor comes along and wants to do a tree crops project, it's not very difficult in these circumstances for the government simply to expropriate that land from its customary owners and either hand it over to a parastatal organization or a private enterprise like Unilever, or create an industrial forestry estate. Many donors have happily financed such ventures.

Where de jure nationalization of land takes place, even when customary rights are more or less respected, there are many, many incidents in which the government simply takes the land, ignoring the prior existence of customary prior tenure relationships. This expropriation has caused an erosion of respect for the traditional tenure systems, undermining their usefulness in maintaining land tenure security.

Other governments like Kenya, assisted by donors, took a different tack, and that was land titling. In Kenya the elite manipulated the land titling system for their own benefit. It's no secret that Mr. Moi is probably the biggest land owner in Kenya; other ministers and urban elite have also benefitted. So land titling doesn't seem to be a very good solution.

The result of these actions is to reduce land tenure security on both cultivated land and forest areas, creating open access in many cases. When there is no land tenure security, there is an incentive to over-exploit the land, and no incentive to conserve it. For example, open access has led to massive fuelwood collection, which has stimulated deforestation.

Mechanisms for fertility reduction. Regarding the demographic connection, we undertook a massive statistical study looking at the impact of infant mortality, women's education level, and the age at marriage on total fertility rates. All these variables proved to be statistically significant and in the direction that the literature suggests.

We then looked at food security. What happens when you vary food security levels over time and caloric intake between countries? We found that at very low levels of food security, an increase in caloric intake was associated with an increase in total population fertility rates; after a certain level of food security, fertility begins to decline. Is this a sign of the demographic transition? Could be.

When we looked at urbanization, we found the expected association: urbanized societies tend to have lower fertility rates than non-urbanized societies.

When we played with some environmental data, we found—again, very tentatively—that countries that have more rapid environmental degradation measured in various ways also had a tendency to higher total fertility rates, all other things being equal.

Now what does this mean? How does one interpret this? One way that we interpret it is that at very, very poor resource endowments, when environments are declining in agricultural areas, people are responding by adding the only factor of production that they have, which is child labor. The marginal productivity of child

labor is in fact greater than the marginal consumption of these children. The very existence of poverty and land degradation is an incentive or pressure to increase children. I throw this idea in, not because it negates my previous statements, but simply to increase the complexity of the equation.

POLICY IMPLICATIONS

Countervailing pressures. These findings suggest that there are countervailing tendencies in most African societies. Some factors such as urbanization and increased female education are pushing total fertility rates down, while others such as agricultural stagnation are actually militating for an increase in fertility. Depending on the balance of these factors, total fertility rates are actually increasing in some African countries, while they are decreasing in others.

Demand vs. supply factors. If you look at Kenya, Zimbabwe, Botswana and Mauritius, the countries where there is just no doubt that there have been declines in total fertility rates, it could well be that it isn't family planning programs that are doing this. These are countries that have better food security situations, less environmental destruction, better female education, and lower infant mortality rates. These factors are actually working on demand for smaller families.

Focus resources where demand exists. If this is true, then the thesis is that family planning could be most effective in those countries where these factors are occurring to generate a greater demand for smaller families. Returning to Dirck Stryker's question about the policy implications, what I would suggest is that we focus the limited resources that we have for family planning in those countries like Kenya, Zimbabwe, Botswana, Mauritius, and perhaps Ghana, where these demand factors are starting to work.

Now I know that's controversial. People are going to say that family planning itself generates demand, and of course it does generate demand. But there is a question of increasingly limited resources. When deciding where best to put those resources, I would suggest that the best place to put them is where there is a demand.

Action plan. In devising an action plan to deal with these problems, six steps are needed:

- **Step 1: reduce population growth.** Obviously the first step is to reduce population growth. I detect from this audience that there is some agreement on this goal. However, the consensus for reducing population growth is not as great among African leaders as it is in this room.

Female education, health care, and AIDS prevention are the priority interventions. In any case, it follows from our study that in reducing population growth, the priority emphasis has to be on reducing demand

for large families. From our statistical analysis, probably the most powerful factor is female education. Next in importance are better health care, access to safe water to reduce infant mortality, and AIDS prevention.

AIDS as a fertility booster. If this is right, as AIDS becomes more important, infant mortality will increase, and that will put pressure to increase total fertility rates. People are going to respond just as they do to increased population pressure on agricultural land by intensifying. They may respond by actually increasing the number of children that they have. So dealing with AIDS is probably going to be an important factor in addressing population growth, curiously enough.

Agricultural development. Agricultural development and intensification, if we are right, are going to have an impact on the demographic transition.

Family planning. Finally, governments need to respond where this demand occurs with good family planning programs. I agree with the previous statements that as the demand occurs, there will be more and more places where family planning programs should be put in place.

- **Step 2: give more attention to environmentally sustainable agriculture.** On the agricultural side, it seems to me that the policy response is to shift a bit of the emphasis from the high-yield variety/fertilizer package (which will continue to be important but less so), to environmentally sustainable agriculture. This was Paul Harrison's thesis in his very interesting book, *The Greening of Africa*, and I think that his thesis is correct.

Changes in content of research and extension programs. Research and extension services that all the donors support are simply going to need to focus more on environmentally benign and economically viable agricultural technologies. These technologies include contour farming, minimum tillage, mulching, and managed fallowing. There are numerous crop rotations and intercropping systems, rather than monocrop. These practices are known, but they are not promoted adequately in extension systems nor given adequate attention in agricultural research systems. So this focus requires a shift in direction. (Paul Harrison has made this point).

High-yield technologies. After considerable consultation in many African countries, the World Bank has set a very ambitious target for agricultural growth. We feel that agricultural growth must be doubled to achieve the economic growth objectives of many African countries. Unfortunately, the environmentally benign technologies aren't sufficient to do this, according to our analysis. So I don't want to suggest here that we should *neglect* in any way, improved variety and farm mechanization technologies. They will be necessary to reach that 4 percent growth. This position is also controversial; let's talk about it.

- **Step 3: adopt appropriate economic policies to make environmentally sustainable agriculture profitable.**

Fiscal policies are key. We continue to believe that making intensive and resource-conserving agriculture less risky and more profitable is as important as bringing the technology. And we continue to believe therefore that appropriate marketing, price, tax, and exchange rate policies as well as structural adjustment are going to continue to be necessary.

Fair prices. Farmers are not going to intensify unless it is profitable, regardless of what the extension and research system has to say. It's not going to be profitable if farmers are paid prices that constitute expropriation or reflect exchange rates that reduce the price of both their export crops and their import substituting crops. So we continue to believe that agricultural adjustment and structural adjustment are a necessary, but not sufficient, condition for this agricultural intensification.

- **Step 4: reform land tenure systems.**

Land tenure reform. We believe that the elimination of open access land tenure systems is of utmost urgency. Unfortunately, it's very hard to generalize because these systems, and the degree of open access have different causes depending on where you are in Africa. As I mentioned, the Francophone countries of West Africa have extraordinarily different tenure systems than do Kenya or Zimbabwe. So obviously the tenure reform has to be tailored to the country.

Governments should not own land. If you want a generality, it's probably the case that governments should get out of the land-owning business. It's probably the case that legal systems should protect rather than reduce the viability of traditional tenure mechanisms. The community tenure should be protected by law, rather than attacked by it.

- **Step 5: reexamine the urban bias in policies and investments; develop rural towns and secondary cities.**

Urban bias in policies and investments. In our research we found that the development of rural towns and secondary cities is as important for agricultural and rural development as is good extension and research. We found a very, very strong urban bias in Africa in infrastructure investments in the cities. I suspect that the fantastic rate of migration that was mentioned earlier is related to the urban bias in policy. A recent World Bank book, called *The Plundering of Agriculture in the Third World*, concluded that the bias in policy against agriculture was stronger in Africa than in any other area of the Third World. The authors found that up to 50 percent of the value added of agriculture in the last 20 or so years has actually been taken by this combination of exchange rate, tax, and price policies as well

as urban bias to the cities (eight African countries were in the sample). Sometimes the revenues are exported abroad.

Development of towns and secondary cities. Our view is that this urban bias in both policy and expenditure has to change, but not completely to agriculture. One of the outcomes of this urban bias has been the development of the megacity. A lot more attention certainly needs to go not only to agriculture, but also to secondary towns and cities—the link points between agriculture and the ultimate market. If farmers are cut off from both export and domestic urban markets by lack of infrastructure and social services such as education and health care, which are often located in secondary towns, they aren't going to be innovators, and they are certainly not going to conserve the environment.

- **Step 6: strengthen planning and management of environmental projects.**

Developing effective environmental projects. Finally, I would agree with Tom Fox on environmental resource conservation. I think that goes without saying. The question on the environmental side is how to do it. In the World Bank we have a whole new generation of environment projects, which we have begun to review. Right now they are fraught with problems in terms of management of money and action. It's conceivable that they will go the same way that the rural development projects did—too complex and too fuzzy around the edges in their definition. I think we have a big challenge in front of us in defining environmental protection and conservation in a way that works.

POLICIES AND INVESTMENTS SPUR ADAPTATION

Example of successful adaptation to rapid population growth in

Kenya. Now I want to end on a positive note. There was a very interesting case study on Machakos, Kenya, a district just outside Nairobi. Environmental degradation was documented in Machakos in the 1930s. Since then it has had a five-fold increase in population with a lot of in-migration. Yet today there are more trees and better soil conservation in Machakos than existed in 1930. The question is, how did this occur? Several key elements were present:

- Relatively good agricultural policy in Kenya, which made agricultural intensification and diversification profitable.
- Good infrastructure, with easy connection to the market.
- Excellent agriculture research and extension, with a research station right there.
- Relatively good food security.
- Good education and health care by African standards.

I would maintain, therefore, that these elements actually stimulated people—or permitted that natural inclination to respond to population pressure—into accelerating the rate of intensification, and that therein lies the solution.

The catalytic effect of policy. If the policy environment is right and good research and extension are provided, then Africans can just follow their natural inclinations to confront these problems. In the rest of Africa, policy may be one of the main constraints to the situation. In any case, this example offers a little bit of hope in a rather bleak environment.

Deforestation and Biodiversity

HENRI NSANJAMA

Vice President for Africa Programs, World Wildlife Fund (WWF)

In terms of biological diversity, I think Africa is still okay, still good. Africa has more biological diversity than any other continent. We have the second largest tropical forests and the largest intact savanna grassland in the world. Madagascar still maintains probably the largest numbers of endangered species.

However, looking at what has happened to biological resources in the past and looking ahead, we do know that most of that biological diversity is threatened. The major factors underlying this threat are clearly deforestation and population pressures. Since population has already been discussed in detail, I will spend some time on deforestation.

DEFORESTATION

Forests are especially needed in Africa because people's well-being depends mainly on forest resources. For example, Zaire obtains up to 75 percent of its animal protein from wild bush meat, a product of the forest. In my native country of Malawi, we eat a lot of fish; 70 percent of our animal protein is from fish. The major fish catches in Malawi come from the forest. In Botswana, animals from the forest provide more than 90 kilograms of meat per person per year. Without the forests in Africa, I think most of the people's lives would be doomed.

Deforestation is probably the major factor responsible for the expansion of the Sahara desert to the south. About 14 million acres of arable land are lost each year to the spreading desert, according to World Bank estimates. Deforestation rates average about 1 percent annually in sub-Saharan Africa—0.8 percent for East Saharan Africa, 0.9 percent in West Saharan Africa, 2.2 percent in West Africa, 0.2 percent in Central Africa, 0.3 percent in Southern Africa, and 1.5 percent in Insular Africa, which includes Madagascar, Comoros, and other islands. Some areas have lost large tracts of forests. For example, people believe that up to 80 percent of Madagascar's original forest has been lost. The data on deforestation may not be

accurate; we could be losing forests even more rapidly than these data indicate. If nothing is done now, Africa will lose all of its forests in 100 years.

I agree with Tom that one of the biggest problems in Africa is lack of good recent statistics. Some outdated statistics exist, and we still use them because they are all we have.

FACTORS CAUSING ENVIRONMENTAL DEGRADATION

In the context of managing biodiversity, it's very important to review some features that are unique to Africa before we even start to think about what we should do. These features include:

- **Poverty.** Because of severe economic underdevelopment, even the most basic human needs are unmet for many Africans. These needs include good health, potable water, and adequate education.
- **Rapid population growth.** Population growth in Africa outpaces agricultural production. Compared with Asia and other continents, Africa is still empty. You travel for miles and you see nothing. But agricultural production has not kept pace with the population growth.
- **Inadequate technical training.** Human resources, as well as institutions, are poorly developed. We just don't have adequate Africans in the field of conservation.
- **Lack of democracy.** Those of us from Africa are pleased to see that most African countries are more democratic. However, in the past lack of democratic governments promoted social, political and gender inequities. The resources available were not shared among the vast majority of people who needed them.
- **Erratic climate.** The climate in Africa has been erratic. Because it is unpredictable, resources are usually shifted toward human needs. I recently visited the six southern African countries that had had a drought last year. Every single department that deals with the environment (and its financial resources) was removed at the height of the drought to cater for human needs.

PROTECTING BIOLOGICAL DIVERSITY

What should we be doing in order to contain the loss of forest in Africa? Nobody knows with certainty how to save biological diversity, but we are certain that humans are the sole source of Africa's environmental crisis. It is logical, therefore, to expect that the solution to the crisis lies in the hands of humans.

Today, conservation issues in Africa are complex, with multiple and often interdependent causes, many of which are not of the African making. Therefore we do need the larger community to come and assist Africans to fix those problems. That's why a gathering like this is most important.

Guidelines for environmental programs. Programs should adhere to four principal guidelines:

- 1. Sustainable use of forest products.** Africans have lived on forest products for thousands of years. This use will continue, but it must be sensitive to ecological processes. Forest products can only be taken away if plants and animals can regenerate themselves. In many cases, that is not happening.
- 2. Ecological ethics.** Africans must develop an ethic for ecologically sound living. We humans have got to be responsible for the environment. Until we accept this responsibility, we will continue to have problems. During the colonial days, most of the resources that Africans used were taken away. Many Africans have not accepted what the colonial governments told them about resource use. We need to change that.
- 3. Local benefits.** Rural communities must benefit in equitable shares of resources, thereby helping to reduce the poverty gap. Local communities need to be involved in preserving our biological investment. They need to understand that we need to build up resources so that they generate more than people are taking out.
- 4. Balance between people and resources.** Human numbers are not balancing with the resources. Maybe it is a question of technology. I'm not really sure, but if environmental experts and demographers can work together, I think we will forge ahead.

STRATEGIES

Based on these guidelines, we need to create practical strategies that we can take out into the field and use. Such strategies include:

- **Creating and maintaining protected areas.** As an African I must say that I hate protected areas. However, given Africa's population trends and the extent of agricultural production that leads to use of marginal land, some protected areas need to be set aside to ensure that some biological diversity is preserved. Therefore, we need to integrate protected areas with the aspirations of the local people living nearby.
- **Linking conservation with human needs.** Rural lands need to be managed and developed in ecologically sound ways. This is a key area that the Africa Program, which I head, is pursuing. USAID, which funds our largest projects in Africa that have linked conservation with human needs, deserves credit for supporting this approach.
- **Building conservation structure.** More resources are needed to build the capacity of African professionals and institutions to manage the natural resource base. Conservation sectors in Africa need to be developed, and conservation specialists need to be trained.

- **Protecting species of special concern.** Some species of wild animals and plants have been destroyed because of trade, again going back to the economic issue. Some species are threatened because of habitat destruction, again deforestation, which relates to economic development. Because the forests are cut down, elephants are restricted in their movements. We need to do more research on threatened species.

These strategies need to be linked with the guidelines and tested to ensure that we can apply them in Africa.

OBSTACLES TO EFFECTIVE MANAGEMENT OF NATURAL RESOURCES

Most neo-conservationists do agree that linking conservation with human needs—integrated conservation programs—is what we should be doing. The problem is that governments in Africa, especially the political decision-makers, and sometimes donor agencies don't appreciate these ideas. Therefore there are some obstacles that need to be sorted out:

- **Harmful development programs.** Development programs tend to be inflexible and destructive as a result of inadequate planning for resources allocation and overemphasis on narrow and short-term interests.
- **Inadequate policies.** Many African countries lack adequate environmental policies, regulations and legislation, resulting in a lack of enforcement and poor sectoral organizations. Effective environmental legislation and policies are a prerequisite for sound management of the environment. In Africa, environmental policies and legislation continue to be developed in response to specific problems. Consequently, they are often overrun by gaps, duplications and conflicts. It is very common to find conflicts within government ministries about what they want to do regarding the environment.
- **Lack of rural support.** Rural communities do not support conservation because they do not realize any immediate benefits from it.
- **Need for broad political support.** In order to implement conservation-oriented economic development, the political arena, as well as decision-makers, need to acknowledge that conservation does not rest with a specific government sector, but rather it is a process that affects all sectors of economic development.
- **Lack of awareness.** Lack of awareness of the benefits of conservation and of its very vast concerns prevents politicians, policy decision-makers and the general public from seeing the need for achieving economic development within a conservation framework.

CONCLUSIONS

Need for Africanization. Conservation in Africa is only going to succeed if it is done for Africans and by Africans. Many conservationists working in Africa are not Africans; this must be changed. Africans need to be trained to assume these positions.

Attention to social and economic factors. The most successful conservation development projects have attracted new migrants into those areas. People come because life has changed, there are more benefits. We start out by saying that these areas need to be protected because they are very fragile, and then more people are attracted to them. We need to look at this problem very carefully.

Conservation programs need people with diverse expertise. Conservation is beginning to change from being just pure biology to encompassing everything else. That's an implication that needs to be looked at and always should be in people's minds. I'm pleased to say that many environmental organizations, including WWF, have hired demographic experts.

Need for private-sector funds. It has been difficult to persuade U.S. foundations and corporations to support conservation work in Africa. For example, 45 percent of my budget for African programs comes from USAID and the World Bank. Foundations and corporations support conservation programs in Asia and Latin America, but they need to understand that Africa needs resources as well.

Protection of indigenous plants. Finally, we need to study indigenous plants so that we don't introduce new problems as we are trying to respond to deforestation. Some reforestation programs are planting eucalyptus and pines. These trees grow quickly, but they also take away the little fertility that may be left in the soil. Local people in Madagascar told me that not only are they aware of the soil-depleting effects of these trees, but also they do not like the trees. More research on indigenous plants could identify alternative tree species.

We need to step back and look at these issues before initiating programs. At the same time, we must recognize that conservation is a very complex activity that often requires risk taking. It is a trial-and-error exercise in which each management decision is an experiment. Adaptive management is the key to success.

DISCUSSION

▶ GEORGE LEWIS:

Thank you very much. We have about 25 minutes for questions from the floor.

▶ JOHN MAY: *Causes of Fertility Decline in Africa*

In regard to Kevin Cleaver's presentation, I would be a bit more optimistic on the fertility decline in Africa. Fertility decline has started in Africa. It is not only in the

famous three countries—Kenya, Zimbabwe, Botswana—but also in southern Sudan, Rwanda, Nigeria, the coastal zone, and possibly Ghana.

So why is it occurring? There are three hypotheses: (1) modernization and adaptation; (2) innovation and diffusion of new ideas in contraception; and (3) the crisis-led transition. In my view, it's probably a blending of the three things, but probably more on the innovation and diffusion, as well as the crisis-led transition.

The strategy of the donors, especially USAID, has been to bet on the innovation/diffusion hypothesis through the supply side of family planning, coupled with information, education and communication (IEC). This strategy has been looked down on by other donors in the United Nations, especially the UNFPA and the ILO. These people have the broad picture. They have plenty of time to solve the problem, and they would look at all aspects of population policy and try to do everything at the same time. I think because everything became a priority, there was no priority anymore.

Looking back, it seems that the USAID strategy has paid off tremendously. Now at long last, after spending millions and millions of dollars—I don't want to know how much—family planning programs have been able to trigger the beginning of a fertility transition in Africa.

Is it going to be a steady transition? I don't think so. It's probably going to be a stage transition. Fertility may drop by one or two children per woman and then remain at four children. That has happened in other countries.

I think there is an existing demand for family planning in Africa that probably has not been fully met, especially because of quality of service problems (a fundamental problem).

Finally, Kevin Cleaver finished his presentation by discussing cost-effective answers to these problems. According to some cost/benefit analysis done in Africa, family planning programs yield considerable savings and other benefits. Nevertheless, the implementation of family planning programs will be very expensive. The World Bank has started to prepare population loans with a line item for commodities. Just the cost of commodities is going to be staggering. Commodity costs may be overwhelming for many countries; that is a problem to be addressed.

► KEVIN CLEAVER: *Need to Focus on Pressure Points*

Fertility declines offset by rises elsewhere. I agree with you that there is certainly a total fertility rate decline in at least four countries, and I'm open to believing that there are some other countries where it is beginning to happen, such as Rwanda, Nigeria and Ghana. That it will happen, I also agree. It's the speed of the transition that is at issue. What I want to suggest is that there are other African countries where it has not happened and where total fertility rates are in fact increasing. This is why the regional fertility data show a remarkable stability in aggregate.

I also wanted to suggest the complexity of the equation. There are other factors that are militating to push fertility rates upward: cultural factors, nutrition, food security, and possibly even environmental degradation.

Donors should focus on pressure points. I think that it is important for donors now to look at tradeoffs. We have to find the pressure points that are most effective, that give us the greatest bang for the buck. In my department, each of the people working in various sectors of activity is convinced that their respective sectors should have priority and that there is tremendous underfunding, which there is. In Africa, each group of sectoral staff has counterparts who are equally convinced that the solution to African development lies in their sector. We cannot continue the scattergun approach, where everything is high priority and we go on soliciting funds for everything. Why is this relevant?

If it is the case that the old supply-driven family planning programs are not going to be very effective in certain circumstances, I would maintain that we probably should put less money into these programs in those countries. Perhaps more should be spent on agriculture or private-sector development. That's the idea of tradeoffs.

Now what I see happening in Africa is fewer resources available from donors. I also see very little interest from either the external or the internal private sector. I see a future that is increasingly resource-constrained. In that situation, the responsibility is even greater on us to assist in identifying tradeoffs and determining what is and is not an effective use of scarce funds.

Demand a pre-condition for supply-oriented interventions. I lived in Kenya for five years. I visited the rural health facilities that had various kinds of contraceptives. The great frustration there at the time was that there was no demand for these at all in the rural areas. The project tried tricks to get people to actually use these things, such as putting condoms out in the evenings, so that people who presumably were too embarrassed to go during the daytime would pick them up at night. Well, they didn't even pick them up at night for free. That was the lack of demand. In retrospect, it is strange that we were surprised that it wasn't working. We came with a supply-oriented project, and it didn't work because there was no demand.

The same thing is true in agriculture. We have gone out with supply-oriented technologies when there was no demand, because the prices were too low or confiscatory, or the technology could not be applied for various reasons. And now the same thing is happening in environment, where we are coming with supply-driven solutions, that are swamped by the fact that there is no demand. For example, the Masai don't demand Masai Mara Park, and yet we are surprised when they encroach on the park. Until we find a way of inducing people to demand these things, whether it's condoms, environmental protection or agricultural technology, it's not going to work. That was my punch line.

► PAUL HARRISON: *Relationship between Environmental Degradation and Fertility*

Supply increases demand. I would just like to make the response that family planning supply often creates increased demand. One of the curious paradoxes is that unmet demand is often higher in countries with higher contraceptive supply than it is in countries with lower supply. So that it does create some of its own demand.

Causal linkages. I'd like to ask Kevin about the study finding that increased degradation was leading to higher fertility. One would expect fertility to be higher in marginal and frontier areas because mortality will be higher, insecurity of life generally will be greater, and education levels will be lower. But if it's true that increased environmental degradation leads to increased fertility, then this leads to a vicious circle out of which one can hardly see a way out. I was wondering whether your data really enable you to make that statement or whether it is not equally possible that it is the higher fertility that is causing the higher rates of environmental degradation.

► MICHAEL FURST: *Address Linkages in Policies or Projects?*

We're talking about the linkages between environmental degradation, agricultural production, and population and demography. Do we need to link policy reform at once between all these three major issues? Or are we talking about operationalizing these linkages in terms of project design? Because if we talk in terms of projects, then we're back to where we started from—the issues with integrated rural development, the complexity of programs and projects that neither we nor anybody else know how to implement.

► RICHARD FORD: *Solutions for Labor Shortages in Subsistence Agriculture*

Kevin Cleaver suggested that one of the dilemmas facing women farmers is the agricultural labor shortage and that this is an incentive for higher birth rates. He suggested that structural adjustment and pricing were longer-term solutions for that. Yet large amounts of environmental degradation and labor shortages are in areas that are probably going to remain subsistence farming for quite some time. They are probably a decade or maybe two decades away from the market. Could you comment on the same interface—of agriculture, population, and environmental degradation, and whether there are alternatives to structural adjustment that may interface with the labor shortage?

► TIMOTHY BORK: *African Involvement in Biodiversity and Forestry Conservation*

In the earlier panel, Mr. Gyepi-Garbrah talked about a very formalized system for involving African leadership in the population area. Mr. Nsanjama alluded to the difficulty in generating resources for biodiversity and deforestation, and the need for Africa ownership there. What's being done, or in your view should be done, to have these very important issues also owned by Africans and to promote further leadership by Africans?

► PAMELA DELARGY: *Export Agriculture as a Source of Environmental Degradation*

We have talked a bit about subsistence agriculture and some population/environmental pressures there. Would you discuss the investment in export agriculture and big agricultural schemes in terms of the resulting environmental problems such as soil compaction from mechanized schemes and salinization from irrigation? Given the need for hard currency in many African countries, do you see it even possible to shift from export agriculture to more food crops for subsistence there? And do you think that agricultural policies would change to food crops, from the perspective of donors and local governments?

► KEVIN CLEAVER: *Policy and Program Implications*

Demand for family planning. I agree with Paul Harrison that family planning can create demand, although the Kenya example suggests that it took a long time. The question is, is a family planning program the most effective way to create demand if it's demand that is the constraint? I agree that it's not the constraint in all countries. But if it is demand that is the constraint, is it created by investing in family planning or in better schools and more schooling of young women? The population project that I was talking about cost \$30 million. I'm not sure that family planning is the best tool for generating demand.

On Paul's question about environmental degradation stimulating demand for families, this was perhaps the weakest statistical link that we have. I wouldn't want to risk my life or even a week's salary on it. We found it was interesting because the relationship was statistically significant. But the converse explanation of what's happening is possible. We did have cross-country and time series data, and we did lag the relationship. That tended to suggest the direction of causality, but of course in that kind of data it's very difficult to prove. So your question is a good one.

Incorporating linkages in project design. Regarding Mike's question on operationalizing project design, quite frankly this has been the weak part of our nexus book. You are quite right, the initial reaction would be to have something like an integrated rural development project that deals with all of these issues in an integrated way and therefore assures the linkages. But we know that those things don't work. They are too complex. They can't be managed.

Now we're taking a look at each type of intervention, either policy and/or investment and adjusting our approach. For example, we think that there needs to be adjustment in the content of agricultural research and extension in most African countries towards what one might call environmentally benign or sustainable technologies. It's a shift in direction, rather than a megachange. Similarly, reducing the constraints on women's time through improved stoves or more appropriate transport vehicles might have a positive impact. So it's really the step-by-step approach. I know that's not very satisfactory. It doesn't satisfy me either, but that's the best that we can do right now.

Labor shortages linked to urban bias. The point on labor shortages is a good one, and I don't have good answers, to be honest with you. Part of the labor shortage goes back to this plundering of agriculture. The public expenditure bias against agriculture has stimulated a more rapid rural-urban migration than has been the case elsewhere. This fantastic, spectacular urban bias is connected to the fact that 16 of the 20 countries in the developing world that have the most rapid rural-urban migration are found in Africa. This is creating the irony of labor shortages in some areas, despite rapid population growth.

As soon as you start to correct that bias, which is what structural adjustment does, there is a switch, as fewer people migrate out of agriculture. Admittedly our data are very bad, but in Nigeria (until recently) and Ghana, which we would maintain have been adjusting better than most African countries, there are signs of a reverse flow of urban-rural migration. It is true that urban-rural migration is also taking place in countries like Zaire, for completely different reasons, as people seek to escape Kinshasa in order to survive. So it's not a very clear picture.

But I would suggest to you that structural adjustment is part of the solution. It's a necessary, but not sufficient condition for dealing with the labor shortage, and for stimulating demand by farmers for intensified techniques.

Export crops. People often ask whether the World Bank is biased in favor of export crops. Quite frankly as the keeper of the orthodoxy on agriculture in the World Bank for many years, I can tell you that we don't have any pro-export view vis-à-vis food crops. We genuinely believe that policy should be neutral and that farmers should choose. For example, to tell the Kenyan farmer that he should pull out his tea to plant maize, when tea provides four times the revenue per hectare than maize, is crazy. But to tell him to plant tea if he wants to plant maize for food security purposes, because he doesn't necessarily get maize from the market, is equally crazy.

So in our view, there should be neutral policy, and we shouldn't be in the business of determining what farmers grow. That doesn't mean that we and other donors don't invest or lend to export oriented projects, as well as to food-oriented projects. You'll find both. We have invested in tree crop plantations, rubber, palm oil, and cotton, as well as food security projects.

I don't think that hard currency needs should be a factor in determining this kind of policy. Obviously the World Bank wants to be repaid, but I don't think that we should be modifying the kinds of recommendations that we make on that basis.

► HENRI NSANJAMA: *Building Support for Biodiversity Programs*

Generating funds. In response to the question about lack of resources to do environmental work, it is hard to raise funds for environmental work. Environmental programs are only attractive to those who are well informed. The good news is that we are seeing more and more people being informed about the environment.

However, many African governments are faced with a lot of economic difficulties and consider putting resources into environmental protection as a luxury. I cannot blame them for that. But in the past six years, new ways to mobilize resources such as debt swaps for nature and trust funds are being introduced. Also, governments in several countries, including Zimbabwe, Zambia, and Central African Republic, are allowing the revenue derived from tourism—both consumptive and non-consumptive activities—to be put into conservation. If we can show that these approaches work, maybe more and more African governments will take such actions.

Training environmental specialists. In regard to mobilization of Africans so that they are the true custodians of these resources, the biggest need is for training. Conservation of biological resources is complex. Of course, some of the difficulties in Africa are not African-made. So we need some leaders who will get into all aspects of environmental conservation.

It is true that some Africans are being trained, but we don't know where they ended up. Training programs need to be targeted. People need to be trained for specific environmental positions in Africa so that they return to a specific job after training. If possible, they should be trained in Africa. If they are trained outside because of specific needs, then we should be able to support research back in Africa, so that they continue to be connected with their future place of employment.

Empowering local people. Also, we must empower the local people. Until recently, we told the local people that they had nothing to do with the environment. During the past year, we told them, "We have tried everything else, and we have failed. Come along and join us." Once we did that, we have seen a lot of change. We explain that we recognize that they have managed natural resources for many years and we want to understand how they did it. We listen to them, and we are making a lot of progress in that.

Cash crops. In regard to the question on cash crops, I'm not an agriculturalist, but animal husbandry makes a lot of sense to me. Cattle are needed for the economy and probably as a protein supplement. We have championed the Multispecies Animal Production Systems project, in which we bring cattle and some wildlife into an area and study the feasibility of mixing wildlife species. We have discovered seven places in Africa where a mix of cattle and wildlife is feasible. In other areas, livestock cause environmental degradation and only wildlife can be raised. Definitely livestock are causing a lot of degradation in the southern Sahara. In marsh systems, I'm sure there are some wild crops and trees that could be mixed with exotic plants without necessarily degrading the land.

Rather than telling people what to do, we spend a lot of time on model projects to show people what can be done. We are finding that people are adopting these new approaches without our having to impose them.

► MYRON GOLDEN: *Does Building on Demand Achieve Development Objectives?*

Kevin, you suggested as one of your solutions that donors should perhaps focus their resources where demand factors are greatest. Are you talking about those countries where the nexus elements exist altogether or individually? It strikes me that if the demand is there, the supply response will almost automatically follow somehow or other. Your solution bothers me because, while it might be a practical and simple solution, I wonder whether it really addresses our development objectives.

► KEVIN CLEAVER: *Creating Incentives for Development*

That's a tough question to answer—a megaquestion. I believe that our mistakes in Africa have been where we have been supply-led. Well-meaning, intelligent people have brought solutions to problems that haven't been recognized by the recipients. The major lesson from the last 25 years is that we have to look for the demand and then respond by supplying the demand.

But your question is good. Implicit in it is what if the demand doesn't occur? Are we just going to sit there and witness increasing misery and poverty? Clearly I think that the policy environment is key. Policy can be used to create incentives for people.

For example, in agriculture it's a mistake to think that we can introduce improved agricultural technologies where policy environments don't permit them to be used profitably. And so the key pressure point is on the policy side. With changes in price policy, marketing, and market liberalization and deregulation of input supply, farmers have an incentive to respond and to demand the technology that then can be brought in by research and extension.

I suspect the same is true in environment. But the incentives are going to be much more complex. This is why I lingered on land tenure. I think that in the environmental area, land ownership is an incentive. People aren't going to cooperate with conservation efforts unless they have a stake in them. They have to own the forests or the land. Or possibly they have to obtain some kind of financial benefit from a park. Creating demand for conservation requires more than just discussing it with the local community and brainstorming. I think we have to deal with the incentive side first through the policy environment, and then start supplying conservation technology.

In family planning, demand is even more complicated. Demand is created by education. It's a realization that there is a value to having smaller families vis-à-vis the cost of having larger families. That can be done mostly by education, but also partly by simply facilitating the process. In other words, if it's food security or lack of food security that is stimulating people to have larger families for labor reasons—I know that's controversial, but assume for a second that it's true—then it's attacking the food security angle that is going to be more important than providing family planning.

So that's the best I can do. But I suspect that the answer to your question is what this seminar is devoted to seeking.

Synthesis: The Environmental Challenge

(Based on George Lewis' summary)

ENVIRONMENTAL PROBLEMS

Africa's environmental problems relate mainly to degradation of its natural resource base. Key issues include:

- **Land degradation.** Since 1945, 22 percent of Africa's arable land has become degraded. Nearly half of Africa's land is too dry to sustain rain-fed agriculture, and about 14 million acres of arable land are lost each year to the spreading desert.
- **Deforestation.** The rate of deforestation is higher in Africa than in any other region of the world, largely due to slash-and-burn agriculture and logging. At an annual deforestation rate of 1 percent, Africa will lose all of its forests in 100 years.
- **Water shortages.** Water resources are showing signs of stress. Many areas are having difficulties coping with variable rainfall.
- **Urbanization.** Rapid urbanization is causing environmental problems in many parts of Africa. Within 20 years, Africa will have 30 cities with at least 1 million people.

These environmental problems undermine efforts to alleviate poverty.

As Tom Fox noted, environmental problems have major economic impacts. Resources, such as water, soil, forests, clean air, are economic assets. For example, forests are a major source of animal and fish protein for many Africans. Natural resources must be valued and taken into account in economic planning and investment decisions. Furthermore, global issues, such as the loss of biological diversity and the likelihood of global climate change, have economic implications. Such issues may be more difficult to address, but they have definite economic ramifications.

AGRICULTURE

In many African countries, food production has not kept pace with population growth. Food imports and food aid have risen dramatically since the 1970s. Yet up to 40 percent of all Africans do not have enough food.

Traditional farming practices, which were generally sustainable and environmentally benign, have not evolved into more intensive agricultural systems in Africa. Factors that have inhibited the shift to agricultural intensification include rapid population growth (at annual rates of 3-4 percent), land ownership systems, women's time constraints, and environmental degradation, according to Kevin Cleaver.

LINKAGES BETWEEN POPULATION, AGRICULTURE AND THE ENVIRONMENT

According to a World Bank study by Kevin Cleaver and Gotz Schreiber, there is an inextricable linkage, or nexus, that binds population growth, agriculture, and environmental degradation in Africa. Because of the rapidity of change driven by increased population density, farmers are trying to intensify agricultural production, but they cannot keep pace. Hence, per capita food production is declining in many African countries. Farmers are caught in a vicious circle because their efforts to increase crop yields often trigger soil degradation that undermines future productivity.

Clearly, one way to break the cycle is to slow population growth. Fertility has begun to decline in several African countries, but the pace and extent of this decline remain uncertain. Factors associated with lower fertility rates include lower infant mortality, higher levels of female education, later age at marriage for women, and urban residence. In the World Bank analysis reported by Cleaver, low levels of food security and rapid environmental degradation were associated with higher fertility rates. One explanation for this association advanced by Cleaver is that under conditions of poverty and land degradation, parents can increase agricultural production only by having more children to provide additional labor. Nevertheless, a causal linkage has not yet been firmly established.

Even where population growth rates remain high, much can be done to give farmers incentives to raise agricultural production. To make farming more profitable and less risky, governments need to change economic policies, reform land ownership systems, improve access to markets for produce, and assist farmers in adopting environmentally sustainable technologies. A supportive policy climate is essential to making these changes. Good research and extension programs can also help to develop appropriate technologies and spread them rapidly.

The best-documented case of a community that made the transition to intensive agriculture while conserving the environment is Machakos, Kenya. Despite a five-fold increase in population since the 1930s, Machakos has more trees and better soil conservation today than it had six decades ago. According to Kevin Cleaver, several positive factors combined to restore productivity in Machakos: agricultural policy, infrastructure facilitating access to markets, agriculture research and extension, food security, education, and health care. Elsewhere in Africa, local communities are managing their resource base without outside assistance, and some donor-funded demonstration projects have been effective.

POLICY AND PROGRAM IMPLICATIONS

African governments are giving more attention to environmental issues, as evidenced by the fact that more than 25 African countries have national environmental action plans. Many countries have designated a ministry responsible for the environment. However, these advances at the central policymaking level have not yet been translated into extensive field-level programs. As George Lewis noted,

“There is a lot of policymaking going on, but a great deal of implementation and operationalizing remain to be done. That’s the hard part.”

Faced with a multiplicity of escalating problems and dwindling funds, African governments must make hard choices in establishing development program priorities. Kevin Cleaver advocated that governments and donors focus on those areas in which a clear demand exists. Efforts can be made to promote increased demand, but unless people express a felt need, the desired changes are unlikely to occur, he stated. The details of how this principle would be applied across sectors and countries need further discussion.

To address the “nexus” issues, Kevin Cleaver proposed a six-part action plan:

1. Reduce population growth, mainly through female education, health care, AIDS prevention, family planning and agricultural development.
2. Give more attention to environmentally sustainable agriculture, by giving it more emphasis in agricultural research and extension programs.
3. Adopt appropriate economic policies to make environmentally sustainable agriculture profitable, including appropriate marketing, price, tax and exchange rate policies.
4. Reform land tenure systems, in order to ensure that farmers have secure rights to their land.
5. Reexamine the urban bias in policies and investments; develop rural towns and secondary cities as markets for agricultural goods.
6. Strengthen planning and management of environmental projects.

In Cleaver’s view, structural adjustment measures play a role in providing the incentive structure to adopt new technologies and create demand in various development sectors.

In regard to protecting biodiversity, Henri Nsanjama listed several key actions:

1. Link conservation with human needs by supporting integrated conservation programs and stressing their benefits to local communities.
2. Create and maintain protected areas.
3. Develop African institutions and train professionals to manage natural resources.
4. Protect plant and animal species of special concern.
5. Promote sustainable use of forest products.
6. Generate broad public and political support for conservation programs.

Clearly at the top of his list was the empowerment of Africans to manage conservation programs.

The evolution of effective environmental policies and programs requires that government leaders be receptive to community concerns regarding the environment, according to Tom Fox. He argues that political structures must be open to community inputs and that democratic institutions facilitate the free flow of information regarding environmental problems. Therefore, movements toward democratization will help to promote wider discussion of environmental problems and possible responses.

The common thread underlying these prescriptions was that education in all forms—formal instruction, specialized training, and public information—is needed to develop broad understanding of environmental problems among diverse constituencies. Priority audiences include policymakers, community leaders, citizen activists, farmers, and people living near protected areas.

ISSUES FOR DONORS

Major issues that donors need to consider in foreign assistance programs include:

- **Strategic focus.** In view of funding constraints and changing aid priorities, donors need to take a closer look at program impact and facilitating factors such as policies and infrastructure.
- **Environmental programs.** Donors need to give more attention to operationalizing broad environmental strategies and developing workable, effective conservation projects.
- **Lack of data.** The lack of current, accurate data on environmental conditions makes it difficult to devise strategies and design and evaluate projects. Donors should support data collection efforts and should be cautious about generalizing from poor-quality data.
- **Long-term perspective.** Donors typically operate on short time-frames, yet environmental problems require long-term solutions. Similarly, politicians and governments also have short time horizons.
- **Multidisciplinary approach.** Inputs from many disciplines are needed to address population and environmental problems. Donors should encourage close collaboration between demographers, environmentalists, and other specialists.

Donors have proved to be an important catalyst in the adoption of environmental policies. Their influence is likely to continue as program interventions expand and diversify.

POPULATION/ENVIRONMENTAL LINKAGES

QUESTIONS POSED TO THE PANELISTS

1. What effect do population growth and density have on environmental quality, especially in relation to agriculture, deforestation, biodiversity, wildlife, and pollution?
 2. What information is needed to understand population/environmental linkages better?
 3. How important are population interventions in promoting sustainable development?
 4. Are there African countries that are close to exceeding their carrying capacity?
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MODERATOR: Keith Brown, *Director of the Office of Southern Africa Affairs, USAID Africa Bureau*

Overview of Population/Environmental Linkages

PAUL HARRISON

Consultant on International Development and Author, London, England

My talk last night was very broad and strategic, so today I'm going to stick to rather hum-drum detail.

We can look at population/environment in two principal ways: the first is population and the use of resources, and the second is population and the degradation of resources.

AFRICA'S CARRYING CAPACITY

Perhaps the key issue on the *use* of resources is whether Africa has already reached or will reach a critical point in regard to its carrying capacity. In 1982 the FAO did a study of the carrying capacity of lands in developing countries. I was involved in popularizing the findings, so I will cite them.

Farmland in short supply. The very widespread myth that Africa is abundant in land has been used as an excuse for inaction on the population front until now. It is time to bury this myth completely. The fact is that most Africans today live in

countries where land is not abundant. Land is already in desperately short supply. The average population density seems at first sight to be very favorable. The African continent has about 217 persons per 1,000 hectares, which is a quarter of the level in Asia or Europe. However, nearly half of Africa is too arid for agriculture, and a good proportion is dense forest. If you deduct these two types of land, Africa's population density is already higher than in Ireland. By the year 2025, even if all the forest is cut down, Africa's density on her non-arid area will be level with present-day Europe. That's the projection for 2025; there will be possibly a doubling of population after that. So Africa faces the possibility of having double the population density of Europe today.

Africa as a whole appears to have large land reserves. The FAO study, which was very comprehensive, found that Africa has 718 million hectares that are suitable for crop cultivation. Today, less than 200 million hectares are cultivated—less than a quarter of the amount available. So you might think there is room for four times present numbers. But the reserves are mainly humid forest land and are very heavily concentrated in Central and Southern Africa. Twenty-four countries in sub-Saharan Africa are already using, even at their present populations, more than half their reserves of suitable land; 13 countries are using more than 70 percent of their reserves; and 6 are using more than 90 percent of their reserves. The East African countries are reaching Asian levels of land shortage.

That's just the total land, regardless of whether it's being cultivated at present or not. If we look at the amount of land actually being cultivated per person, the situation is even more unfavorable. In 1961 there were 0.55 hectares of arable land per person, which is about equal to developed countries today, although of much lower quality. Since then, arable land has expanded more slowly than the population, so that by 1988 it was down to 0.31 hectares per person. This level is not far from that of the Near East, where they have a very high level of irrigation. So again, it's a very unfavorable situation.

Africa faces a situation of extremely serious land scarcity in the future. If population grows as projected and if land expands at the rate of the 1980s, then by 2050 the arable area per person will be down to 0.11 hectares. This is only a little bit more than in China today, which has very high levels of input and irrigation. It's almost inconceivable that Africa would be able to cope with so little land per person, given her land quality.

The land reserves are there, but they are in the wrong places. People actually prefer to live in the drier and cooler areas in Africa, mainly for health reasons. Yet, according to the FAO study, the big potential for extra production is in the warm tropics, where you can grow crops all year round because there is so much rainfall. These areas are very much underpopulated in relation to their potential, but I would argue that there are strong health reasons for people choosing to live elsewhere. Since the human race originated in Africa, it's not by chance that people have kept out of those areas for so long. It's because they actually prefer not to be in them, and I don't think they can be compelled to move there.

Food production potential. The FAO also tried to calculate the number of people that could be fed on African soils. Again, the regional total sounded fantastic. Even with low inputs, Africa could support 1.1 billion people. However, the regional population will have passed this level in the year 2010, so low inputs will not be enough. At medium inputs African lands could support 4.4 billion, which is more than the expected plateau population of 3 billion. But this figure is very misleading. Again, it's concentrated in Central and Southern Africa where the land reserves exist. Even within these countries, that potential will never be realized. It assumes that all forest and woodland will be cleared for agriculture. And it also assumes an absolutely impossible rate of clearance. In Zaire for example, it would require expanding the cultivated area by 20 times. If the rate of land clearing continued as in the 1980s, it would take 883 years to occupy that area. Also, the labor requirements of that clearance would require massive migration into Central and Southern Africa from other parts. Logically you would think that all those people in hilly East Africa could be shifted into Central Africa. But it could never happen on the scale required.

Results on a country basis are extremely worrying. By the year 2000, 29 countries will be unable to feed themselves from their own lands using low inputs. These countries contain about 466 million people or 60 percent of the regional population.

A number of countries will not be able to feed their plateau populations, even using high inputs. Ethiopia could almost manage it using high Western European levels of input. Mauritania is worse off. The countries in East Africa and the Horn can support less than 40 percent of their plateau population.

In terms of critical zones, things look even worse. Forty percent of the total land area was unable to feed the numbers living there in 1975, using the low input level, which is largely what they are using. These areas are also environmentally vulnerable because they are semi-arid or hilly and therefore prone to soil erosion.

These results are not set in stone and absolutely faultless. Still, they indicate the level of problems that may be faced in the future.

Water scarcity. In regard to water resources, the situation is equally critical. The FAO land use study included water resources as measured by how many days of the year crops can be grown. Swedish hydrologist Malin Falkenmark has done a separate study on water. She estimates that in 1982 there were six African countries with a population of 65 million facing water stress or scarcity. That's a level of scarcity equal to or greater than the Colorado Basin in the U.S.A. By 2000, 12 countries, with 250 million people, will be facing that level of scarcity. By 2025, 21 countries, with 1.1 billion people or more than two-thirds of the region, will face a fairly acute level of water scarcity. Falkenmark attributes the whole of that increase in vulnerability to population growth.

Obviously, water scarcity will place severe restraints on development. Something has to give somewhere. Probably agriculture will not be limited, but there will be restraints on industrial development and on human hygiene and comfort.

Feasibility of mass migration. Both the land and the water situation point to the need for massive migration within and between countries. But this migration can never happen on a scale adequate to deal with the scarcity situations in the overpopulated areas. We've seen the sort of ethnic, cultural and political problems that mass migration has led to in West Africa, to the extent that migration flows have been reversed at great personal cost. I don't think that East Africa can be saved by migrating into Central Africa. Moreover, the likely migrants don't have the appropriate agricultural techniques and would probably devastate the area.

IMPACT OF POPULATION GROWTH ON RESOURCE DEGRADATION

The issue of population and degradation of resources is difficult. As everyone says, the data are very inadequate. I often use the FAO land use figures, but I have been told that some people in African ministries who provide land use figures to FAO use the same figure year after year or just add 2 percent onto the last figure without any real factual basis for that. But we have to make do with what we have; it gives us a very rough idea.

Loss of forests and pastures. Between 1973 and 1988, Africa's forest area declined by about 40 million hectares. The pasture area also declined by about 6 million hectares. If we look at what happened to those two, we can find out the causes of their loss. The arable area expanded by 14 million hectares. The non-farm area for roads, houses and other uses grew by 31 million hectares. I would argue that virtually 100 percent of the loss of forest and pasture is due to population growth because we know that consumption has not grown in Africa; in fact it's decreased. Similarly, use of technology to increase crop yields would have reduced the amount of land needed. So I think we can attribute virtually 100 percent of deforestation and loss of pasture and other types of wildlife habitat to population growth.

Some people have attempted with little success to correlate deforestation with population growth. When you do that, you get a hopeless scatter of dots, and there are no significant correlations. But if you plot population density against the deforestation rate, there is a fairly respectable correlation. It explains about 45 percent of the variation, and it's very statistically significant. In other words, the population density is clearly a very significant factor in the rate of deforestation, and many studies confirm this finding.

Loss of wildlife habitat. Similarly, a graph for loss of wildlife habitat in Africa, based on an IUCN survey, shows a clear trend and there is a very high level of correlation, which is also very significant. I did another scatterplot based on 55 countries in Asia and Africa. With average population densities of only 31 people per square kilometer, the wildlife habitat losses are quite modest, about 40 percent. When density reaches 214 people per square kilometer, the losses are very high, over 80 percent.

Increasing population density means loss of forests, wetlands, grasslands, and wild mountain area. Therefore it also means loss of wildlife habitat, and therefore loss of wildlife diversity.

We can all think of individual examples where the connection is absolutely plain. In Rwanda, the area around the gorilla habitat in the mountains declined by approximately half between 1958 and 1979, with disastrous effects on the numbers of gorillas. In Madagascar, the Ranomafana rainforest, which is the last habitat of the golden bamboo lemur, declined by three-quarters of its area between 1973 and 1987.

Soil erosion. It is very difficult to document a population link with soil erosion. Although it would seem logical that population growth should increase soil erosion, other factors affecting soil erosion don't remain equal. In reality, as Boserup suggests, as problems build up, people deal with them. When population density reaches a certain level, people use a lot more conservation methods. So there is a U-shaped curve. Things get worse at first, they reach bottom, and then they begin to get better. In Machakos, despite very considerable population increase, the soil conservation situation has improved.

Pollution. In terms of pollution, I have calculated that population growth is responsible for about 35 percent of the increase in fertilizer use in Africa in past 30 years, and technology for the other 65 percent. Consumption accounts for none of the increase, since consumption declined. In regard to air pollution, population growth was responsible for about half of the increase in carbon dioxide output from Africa over that same period.

IMPACT OF POPULATION INTERVENTIONS ON ENVIRONMENTAL QUALITY

Obviously, population interventions can't actually reduce environmental damage, as long as populations are growing, but they can reduce damage below the level that it would otherwise reach. But obviously a multi-pronged approach is needed. Population interventions take 15 to 20 years to begin to show significant results. Technology changes can start making a difference this year or next year.

Clearly, study of the linkages between environmental degradation and population changes is in its infancy, and we need an infinity of studies. But in the case of Africa, I don't think we should wait on the results of those studies before acting. We know enough already to show that the link is strong.

We know that the four-pronged program that I mentioned to bring population growth down—improvement of women's education, women's rights, mother and child health, and access to family planning—has many, many other benefits and also will help to reduce the increase in environmental damage. So we should definitely go for them.

We know too that low-cost conservation methods that also increase production are popular and successful wherever they have been tried and properly designed. So I think despite the great holes in our knowledge, we already know enough to get on with those two high-priority tasks.

Population-Environment Dynamics

GAYL NESS

Director of the Population-Environment Dynamics Project at the University of Michigan School of Public Health

I want to make four very brief points:

1. The difficulty of thinking about and working on population-environment dynamics;
2. The character of the human impact on environmental systems;
3. The kinds of policies and programs that are needed and the importance of monitoring and signals; and
4. Management of projects and delivery systems, which is one of the things I think A.I.D. really does well abroad.

DIFFICULTIES OF ADDRESSING LINKAGES

First, on the difficulties, I will refer you to two things I've written: (1) a book entitled *Population-Environment Dynamics: Ideas and Observations* (University of Michigan Press, 1993), which contains a series of papers on the difficulty of putting these two topics together; and (2) a working paper that deals with conceptual frameworks and will be issued shortly by the Environmental and Natural Resources Policy and Training Project (EPAT).

Disciplinary boundaries. It is difficult to put population and environment together because on the one hand, population is served by one small, tightly cohesive, very powerful and very narrow technology—social demography. Environment is the field of everything, from anthropology to zoology. Organizationally, these are different. All these disciplines are political units with boundaries, gatekeepers, and journals. It is not very easy to get them to talk to one another. Steve Sinding told me it took him 10 years to get population and health in A.I.D. to work together to support the Demographic and Health Surveys. And the two offices were just one floor apart.

Political sensitivities. Then there is a great difference in the degree of sensitivity of these issues and their bargaining power, so it is very difficult to bring them together. For that reason I particularly commend the Africa Bureau for setting up this meeting. I think this is an extremely useful and rich thing to do, to bring together people from very different disciplines and walks of life, with very different agendas, to try to talk about these issues. It's difficult, but it's a good thing to do.

HUMAN IMPACT ON ENVIRONMENTAL SYSTEMS

I agree with Paul: everything that humans do has an impact on the environment. A man walking along a path has an impact on the environment. But I will make the point that there is no simple, direct impact of any population activity on the environment. Every impact that population has on the environment and every impact that the environment has on the population is mediated by some form of technology and social organization. A man walking barefoot on a path has a very different impact on the environment than a single man riding a bicycle or a single man riding a motorcycle. The difference is in the technology involved.

We can make a four-fold table plotting population growth ranging from zero to rapid against environmental degradation ranging from high to low. You can fill all of the cells in this table with examples. Machakos, just outside of Nairobi, has had rapid population growth and extensive environmental protection. You can say the same thing about Singapore over the last 40 years. On the other hand, Eastern Europe and Russia have had low population growth and massive environmental degradation.

What's critical to understand is that everything comes through some form of social organization and some form of technology. That's what human ecology has tried to promote for some years.

We can also take a long historical view of this and see that's a pretty prescient idea. Roughly 200 or 300 years ago we made the transition in energy from sail, wind, and human power to fossil fuels. If we had not done that, we wouldn't be sitting here talking about these problems today. Were we not a fossil fuel-based technology and economy, it's not likely in my view that the world's population would be over a billion.

Social organization. We have also developed a form of modern bureaucracy over the last 200, 400, or 800 years. It is one of the most powerful social inventions that we have had since sexual reproduction or monotheistic religions. I love the phrase of Max Weber, the German sociologist, surveying the European and Russian scene in 1905, after that disastrous war with Japan and Russia's aborted revolution. Weber said that if Russia ever gets into another international disaster such as this and if it has a successful internal revolution, it will become the most bureaucratized society the world has ever seen. Contrary to Marx, he said that it is not the proletariat that is on the march, it's the official that is on the march.

We have developed massive bureaucratic organizations. They are extremely powerful—not necessarily efficient, but very powerful. They are powerful because they can concentrate massive amounts of resources on a few single activities. They are goal-oriented and action-driven. In some respects, they are very effective organizations, although they can also be very, very ineffective.

In order to manage the business of sustainable development or sustainable societies with 5-10 billion or more people, there is no possibility for us to go back to traditional modes. In the last 300 years, the world's population has grown from growth rates of less than one-tenth or 1/100th percent per year for thousands of

years, into growth rates of 1-2 percent per year that have given this 5-10 billion or more people. To manage these numbers is going to take a totally different type of technology and organization, based upon what we have now—this fossil fuel and bureaucratic urban industrial society. We cannot go backwards. We're going to have to find some way to tame these organizations and make this technology work for the business of sustainable development.

Whether we can do that or not is an open question. Until a short while ago, we had the capacity and almost the political will to destroy life on the earth through an atomic or nuclear holocaust. That still may happen, but we've seen the major powers draw back from the potential overshoot. Now we face the threat of cooking ourselves to death in a greenhouse, asphyxiating ourselves with noxious gases, or poisoning ourselves with toxic effluents in the air, earth and water.

Can we draw back from that? Well, I tend to be an optimist. The world is crumbling about my ears, but I know it's going to stand.

POLICY AND PROGRAMMATIC RESPONSES

We must find some way to use the technology and organization that we have to do some more benign things. I will focus on two things: monitoring environmental signals and managing delivery systems.

Monitoring environmental signals. Paul spoke yesterday about the importance of signals to adjust to environmental stress caused by either population growth or other sources of environmental degradation. We have all seen the problems of blockages in those signals. A signal doesn't get through. People aren't listening. Or they are listening, but the wrong people are listening. Even if the right people are listening, they may not know what to do. Or they may do something, but it's too late, and there can be overshoot.

The anti-natalist policy revolution. I want to give you just two illustrations to show the importance of monitoring to develop the kind of policies we need to move ahead. In regard to population, I think it's important to recognize that we are right in the middle of one the most major policy revolutions the world has ever seen. I will call it the anti-natalist policy revolution. Up until 1952, virtually every government in the world throughout human history had seen people as power. All governments wanted more of them. You can tax them, work them, and send them off to war for the greater glory of government. In 1952 India became the first country to adopt an official policy to reduce population growth by reducing fertility within marriage. That was a revolutionary change. Today virtually all the Third World countries have some policy that is fairly close to that. That, I would argue is a very revolutionary change over the last few years.

This change comes about in part through the process of monitoring. Tracing the world's history back 300 years, imperialism gave rise to colonialism, giving rise to nationalist revolutionary movements, leading to pressure for modern economic development. Modern economic development led us to see that population growth

was a problem. Monitoring, particularly surveys and censuses, made that very, very clear. In the 1950s, even India didn't do very much with its population program because it had estimated in its first two five-year plans that the population growth rate was going to be 1.25 percent per year. It was the precensus work in 1960 and the census in 1961 that led India to see that it had a growth rate of above 2 percent. It scared the heck out of the Indians. They doubled the family planning program budget every year for the next 10 years, and that really pushed them ahead. In fact, if you look all over Asia you find that this round of censuses from 1960-61 had a very remarkable impact on policy.

It's important to recognize that this big policy change in population comes largely out of Asia. Asia made the changes first, before the rest of the world. By 1966 when the United Nations made family planning legitimate and the U.S. began to put money into it, most of the Asian countries had already made a decision to do something about fertility.

Asia dragged the rest of the world, kicking and screaming into the business of reducing fertility. That came in very large part out of a long history of censuses and surveys, some of them related to economic development. In the 1960s and 1970s, there was a lot of census and survey work in Latin America. In the 1970s, Latin American countries shifted their population policies—not all of them, even Brazil did not—but most of them. In the 1970s and 1980s there was a lot of census and survey work in Africa, and that's one of the things that has led Africa to make a lot of these policy changes. So these monitoring systems are very important in allowing policy-makers and others to see that there is a problem.

Monitoring reveals unexpected environmental damage. Chlorofluorocarbons (CFCs) are another example of the benefits of monitoring. In the 1930s, we invented a marvelous new chemical. It didn't smell or corrode anything. It was a beautiful refrigerant and a great insulant. It was very cheap to produce. It could be put in all kinds of things, and it didn't do anything or hurt anybody. Two theoretical papers done in 1972 suggested that in floating up to the stratosphere, those CFCs were breaking down and the chlorine was destroying the ozone layer, which was increasing the ultraviolet-B layer. Those two papers triggered the newly emerging U.S. environmental movement to push for a ban on aerosol sprays. Consumers boycotted aerosol sprays; sales went down by 35-40 percent. That drove the companies that were producing the aerosols to develop some substitutes. In 1985 monitoring demonstrated that the ozone layer over the Antarctic was greatly reduced. In 1987 protocols for reducing CFC production were developed, with the acquiescence of industries. Over the next few years, it was discovered that CFC production was even being more costly to the ozone layer than people thought, and that led to the 1990 global policy change to stop producing CFCs by the year 2000.

The important thing about CFCs is that policy changes were made by a global community before there was any well-established health impact of that environment change. The policy called for industry to withdraw from an extremely produc-

tive economic activity, even before we had that information. In sum, monitoring led to new kinds of policies and more effective ones.

Now I would argue that we need a great deal more monitoring and that's something that A.I.D. and other international organizations can greatly influence. We need monitoring to see what we are doing, so that we can change behavior at all levels—at these global policy levels, national policy levels, and even down to individual behavior.

Remote sensing. Let us be sure to look at the immense potential of remote sensing for this new type of monitoring. Some time ago, Chuck Olson, one of our professors of remote sensing, was working in northern Kenya to persuade villagers to change their planting practices in order to protect against soil erosion. They wouldn't do it. Obviously, that part of the delivery system wasn't working so well. Chuck had a helicopter and video equipment. The chief refused to go up in the helicopter, but his son did go along. From the helicopter they took video images of the village. At night they showed the pictures on a screen in the village center. No one believed that was their village because they had never seen it from that direction. But the chief's son verified specific landmarks. The pictures showed the sheet erosion taking place. That was enough to let those people know they were doing something wrong, and they became more receptive to the efforts of the agricultural experts.

Many of us think that remote sensing is going to have a massive impact on all the social sciences in the very near future. Its impact could be as great as the impact that social survey research had 40 and 50 years ago. Up until the 1950s, there was little survey research. A lot of what went by the name of political science was political journalism. Sociology was social problems analysis. Then all of a sudden large-scale sample surveys were done. With them came marvelous tools of analysis that enabled us to talk about all sorts of things. That had a very major impact on all kinds of policy.

Social surveys. Think where we would be today in population programs if we did not have the knowledge, attitude and practice (KAP) studies. The first one, done in Taiwan in 1962 by Ron Freedman, showed the Taiwanese government that, contrary to their belief, people wanted to know something about population control, and they felt they were having too many children. Without these social surveys, the population field would have made little progress, and environmental work would be very, very far behind. I believe that we need a lot more monitoring at all levels and of all sorts. Let us particularly not forget the possibilities of remote sensing.

MANAGEMENT OF DELIVERY SYSTEMS

Training. Managing delivery systems is very important to A.I.D. because international organizations are in business essentially to move money, technology and people into places where they can help set up policy-making processes and

delivery systems. Of all of this, perhaps training is the most useful thing that A.I.D. does. When I first went to Southeast Asia in 1961 and began looking at economic development there, almost all of the experts were foreigners. Today, Southeast Asia exports experts throughout the world.

I first met Bob Haladay in 1979 during a review of A.I.D. inputs into the Indonesian Family Planning Program. We could see very easily that one of the best things A.I.D. did was to train a tremendous number of people, so that the program's direction, organization, and leadership became that of the Indonesians, rather than of foreigners.

USAID field presence. I would like to say a few more things about that particular project. In 1979, A.I.D. had a lot of capacity—three staff working in population who all spoke Indonesian and spent about one-third of their time in the field. They were doing a lot of things to stimulate local government and private groups to develop population programs. For example, they had a “fast money-moving mechanism,” so that proposals from the field could be funded within three or six months. That activity generated an immense amount of initiative and helped greatly.

Ten years later when I was back, Carol Carpenter was the lone A.I.D. person, and she was so overwhelmed in the office, moving papers from in basket to out basket that she could not get out to the field. That's okay because Indonesia was taking off then. Still, at a critical point A.I.D. had people in the field to really push things out, and that was very effective.

Need for local project design. Another lesson from Indonesia pertains to program design. During the 1970s, the Population Council developed combined maternal/child health and family planning programs in the Philippines, Indonesia and West Africa. These programs were a colossal waste of time, money and energy. The Indonesians were very polite about it. They did everything the Population Council wanted them to do, and then they quietly ignored the project and developed their own village-based family planning program. That's the thing that worked extremely well.

Let us beware of these packages that are developed in New York and Washington and parachuted into the field. Do the training and let people at the local level decide what kinds of things should be done.

Mobilizing donor resources. Indonesia also represents another environmental problem that A.I.D. works with—the bureaucratic environment, other organizations and governments. Think about the difference between Indonesia and Bangladesh and you have the same kinds of differences in Africa.

The Indonesians managed the donor community. They put them together and told them what they wanted and who's going to do what. Haryono Suyono, head of Indonesia's family planning program, explained his technique for dealing with the World Bank. As long as they are giving the loans, they are very flexible. Once the

loans are in place, they become very inflexible. "They don't want you to change, but we had to change. Things have to be adjusted. So if you want to change, you simply tell the World Bank, we won't use your money. If you stop moving the money, that gets everybody terribly frightened and then they get very flexible," he remarked.

So they have the capacity to mobilize the donor community. Bangladesh does not. The donor community writes the legislation, moves the papers through, and gets all kinds of things done. You have that same sort of problem in places in Africa. You can't change the governments very much, but you deal effectively with that.

Integrating population and environmental programs. The last point I want to make is on integration. I've done a lot of study on integration in the health and family planning field. I think you want to be very careful about integrating population and environment programs, especially where and how you integrate them. To make a very long story short, you can think about two types of integration:

- 1. Administrative integration**, where different units are under some administrative central. For example, you could put population and environment under a ministry of population and environment or put them under a ministry of planning. Typically, this change only builds an empire for the people at the top, and it doesn't usually have any impact on the service delivery at the bottom.
- 2. Service integration**, where service delivery staff at the point of service are linked in ways that make sense on the ground. That kind of integration works very effectively if you work it out on the ground.

Finally, as a parting note on the business of management, we've got a lot of myths in management. We do strategic management, management by objectives, total quality management and so on. I think those are mostly fashions that primarily are designed to give consulting firms work to spell out the new rules.

I think there are two rules in management we ought to pay attention to. One is, the bottleneck is always at the top of the bottle. If you have problems, they are probably yours, not somebody else's. The second is, if you want to get anything done, pay attention. Structure things so that someone pays attention to that. The idea is, a watched pot boils.

Sahel Natural Resources Management Studies

ASIF SHAIKH

President and Chief Executive Officer of the International Resources Group

Some efforts to manage natural resources in Africa are succeeding, and the inevitable question becomes where does this all lead—what is the strategy? I'll draw on some ongoing work that I have been involved in for the Club du Sahel, with a multinational team drawn from the Sahel, France, Holland, and the United States. From Holland we've been working with a research institute called CABO that has been researching for over 20 years the ecological carrying capacity of Sahelian countries. From the Sahel, a demographer at CERPOD in Bamako, Basil Gissou who is the former minister of environment of Burkina Faso, from France, Marie Monimart who is a specialist on rural development and on the role of women, and from the United States, Kjell Christopherson and myself, both from IRG.

Some of the findings that I will talk about apply to other parts of Africa, but I think it's much safer to assume that you can't generalize these things. To the extent that there is a lesson that applies, others will be better placed to judge that than I, so this is explicitly a presentation about the Sahel.

In drawing on the nexus work, we are attempting to focus on one region and see if the lessons or implications might have different nuances. The basic question is, does the nexus explain the root causes? I think our answer is, yes, it does. But it doesn't necessarily follow that solving the population and environmental problems will fix the economic problem. If you will, they have let the lion out of the cage. But once the lion is out, simply fixing those problems will not put the lion back in. I think that's a slightly different nuance in terms of where our conclusions come out. That's the ending of the story, and I'll take a few minutes now to summarize what our story is.

Population doubling is inevitable. After 40 years of rapid population growth, future population increases are already built into the Sahelian age structure. In Mali for example, 50 percent of the population is under 15. There are 40 percent more girls under 15 than there are women between 16 and 35. Even if fertility comes down rapidly, births will continue to grow, as girls under 15 reach maturity. Population growth rates and fertility rates in the Sahel are among the highest in the world. While it is urgent to begin reducing fertility now, the long-term differences in population occur towards the year 2056, rather than over the next 30 years.

Even if population growth slows now, the quantitative impact in 30 years is quite limited. The bigger impacts start happening towards the latter part of that cycle. In other words, no matter what we do, by 2025 the Sahelian population will go from its current level of about 45 million to somewhere on the order of 95-100 million people. In the high case, it may be 115 million, in the low case it may be 90 million.

Population policies, therefore, cannot forestall the basic structural transformations in the agricultural production system that must take place between 1990 and 2025. That is an important point that we should certainly debate and discuss, but it is central to our findings.

To understand what has happened and what is happening, I think it's useful to take a longer-range view. In 1950, there were approximately 18 million Sahelians and fewer than 5 percent were urban. The level and distribution of 1993 population already reflects a dramatic change in the relationship between social and production systems and the environment. In 30 years there will be 100 million people in the Sahel, and nearly half of them will be urban under the most optimistic scenario.

Evolving economic and social structures. The problem is less about population levels than it is about a structurally different economy and society. In economic terms, it's about a basically different ratio of land to labor, and about the inevitability of new production systems if income is to be maintained. Future population growth is already built into the age pyramid.

The Sahel faces a profound ecological crisis because traditional production systems have failed to keep pace with the growing pressure of population. This has been discussed extensively this morning. But the region is in the process of a much broader, long-term structural change. It began 40 or more years ago, and the basic dynamics of that change are such that it is not going to settle down for another 40 or more years from now.

It's important not to lose sight of the fact that there are very broad changes happening out there in terms of social aspirations, mobility, the breakdown of traditional authority systems, roles of the young, roles of women, economic and technology options, new ideas, and new forms of political organization.

The basic point here is that the major trends that drive structural change are already in process and their future evolution is inevitable, even if the specific outcomes are not inevitable. Strategies that look for short-term equilibrium will have a very hard time finding it. And they will probably do little, if anything, to change the long-term prospects for either the economy or the environment.

I want to be very clear about the underlying point here. This is not in any way, shape or form, to suggest that it is less urgent to begin addressing the population issues. In fact, if we don't, whatever progress is made in this generation will inevitably be wiped out in the next generation. You have to begin it now precisely because it takes such a long time. But it is unrealistic to expect that no matter how successful we are on slowing population growth, we will actually be able to forestall what must happen on the agricultural transformation.

New production strategies essential. What about the environment in this equation? Traditional equilibrium could rely on natural renovation. This is probably a point of some debate, but I think there is a fairly broad consensus. With increased pressure on the land, the fallow cycle can no longer assure sustainability. There is already intense resource competition and conflict. Without fundamentally different

production strategies, the environment will continue to degrade. You have to change the traditional practices in response to the changing ratio of land to labor. Again, that's a point that both Paul, Kevin, and others discussed at some length.

Now in many areas of the Sahel, consumption (or consumption need at least) already exceeds—sometimes substantially—what can be sustainably produced based on natural regeneration alone. Often that gap is being filled by resource mining—that is, getting more short-term production than is sustainable. It is analogous to drawing from the savings account to pay the bills. The gap is likely to grow as population increases and as the environmental savings account becomes depleted.

Resource management eases the transition. Better management of existing resources—natural resources management (NRM)—is a key element in the strategy and has a central role to play in the transition. There is a menu of proven technologies, ranging from contour dikes to agroforestry and in-field tree planting. These technologies are financially proven. They are easy to adopt in many instances. They can increase sustained yields and buy time. However, over time our findings indicate that external inputs will be necessary. It's the same conclusion—that external inputs will be needed over time on a broad scale in order to maintain the sustainability of production systems—with a slightly different nuance. Perhaps for the Sahel, the outcome is different. Natural resources management may buy us 20 years or 30 years and may become critical to successfully making the transition.

Shift to cash economy. What does this imply for the rural economy? In the next 30 years or so, a transition to widespread—not universal—use of external inputs to maintain the input/output balance implies being part of the cash economy. It implies changes in the basic rationale of rural production from subsistence production to investment in agriculture, from self-sufficiency to commercial exchange, and from extensive land use to intensive management.

These changes are already occurring. However, they come in the context of much broader structural change throughout the West African region. Again, there was some discussion this morning about regional thinking, and I think one really has to look at the West African economy when considering any given Sahelian country.

Regional markets. In the region, trends towards urbanization and changes in demand, transport, trade, infrastructure, marketing and social and political systems must be taken into consideration. Nigeria in 30 years will have a population of nearly one-quarter of a billion people, and that has tremendous implications for the economy of Niger. Ivory Coast's economy has tremendous implications for the economies of Burkina Faso and Mali. There will be new opportunities and problems, including very different market incentives for the major production choices that we put on a cost/benefit analysis today.

It's not sufficient to look at what exists now in terms of relative resource scarcities, but how the change is likely to influence that. Capitalizing on these changing incentives should be a key focus for public policy.

Limited alternatives. In a system-wide sense, and I stress the term system-wide, the long-term choices that Sahelian populations face are: (1) to mine the environment to maintain current income; (2) to use external inputs and resource management to maintain the input/output balance of rural production; and (3) develop non-agricultural sources of income (see figure 6).

It's very important that we avoid *linear* strategic thinking. The shortest distance between two points may not be a straight line. Eventually, people will move to non-agricultural sources of income. Most people are already somewhere in the triangle in terms of practicing a mix of resource mining, management of agriculture, and non-agricultural income. This is particularly true in the marginal areas in the Sahel, a case in point being people who have migrant families.

You may find a farm family that produces some grain, does some gardening, and has some family members in Abidjan, Lagos or even Paris. These multiple household strategies are very important to the overall Sahelian household equation.

For many producers in fact, natural resources management is not so much an environmental strategy as it is a strategy to increase income and to build capital as a potential means of getting out of agriculture altogether in the long-term. Peoples' strategies vary enormously. It's important that we avoid simplistic conclusions.

Approaching sustainability. Just because sustainability may imply movement up this triangle over time, does not mean that everyone will do it. Some people will be all over within it. Again, we are talking in terms of sustainable *systems*, but that goal may not be realistic. I think there's too much emphasis in projects on every activity being sustainable. Subsistence agriculture for one, may not be sustainable ad infinitum. It may be necessary to move outside of subsistence agriculture for a fair piece of the population in order for the system as a whole to achieve some element of sustainability.

The basic link between environment and development in this is that the environment cannot long be preserved if the root causes of resource mining are not addressed. If the alternative is starvation, then the environment will continue to degrade. Viewed from this perspective, the long-term environmental and economic sustainability issues are the same. They both require sustainable input/output balance in agriculture and growth in non-agricultural employment. It is not a realistic strategy to try to make every activity sustainable ad infinitum.

Adaptive capacity. In terms of the system becoming sustainable, the capacity to adapt, which has to do with the resiliency and strength of economic, social and political institutions, is as important as the current sustainability of what people are doing. One of my favorite analogies for this is the concept of riding a bicycle. I am convinced that if there were a series of donor projects on bicycle riding, we would try to teach people to remain in perfect balance in order to ride a bicycle. In fact, the process of riding a bicycle is the ability to constantly adjust, otherwise sooner or later you hit a curve in the road.

That's really what lies at the heart of economic theory, the price mechanism creates a form of equilibrium. There has to be the capacity to respond to this equilibrium, and that's an underemphasized area in our project and program thinking.

Major changes ahead. The key word here is transitions. In demographic, environmental and economic terms, the next 30 years are a period of transition. The transition has social as well as political dimensions. In social terms, there will be winners and losers. That's one of the most vexing policy problems we have. It is a problem that has to do with all aspects of what we've been discussing today.

There already are winners and losers, and the stakes are rising. Issues like the land tenure debate are ones in which there will be enormous shifts in control of resources over the coming years, as a lot of political clout comes out of the woodwork. Public policy is unlikely to be able to assure equal outcomes without command and control, which will not work. But it can do a lot to promote equal access and equal opportunity, the coherence of a larger development strategy, and specific development projects.

The urban and rural transitions are intimately tied here. Urbanization is a double-edged sword. If it doesn't reach 50 percent as projected for 2025, there will be even greater pressure on rural resources. If it does reach the projection, where will the jobs come from?

Dependence on donor support. There has been talk in recent years about the vibrancy or the relative optimism that we can have about the informal sector. But the fact of the matter is, in Sahelian countries very little productive urban employment has taken place over the last 30 years. Much of it has been supported by donor money, and yet we have the frightening prospect of a very large percentage of the population in urban areas who must eventually become the market for food produced in the rural areas if prices for rural commodities are going to be sufficient to justify the kinds of investment in agriculture that may be needed to make agricultural production sustainable.

Again, I have no answers to these and other questions, but I think they are important things for us to talk about. And again, there is a glimmer of hope in the informal sector.

Tremendous ambiguities are created by the social transitions, which are themselves an obstacle, such as the ambiguities concerning land tenure in a situation where shortening fallow cycles and increased potential capital value for land are themselves an obstacle to improved natural resources management.

"Uncentralization." It's important to remember that there was a centralization process that took place 30 or 40 years ago. As we talk about decentralization, I think there is sometimes a tendency to assume that the same institutional structures that were appropriated or expropriated sometime back, can be given back the authority that they once had. We are talking about a process of uncentralizing state power, at least for various levels and that process is unlikely to find stable

institutions at the local level until the larger structural transformations that we have discussed have played out.

Political instability. Anyone who has visited the Sahel recently, particularly since 1989, knows that there is a time bomb of frustrated hopes. As has been seen in so many African countries, political instability may well be the greatest threat to development and the environment. The list of unstable countries includes Somalia, Ethiopia, Togo, and Sudan.

The frustration has initially been aimed at centralized state power and one party systems. But with progress in democratization, the spurt of euphoria at political success quickly gives way to deeper alienation as things fail to improve, even with the new government. We have seen this with government after government. The expectations of a new government cannot easily be realized because the underlying economic trends that are driving resource degradation and economic stagnation are not changing. The net result is that the political honeymoons of new political powers are getting shorter and shorter.

The move towards democratization is one of the most positive trends in recent years. But I think we should be honest that there is a lot of danger during this period and that we need to keep focused on the underlying questions to prevent the time bomb from going off.

Piecemeal development programs. When we talk about government in the Sahel, it's important to understand exactly what we mean, no matter how painful. The basic structure of Sahelian states cannot exist without donor support. It's as simple as that. Yet no donor takes responsibility for programming development *per se*. Each programs its projectized piece of the pie. Governments are often too preoccupied with the maintenance of power and too dependent on donor funding cycles and specialists to make long-term development choices either. No individual donor views itself as responsible for development. Governments are driven by donor money to the tune of more than 95 percent.

For all practical purposes, donor money is the development budget. There is a limited ability to articulate and carry out a coherent development strategy on which the already slim hopes for development rest. We can be optimistic or we can be pessimistic. I don't think there is a person in this room who doesn't believe that it's going to be a struggle, and if that struggle is not done well, then we give up before we start.

Administrative burden. There is an enormous number of individual donor projects, each with its own design documents, approval procedures, funding sources, technical assistance, accounting systems, life spans, equipment specifications, a counterpart and support system agreement, extension approaches and messages—on and on.

I recently reviewed a list of projects in Niger. One *arrondissement* (subsector) had nearly 200 donor and NGO projects. I just gave up and went on. There was

some pride in the number of projects, and somebody had given them a computer to track all of the projects. I don't mean to suggest that it's bad to have 100 flowers blooming, but there is a flip side to it as well.

Attention to root causes as well as immediate needs. I don't want to end on a pessimistic note, and so I will talk about some rays of hope in A.I.D., World Bank and other natural resources programs throughout Africa. Increasing attention is being given to the need for policy change around consistent—and I stress the word consistent—environmental and development strategies. Some programs are recognizing that in addition to protecting endangered resources in the short run, you must also address the causes of resource degradation to protect resources in the long run. Hence—and I didn't come up with these names—Madagascar has the KEAPEM Program for policy reform, to go with the SAVEM Program, which protects biological resources.

Governments need to respond to structural change by making basic reforms in public policies affecting resource use incentives. Donor support in this basically provides the transitional funding, which gives the cushion and the incentive for the government to incur the costs that will eventually generate revenues to make it sustainable. But the government can't get there from here because in the short run they will have to spend some money.

Again, this is not necessarily to suggest that this or similar programs address all the issues raised in this presentation. What they do accomplish is to provide coordinated long-term support that focuses on public policies to manage structural change. If this is not the answer, that's less relevant for my purposes here than the idea that donors have gotten together and that there is a consistent, coherent policy and not simply a maze of projects. I think this is a hopeful sign, and one that hopefully will become a trend.

Reconciliation of local and international environmental goals. Concern about the environment in the Sahel has two dimensions. First is the degradation of the productive base of capital for agricultural and livestock production. Concern about that goes back to the 1930s. Secondly, concern for international environmental reasons has arisen more recently. As the percentage of money devoted to environmental protection in the Sahel increases, it becomes urgent to reconcile these two goals because the implications of the second are not immediately obvious in the Sahelian context.

Adapt strategies to field realities. To sum up, the Sahel is in the long-term process of structural change in which the underlying trends may be inevitable. Public policy can influence them and, more importantly, their consequences. If these are the long-term trends, it is important to do something that fits their direction. You can redirect a river by using the power of its own flow, but you can't simply pick up the river and move it somewhere else because that's where you want it to be.

Successful strategies must take account of these underlying trends. Now it would be simplistic to say that we know what to do about managing this change because the fact is, we don't. The point of this analysis is precisely not to be prescriptive, but to test this approach against field realities. That's something that we are planning to do over the next few months in Mali and Niger. Our hope is that our approach will be more important than any specific conclusions that I have presented here and that a clearer strategy will emerge from the country studies. From this, governments can establish a better balanced set of priorities that understand urban and rural linkages and develop a more focused allocation of resources in the near-term.

DISCUSSION

► FATHY SALEH: *Environmentally Benign Technologies*

It looks as if Africa is facing very minor environmental challenges compared to the United States. Deforestation and loss of soil don't compare to the Love Canal, Three Mile Island or the air pollution problems of Los Angeles, and I can name many other examples.

I think the problem here is what we should do if the four-point program that Paul Harrison presented does not work in controlling the population. I liked Gayl Ness' statement that it's not the population growth, it is a need to introduce technology. The question is what kind of technology are we going to introduce that will be environmentally friendly and able to be adapted by local people?

Tradeoff between reduced fertility and increased pollution. There was some mention of urbanization of some parts of Africa as a means of controlling population growth. Urbanization generates air pollution problems, discharge of industrial waste, and other more challenging environmental problems. As an alternative, perhaps we can increase the productivity of the land by using environmentally friendly technologies like hydroponics. There are so many examples where you can use local natural resources to solve environment problems or to increase productivity. For instance, in a project in Rwanda, we used extracts from marigold for vector control and bean preservation instead of using excessive pesticides and other chemicals.

To me the challenge is to identify appropriate technology in order to avoid creating the same problems we have in this country in Africa, which in my opinion has a very clean environment at this point. I would like to hear the opinion of the panel members on this.

► PAUL HARRISON: *Systems to Identify Appropriate Technologies Needed*

High-quality, multifaceted programs will reduce fertility. What do we do if the four-point program doesn't work? Basically, we know that every element of those four points reduces fertility. If you do all of them, the chances of it not

reducing fertility are almost zero I would think. I don't see any way that the program can't work if it's done properly and sensitively. But you can't just blunder in and scatter contraceptives everywhere as has been done in previous times.

Participatory systems design. Even if fertility reduction efforts are successful, the population will continue to grow considerably, so we will need technological change as well. I don't think we can specify in advance exactly what those changes are going to be. It is more important to design systems with farmer participation to identify the proper technologies, taking farming situations into account.

Environmental problems differ according to development stage. Development does replace one set of environmental problems with another set. I don't actually agree that air pollution is more serious than soil erosion, falling water tables, or deforestation that requires women to walk four hours a day to get fuel. Whenever we find one solution, we find another problem developing, and perhaps we'll never get to the end of that process. It's a continual process of adaptation, and that's life.

► GAYL NESS: *New Technologies and Dissemination Organizations Needed*

More research and development. I think you're quite right. We need a new technology. We cannot go back. And we need much more attention to research and development on the broad range of technology and on the kinds of organizations that work to make that technology available.

Every new technology we invent is going to have some problems. Remember CFCs? They were marvelous until we found out that they do something bad in the stratosphere. Remember the automobile? It came in as a very environmentally clean mode of transportation. Think what New York would be like today if it had the same ratio of horses to people that it had in 1870? The automobile cleaned up flies, horse manure, and so on. Some years later we discovered it had some problems, first with the lead in the gasoline, but we found ways to get the lead out.

We still have problems. We need constant research and development on this technology, with a whole series of development organizations to move that technology.

Global community. We need to develop a new type of community, a global community. If you think that's easy, look what's happening in Yugoslavia. The world is full of ethnic communities that promote the idea that they are separate and better than the others. Sometimes that betterness extends to the point that those others are not even human, and therefore you can kill them. For 2,500 years we've been developing world religions that try to say we are all one community, and we've still got a long way to go.

► ASIF SHAIKH: *Markets Affect Technology Adoption and Use*

I think the issue of technology is going to be very much driven by the issue of markets and economics, particularly in the agricultural transformation. In 1989 we had a regional workshop in Mali to discuss the natural resources agenda. The donors and representatives of host country governments were all talking about big theories. Meanwhile the farmers were saying, "Can you get us somebody to help us market our stuff in Abidjan? Don't worry about the technology, we can figure it out. Get us the markets and the transportation systems." So there is sometimes a disjunction between what we see and what farmers see.

I suspect that the technologies are out there. They will not necessarily be clean technologies. And if environmental technologies don't make sense, they won't be adopted. So in fact it has to be the dynamics of the system.

Now you can influence it this way or that, but I'm not even all that worried if we don't wind up having perfect technologies the first time around. After all, the Model T Ford was not a Ferrari. You can debate which one is better. Activating the market systems—the producers and salespeople—allowed for innovation in the technology itself. But until you have that system, the technology doesn't exist in a consumer sense.

► MARTIN HANRATTY: *Focus on Entire Market System*

It seems to me that for years and years we continue to design projects that focus on either the technology needed at the farm, or the technology needed between the farm and the processing plant, or the technology to move the processed product to market, or the market in the urban area. We never take a look at the full system and bring in each of the components that make up the demand structure for that technology at the farm level. We don't say, "We're going to do a systems concept here. We're going to begin working across the board at different constraints in this system." Over a period of time, we could build in change in different areas and then make the system more efficient.

► DIRCK STRYKER: *Should We Raise Crop Yields or Promote Migration?*

Asif has pointed out the magnitude of the problem. It is an enormous problem that will totally swamp current resource allocations for development in Africa as well as the amounts likely to be allocated over the next several decades. Asif has talked about the Sahel, but I think the same thing applies in much of the rest of Africa. Some very hard choices are going to have to be made, and it's really incumbent upon people in this room to help to decide where those choices should be made.

Let me give one set of examples. With the population growth projected, enormous changes in rural production are going to have to take place. I'm not even saying necessarily food production, but some form of rural production, as long as half of these people are going to live on the land. What the other half living in

urban areas will do is a separate question. But of the people who are going to live on the land, where are they going to live? There are two possibilities:

- 1. The intensive margin**, in which they build up relatively high-yielding systems with fairly good access to transportation. Irrigation is a possibility. But other problems such as land tenure are associated with this approach, and not all areas are suitable to it.
- 2. The extensive margin**, in which they move to new areas. We generally have a presumption that the extensive margin is somehow biologically more fragile. Perhaps it is, but I don't think that is always the case. For instance, I know something about rangeland management, having worked with a livestock project in Niger for five years. There the annual grasses found in the more northern, drier regions, which are grazed only during the rainy season, tend to be relatively more robust and less sensitive to environmental damage than the perennials in the higher rainfall areas. If the rain comes, the seeds are usually there, and the annuals come up. Now this suggests that people moving out onto the extensive rangeland in the northern areas where the annual grasses prevail are not a major problem. But on the other hand, only so many people can be absorbed there. So this is not a solution either because there simply is not sufficient biomass created, nor is there any foreseeable technology for profitably increasing the biomass so that the area could absorb more people. People are going to have to move out of, not into, these areas as population grows.

Impact of development on population density. It's important to look at what occurs as far as extensive versus intensive systems of production are concerned in the process of development. If you compare the pastoral zone in West Africa with similar arid or semi-arid areas in Australia and the United States, the first thing that strikes you is there are a lot fewer people in West Africa than in Australia and the United States. In other words, wealthier countries don't exploit those lands with the same degree of intensity, at least as far as people are concerned, as do poorer countries. The reason is obvious. As people's incomes rise, they have to move off of those lands. If their income opportunities outside of living off the land increase, they are going to move somewhere else. They can't possibly earn what they would need to in order to stay on the land. What this says is that the extensive margins may not necessarily be those most susceptible to environmental damage—maybe in some areas, but not in others. We need a lot more very specific information and knowledge.

Limited numbers can be absorbed. It's highly unlikely, therefore, that increased population is going to be absorbed on the extensive margin, for the simple reason that these areas cannot absorb it. The necessary technology does not exist, and I don't believe it's going to come along. Instead, we'll probably see the reverse—people withdrawing from these areas. What does this mean in terms of

the kinds of decisions that we want to make? Do we want to build roads into those areas? Do we want to try to put a lot of emphasis on agricultural research to design technologies for those areas? Or should we put more emphasis on relatively more productive intensive-margin, higher-rainfall areas (dealing with problems of disease, for instance) that over the long run are likely to yield a much higher return than investment in the extensive areas?

I don't know the answer to this question, though my feeling is it's probably more on the intensive side. But I certainly think that this group should be considering questions of this nature. These are high-priority questions, particularly given the major problems that we're going to be confronted with, and the very meager resources that are going to be available relative to the magnitude of the problems.

► WILLIAM WEBER: *Significance of Wildlife Losses Varies*

We've been talking about forests in a generic sense. Not all forests are equal. The data on deforestation combine everything from very sparsely wooded, semi-arid lands, to savanna woodlands, all the way to dense forests, and then rainforests. Regarding environmental impact, I agree that some of the more sparsely wooded areas are more robust ecologically. However, deforestation also has an impact on wildlife habitat and hence has a huge impact on biological diversity.

Deforestation does not necessarily cause wildlife losses. It depends on what you lose. One of the reasons we got away with such massive devastation in North America is that we have a very low diversity ecosystem in general. Even though we did a very good job of wiping out 90 percent of the forests, most of the species were still left. So when we lose certain kinds of African habitats, we may not be losing that much in terms of overall biodiversity.

Similarly, not all wildlife are equal. Westchester County, where I live, has lots of wildlife. We have deer, raccoons and squirrels, and they are everywhere. If Africa is reduced to the same level of diversity, we will have lost something extremely important. When we talk about forests, it is important to ask whether we are maintaining the diverse ecosystems that have evolved in those areas and that have maintained the human populations in Africa over a long time.

Synthesis: Population/Environmental Linkages

POPULATION IMPACT ON RESOURCE USE AND DEGRADATION

Everything that humans do has an impact on the environment; this impact is mediated by technology and social organization. Population growth affects resource use and degradation not only by increasing the number of consumers but also by raising population density.

In many parts of Africa, population densities have increased beyond the level that can be supported by traditional agricultural production techniques, leading to

soil degradation, deforestation, and loss of pastureland. Sub-Saharan Africa lost millions of hectares of forests and pastureland during the 1970s and 1980s, mainly due to population increases. Areas with high population density have lost wildlife habitat; some species are threatened with extinction.

Population growth is not necessarily linked with soil erosion in all settings. Rising population density may lead to technological and economic changes that cause investments to be made to protect soils. Population increases have been linked to increased fertilizer use and carbon dioxide emissions.

CARRYING CAPACITY

Already, Africa's population density relative to arable land is relatively high, since nearly half its land is too dry for agriculture, and large amounts are dense forests concentrated in Central and Southern Africa. Shifting large numbers of people to underpopulated areas of the continent is not feasible as a means of alleviating population pressures, given the practical problems of clearing forests, eradicating endemic diseases, and overcoming ethnic, cultural and political obstacles.

If their populations grow as projected, many African countries will no longer be self-sufficient in food production. By the year 2000, 29 African countries will be unable to feed themselves from their lands using low inputs, according to an FAO study.

Population growth will greatly exacerbate problems of water scarcity. By the year 2025, 21 countries, representing more than two-thirds of the region's population, will face acute water scarcity.

IMPACT OF POPULATION INTERVENTIONS ON ENVIRONMENTAL QUALITY

While much more research on population/environment linkages is needed, it is clear that the two sectors are strongly linked. Sufficient information is available to justify concerted actions to address both population and environmental issues.

Programs designed to slow population growth or influence population distribution can prevent environmental degradation from becoming worse than it might otherwise have been. They can also affect long-term demand for natural resources and allow governments more time in which to introduce new technologies. Nevertheless, it should be recognized that it may take 15-20 years before the impact of fertility reduction programs is visible as smaller cohorts move into the labor force and establish households. Because the next generation of parents is already born, population programs cannot dramatically alter the projected population increases within the next 30 years. However, it is still important to make a considerable effort to reduce fertility because the timing of the fertility decline makes a major difference in the overall size of Africa's population.

At the same time, interventions to promote sustainable development and protect the environment should not be neglected. In the short term, changes in technology offer more immediate payoffs in influencing resource use and protecting natural areas, compared with population programs.

FERTILITY REDUCTION POLICIES AND PROGRAMS

Government policies regarding population have undergone a major change over the past four decades. Most countries have shifted from pronatalist to anti-natalist policies with the explicit goal of reducing population growth. These policies emerged partly in response to census and survey findings showing rapid population growth. This policy change illustrates the value of monitoring environmental signals and educating both policy-makers and the general public on their significance.

According to Paul Harrison, governments should adopt a four-pronged program to reduce fertility: expand women's education, raise women's status, improve maternal and child health, and extend family planning services.

In addition, the trend toward urbanization may help to reduce fertility. Nevertheless, a policy to encourage urban migration, or even laissez-faire neglect of rural areas, is not necessarily desirable from an environmental perspective. Urban people may have smaller families, but they also use more resources and generate more pollution. In any event, there is little evidence that efforts to discourage urban migration and to make rural areas more viable have much effect on migration streams.

Integrating population and environmental programs can be justified at the service delivery level if local implementers work out the details. Administrative integration only creates another bureaucratic layer.

ADAPTING TO POPULATION GROWTH

To manage a world population of 10 billion or more people will take a different kind of technology and organization than exist today. Our bureaucratic urban industrial society, run on fossil fuel, will have to change. The role of technology will be critical in making this adaptation. New systems to develop and disseminate new technologies are needed.

Since significant increases in population seem unavoidable over the next few decades, governments must develop strategies for coping with these increases. Governments need to be thinking about food supplies, employment, housing, and other human needs now. Policies affecting population distribution patterns and human settlements need careful review in the larger context of resource use, economic growth, and long-term sustainability.

Rapid urbanization poses special problems for sub-Saharan Africa. Within 30 years, at least half of the region's population will live in urban areas. Governments will need to make choices in allocating resources between urban and rural areas. These choices have far-reaching political and economic consequences.

In regard to rural development, investing in intensive cultivation versus supporting resettlement schemes will also entail difficult choices. Promoting high-yielding agricultural systems could accelerate soil degradation and fertilizer runoff and cause conflicts over land tenure. On the other hand, the number of people that can be absorbed in less densely settled areas is limited, and marginal areas could become seriously degraded. In all areas, low-cost soil conservation measures will be needed to raise food production and protect farmland.

CASE STUDIES

QUESTIONS POSED TO THE PANELISTS

1. What are the population/environmental linkages at the household and local community levels? Does population pressure always have a negative effect?
 2. What strategies can communities use to adapt to rapid population growth?
 3. Have communities successfully combined population and environmental programs? What were the major factors that contributed to their effectiveness?
 4. Do villagers and community leaders perceive population and environmental issues as related phenomena?
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MODERATOR: Myron Golden, *Director, Coastal and Central West African Affairs, USAID Africa Bureau*

Ecosystems: Protecting Natural Areas in Kenya and Zimbabwe

PATRICIA WAAK

Director of the Population Program, National Audubon Society

The National Audubon Society has been involved in population issues for more than two decades. In 1970, Frances Breed, the first director of Audubon's Population Program, went to the Stockholm environmental conference to lobby for inclusion of population issues into the environmental agenda. Since that time our major focus has included public education, coalition-building and outreach.

Guiding principles. In 1988 we began the precursor study to the Sharing the Earth Project, which was built around five principles:

1. An ecological interdependence between human beings and other species on this planet must be recognized.
2. Those species often are a harbinger of the health of the total system, and their wellbeing will tell us in many instances what human chances are for survival.

3. Unlike some wildlife biologists, we do not accept the concept of demographic winter—that humans will so overwhelm the earth, there will be no room for other species of life—because we do not believe that such an environment is good for humans or wildlife.
4. There is a point of integration among these issues at all levels.
5. To accomplish this, a balance between humans and wildlife, there is going to have to be an ownership of resources at the household or community level, as well as the national level.

In the original population, wildlife, and environment study, we started out with our own resource, namely Audubon's 100 wildlife sanctuaries in the United States.

Audubon has been involved in wildlife protection for more than 100 years; it was the model for the national refuge system in the United States. Many of Audubon's sanctuaries have an on-site manager. For 30 years, these managers worked inside those areas to keep people out. Then one day they realized that if they were going to save critical habitat, they were going to have to involve the people who were on the outside.

Selection of case study areas. For our study, we picked the eight Audubon wildlife sanctuaries that were most heavily affected by human activity, either numbers or consumption of the resource itself. These eight sanctuaries were matched with areas in developing countries having similar species and similar wetland, woodland and forest habitats. The areas selected for case studies all contained water fowl, which is Audubon's traditional focus. We undertook the studies as partnerships. We recognized that we didn't have all the answers and that almost all of our sanctuaries are threatened in one way or the other. Copies of the book on the various case studies, entitled *Sharing the Earth*, are available.

Major findings. The study had three basic findings:

1. Wildlife managers and conservationists share common problems throughout the world, despite their differences in geography, economy and culture. They have much to learn from each other.
2. Natural areas are being degraded worldwide, and most of the habitat loss is related to human population pressures through either the sheer numbers of people, or how those numbers use the earth's resources.
3. In many cases, human technology and consumption have led to more rapid and extensive environmental degradation than have masses of human beings living in poverty. However, the nature of the damage is similar, if not identical.

ZIMBABWE'S MAPEMBE MOUNTAIN

We identified Zimbabwe as a case study site because people there were interested in connecting population and conservation policies. Audubon exchanged biologists from South Carolina and Zimbabwe to look at wetland systems. But interest in something totally different changed the case study to Mapembe Mountain, which is in the Odzi Intensive Conservation Area. The mountain is located in Manicaland Province, close to the Mozambique border. Its 850-hectare area consists of a partially vegetated granite dome that rises to about 5,000 feet above sea level. The area contains woodland and brush savanna, riverine and wetland areas, and two reservoir lakes.

This particular mountain is not much different ecologically from other mountains in the area, but it was being protected by the local Marange people because of its cultural and spiritual history. The Marange preserve the area for cultural and spiritual reasons and regard to mountain as a "sacred place." Mapembe Mountain is on communal land. Like many other communal lands in Zimbabwe, there is overgrazing, row cropping, deforestation, stream siltation, and wildlife habitat destruction. The Zimbabwe government is resettling people on communal lands, which are becoming extremely over-intensified.

Settlers disregarding traditional customs. The government has permitted non-Maranges to resettle near the mountain. They are violating the local customs and rules that the Marange have set up. Consequently, the Marange have joined with local white farmers in requesting the government to make the mountain a protected area.

Education and legal enforcement. With government assistance, the Marange have embarked on a major program to educate people about the benefits of smaller families and the need for conservation in that particular area. They are also working on enforcing local groups' ability to use the laws in place for protection.

The Marange feel that the land can only be protected through governmental laws, local education, and local enforcement of existing laws. They have not lost sight of the fact that family size has some effect on numbers of people, although they have not necessarily made the connection that family planning services need to be increased in the area.

KENYA'S LAKE NAKURU

In Kenya, we chose to work with Lake Nakuru National Park, which Roger Tory Peterson, the great ornithologist, describes as "the wildlife spectacle of the world." The park covers 40,000 acres of the Great Rift Valley. Lake Nakuru itself is about 10,000 acres. It is highly alkaline because it has no outlet except evaporation. The algae that grow in this alkaline system support one million flamingos living there on a regular basis. The lake's catchment area is about 450,000 acres. It is a

huge wildlife area. Because it is fenced off, it's a refuge for Black rhinos, Rothschild giraffes, and other endangered species.

Increasing population density. Fifty years ago this area was heavily forested and sparsely inhabited, mainly by pastoralists. Some people settled there during British colonization, but the impact on the land was slight. However, after independence, large ranches were set up by cooperatives and subdivided for large-scale settlement of landless Kenyans.

The basic plot size now is two acres. The people themselves are coming to a realization that they need smaller families because the plots are diminishing in size as they are subdivided repeatedly among the children of succeeding generations.

Resource degradation. Requirements for fuelwood, grazing and cropland have caused massive deforestation, scarification and erosion. The deforestation and poorly planned small-scale agriculture in the watershed have reduced and degraded the stream flow into the lake.

Pressures from agriculture and urban expansion. Lake Nakuru had very similar problems to the comparison site, Corkscrew Swamp Sanctuary in Florida. In both places, agriculture is impinging on the watershed, and neighboring urban areas are expanding rapidly—Naples and Ft. Myers in Florida, and Nakuru, Kenya's fourth largest city. In both areas, neighboring cities are growing by about 7-10 percent annually. In Nakuru, rapid population growth is caused largely by its high birth rate, while in Florida it is caused by in-migration from people seeking a warmer climate. About 1,000 people a day move into Florida.

Community education. Lake Nakuru's environmental center, which was established under a World Wildlife Fund project, is working within this densely populated farming area. It teaches conservation and tree care and educates children to be involved in the area's restoration and protection. A university study on land and water use is also underway.

When it was established in 1961, Lake Nakuru National Park included about two-thirds of the lake; in 1968 some shoreline was added. In the 1970s, the park area quadrupled in size as a result of a fundraising drive among children in Europe.

Meeting immediate needs. Today, Lake Nakuru Park has to cope with immediate problems involving basic human survival, such as soil erosion and fuelwood supply. They must also institute a comprehensive growth plan. Until now, they have not had a family planning program. With growing realization of the impact of large families on the area, they are adding that component.

STUDY RESULTS

Two key findings emerged from our studies:

1. **Technical partnerships** are important, and I stress partnerships. We did not assume that we had all the knowledge, and our partners were very helpful in pointing out things that we didn't see because we were too close to our own particular situation.
2. **Community involvement** is very important, whether it's children raising money to expand a park or people educating others.

We are doing two follow-on studies, which are in the second of their three-year term.

The need for protected areas. As a result of this project, we have shown that ecologically sensitive systems can only be protected if population growth in the surrounding area is stabilized and human impacts on non-renewable resources are reduced. We must also recognize that there are biologically sensitive areas that can never be inhabited. That's where the basic biodiversity is. If nothing else, protected areas can become a remnant that people from crowded areas can use for recreation. Governments must continue to establish zones that are legally protected and promote economic development systems that are not dependent on people destroying a biologically sensitive area. Through an understanding of the importance and a sense of ownership of the local people, we must create their involvement in protecting that particular area.

Bringing integration to the household level. Integrated approaches are essential. We need to exchange information and work together. The most innovative solutions to the problems we face are going to come from local communities. We must enable and encourage the enterprise of citizens, who in their own households will combine family planning, health, income generation, conservation and women's participation in education. In the end, this integrated approach will probably make the greatest contribution of all. In our film entitled "Finding the Balance," a woman from a housing project in Costa Rica says, "We want to tell the government and the politicians that the answers to these problems lie here in the local experience."

Agricultural Transformation in Kenya and Nigeria

MICHAEL MORTIMORE

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This is where the good news starts, and if what I say appears to controvert a great deal of what has been said already, this is not an accident, and I hope it will stir up a little bit of debate. I will discuss two case studies, one in Machakos, Kenya, and the other in Kano in northern Nigeria.

MACHAKOS, KENYA

Widespread devastation in the 1930s. I want to begin by entertaining you with a quotation from the British colonial literature on Kenya, dated 1937:

The Machakos Reserve is an appalling example of a large area of land which has been subjected to uncoordinated and practically uncontrolled development by natives, whose multiplication and the increase of whose stock has been permitted free from the checks of war and largely from those of disease under benevolent British rule. . . Every phase of misuse of land is vividly and poignantly displaced in this reserve, the inhabitants of which are rapidly drifting to a state of hopeless and miserable poverty, and their land to a parching desert of rocks, stones and sand.

Productivity restored (a set of photographs in matching pairs, 1937 and 1990). A photograph, taken in 1937 by a soil engineer writing a report on erosion in Machakos district shows a largely deforested landscape, with a lot of bare soil and patchy shifting cultivation on the slopes. In 1990, this area has a very carefully terraced landscape, covered with fruit trees and scattered farms; the vegetation has noticeably increased, as well as its productivity.

Another slope photographed in 1937 shows active gully erosion, grassland, and a few early attempts at stabilization with hedgerows. In 1990, the same slope shows a very dramatically changed appearance. The only similarities remaining are one or two small patches of open grazing.

In 1937, observers believed that the topsoil in this area had been irretrievably washed and the productivity irretrievably damaged. In 1990, the same slope has largely been converted into very carefully terraced farms, leaving patches of grazing, which are not very much different from the way they looked before.

Huge areas of so-called marginal land have been transformed into productive farmland. At closer range, we can see the change on a particular slope—extremely steep land. In 1937, the slope had a few trees, dating back to the early attempt to reforest the district in the 1930s. In 1990, it's been converted into a productive farming landscape. These changes have been made by family labor. That's the Machakos story summarized in a few photographs.

Dry climate. Machakos district is semi-arid, with two short rainy seasons. The northwest section is fairly close to Nairobi, but the southeast portion stretches a long way from Nairobi. Our study included five areas of the district.

Rapid population growth. In 1948, most areas of the district had population densities under 100 people per square kilometer. By 1979, population density had more than doubled, with some areas having more than 400 people per square kilometer. The district's population growth rate peaked between 1969 and 1979 at 3.76 percent annually.

Increased food production. Food production rose from less than 0.4 tons per capita in 1930 to nearly 1.2 tons per capita in 1987, converting the output into maize equivalent at 1957 prices. Similarly, food production per square kilometer of farmland was about five times greater in 1987 than it was in 1930. Cash crops, particularly coffee, make up much of the increase during the 1970s and 1980s. This is a system that has managed to produce income for its inhabitants on a consistent basis and has even improved over a relatively long period of time.

Increase in farmland. Land use change—the conversion of grassland and woodland to arable land—is the most obvious measure of the impact of a growing population density. The five study areas, which have highly variable ecological characteristics, all had large increases in the percentage of their land under cultivation between 1948 and 1978. (Comparable data for more recent years are not available because air photography was discontinued.) Even more significant, 100 percent of the cultivated areas have been terraced during that period. The only exception to this trend was the driest and most recently settled area.

Erosion control. This achievement in rural capitalization is controversial. In the 1940s and 1950s, the colonial government put enormous pressure on the Akamba farmers to conserve their soil by terracing. This pressure had a large impact, but it was somewhat temporary. When coercion was removed shortly before independence, much of the terracing fell into disrepair. Then efforts began again, usually as a result of objective observations by farmers who saw that the terraces were producing higher yields. They voluntarily invested private capital on terrace systems on their own private farms. As a result, the terraced fields have little soil erosion; grazing lands are generating most of the soil erosion.

Today, erosion is largely under control on the arable land which is terraced. The grazing land is only now beginning to come under more careful management as its value increases.

Tree production. The production of trees is another important component of the farming system. Several estimates of the wooded vegetation in Machakos district produced doomsday scenarios, particularly in relation to fuelwood production. Consumption was always estimated to be running ahead of production. For

example, in 1958 it was estimated that 2,000 hectares of plantations would be needed to meet fuelwood demand. In 1980 this estimate was multiplied by 10 to 20,000 hectares. The projection for 2000 rose to 226,000 hectares, clearly a posterous undertaking for the forestry department to implement.

Yet a blind eye was turned to tree protection, tree planting and tree management on farmlands. It was always assumed that fuelwood would have to be collected from the bush, but a large amount of it comes from trimming hedgerows and farm trees.

More important still, farm trees produce income from fruit. Women, in particular, plant such trees. Data from some farms show not only that high densities of economic trees on farms are maintained, but also that the highest densities are on the smallest farms.

It's fairly clear that private forestry works. A recent survey using a different technique of land use in the district estimated that hedgerows and field dividers alone—that includes terraced banks—constitute 1 percent of the district. Now 1 percent of the district is also the area maintained under forestry reserves and plantations after 60 years of forestry department activity. So we can contrast the impact of private capital by small holders with the efforts of government over a long period of time.

Growth in farm labor and markets is key. From our Machakos study, we conclude that rapid population growth can be fully compatible with improving output, productivity and incomes in the longer term, as well as land conserving and improving investments leading towards more sustainable resource management. The driving forces in this process have been the growth of the labor force on the farms and the growth of the market, both for products of the agricultural system and also for labor. Labor diversification has generated not only employment, but also capital for farm investment.

KANO, NIGERIA

Is Machakos unique? Can it be dismissed as an aberration, perhaps having received more than its share of colonial investment back in the 1950s or EEC investment in the 1970s? I want to take you very quickly to West Africa to look at the Kano Close-Settled Zone in northern Nigeria.

This zone's farming system has enjoyed some notoriety for a long time. In 1851 the explorer Henry Barth said, "We must remember that the province [Kano] is one of the most fertile spots on the earth, and is able to produce not only the supply of corn necessary for its population, but can also export. And that it possesses besides, the finest pasture grounds." This is quite different from the colonial interpretation of Machakos, but I suggest that there are points in common.

Declining rainfall. The Kano Close-Settled Zone is another dry place. In the last three decades, the rainfall has actually fallen quite substantially. During this century, population density progressively increased. (This data series terminates in

1962 because of the well-known unfortunate history of census-taking in Nigeria. As soon as I can lay hands on the 1989 census, I shall correct it.)

Stable land use. Land use change differs greatly from Machakos. Land use distribution has remained stable, with cultivated land occupying 80-85 percent of the total area consistently from the 1960s to the 1980s. Clearly, it can't go any higher, and it's not going to come down.

This is not a highly dynamic situation like Machakos. Its stability is of interest because, given permanent cultivation on such soils in such rainfall conditions, should not the soil nutrients and physical properties be showing signs of collapse? These soils are cultivated every year without fail.

Soil quality. Our study of soil chemical nutrients from 1977 to 1990 failed to produce evidence of statistically significant change, except for potassium, which may be due to a data error. The soil samples were indicative, not of degradation, but of stable management.

With regard to the physical properties of the soil, a very similar picture emerges. Particularly significant here is the fact that the silt and clay fraction of these soils on which so much crop production depends is quite stable over a period of 13 years. This is a very rare example of monitoring of soil fertility over time. It may not be conclusive, but it is an indication.

Tree production. The second element of the farming system that we can monitor chronologically is the farm tree population. Between 1972 and 1981 the density of trees didn't change, except in one case where it changed for the better. These data do not support allegations that the trees are being chopped down for fuelwood, nor the myth of rings of deforestation around cities. At least, it's mythological as far as Nigeria is concerned. Our data do not support the idea that high population density leads to the disappearance of trees.

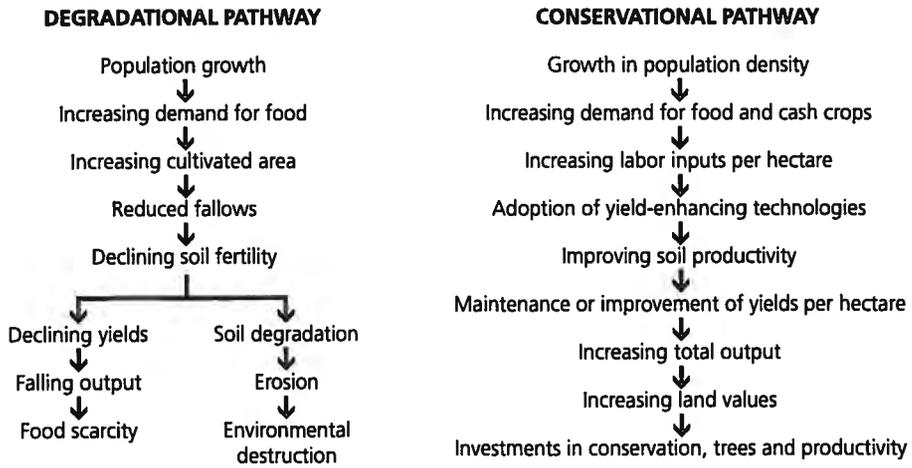
IMPLICATIONS FOR AGRICULTURAL PRODUCTION

To generalize a little from this experience, there are two optional courses for farming systems over time:

- 1. The degradational pathway**, which is being discussed almost ad nauseam in the literature about tropical degradation.
- 2. The conservationary pathway**, in which the growth in population density and market developments may lead to improvements in productivity and conservation (see Figure 7).

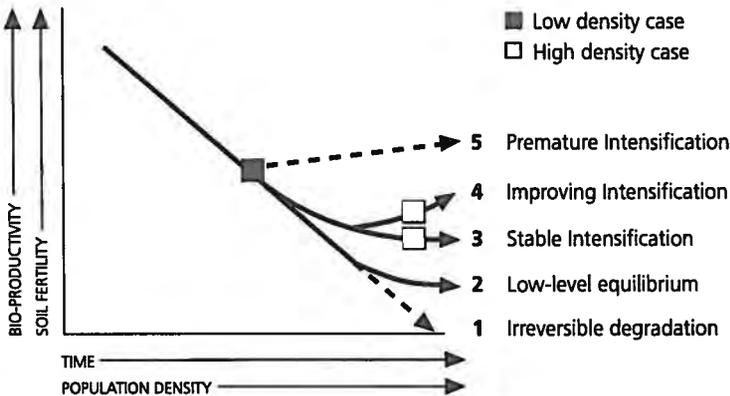
Under what circumstances may a farming system move from one pathway to the other? I think one must look at this in historical terms. This is where I feel that we must take heed of the sharp disagreements between cases that have been reported at this meeting and generally in the literature.

FIGURE 7. Degradational Pathway



Intensification holds various possibilities. If a farming system evolves over time under conditions of growing population density, we may expect to see evidence of declining fertility or biological productivity, until a point is reached where a transition occurs to an intensification trajectory (see Figure 8). As the need for intensification becomes evident, there are five possible directions:

FIGURE 8. Alternative Paths to Agricultural Intensification



- 1. Irreversible degradation.** Although it's a favorite expression in the literature, I doubt if it actually happens much.
- 2. Low-level equilibrium.** This level means bumping along like the famous field at Rothamstead, with its wheat crops for over 100 years.
- 3. Stable intensification.** Yields are maintained at a higher level by inputs.
- 4. Improving intensification.** Inputs (and yields) are gradually increased, which I believe should be the policy objective of all interventions in such farming systems.
- 5. Premature intensification.** In this situation, the timing for increased inputs is wrong. The factor ratios need to evolve in a favorable direction so that labor-intensive rural capitalization makes sense. For example, pushing terracing in Machakos in the 1950s was premature, although the timing was right later on.

The Kano system is in the third or fourth trajectory.

Room to maneuver. It seems to me that if we conduct the debate about the relationship between population growth and environmental management looking only at population density in relation to soil fertility, our conclusions are predictable. If we take into account the possibilities for intensification, we have a little bit more scope for maneuver.

Adaptive behavior is unpredictable. In conclusion, I would like to emphasize that we are talking about adaptive behavior by independent and technologically most resourceful small landholders. Because we are talking about adaptive behavior, we cannot always predict the outcome.

[The Machakos study was carried out by the Overseas Development Institute in association with scientists from the University of Nairobi, and is reported in Mary Tiffen, Michael Mortimore and Francis Gichuki (in press), *More people, less erosion: environmental recovery in Kenya* (Chichester: John Wiley). The Kano study is summarized in Michael Mortimore (1993), "Northern Nigeria: land transformation under agricultural intensification" in: Carole Jolly and Barbara Torrey (eds.), *Population growth and land use change. Report of a Workshop* (Washington, D.C.: National Academy Press).]

Population Growth, Changing Agricultural Practices and Environmental Degradation in Zaire

DAVID SHAPIRO

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My study looked at linkages between the demographic changes taking place in Zaire, especially overall population growth and increasing urbanization, and corresponding changes in agricultural practices and the environment. Boserup has argued that population growth in the past had a variety of effects on agricultural production techniques, leading to intensified land use and increased agricultural production. However, concerns about rapid population growth and its consequences on fragile African soils have resulted in questioning of the appropriateness of the Boserup hypothesis in current circumstances in sub-Saharan Africa.

Urban food demand. My paper looks at the likely consequences of the changes taking place in Zairian agriculture for food production and the environment. It adds one wrinkle that other people haven't mentioned: pressures to feed Zaire's rapidly increasing urban population, which fall on a rural population that has been growing only relatively slowly in recent years, as well as population growth and increased population density have resulted in changes in agricultural practices. These changes are leading to declining soil fertility and the degradation of the natural resource base. It will not be possible to sustain continued increases in food production under these conditions, in the absence of advances in scientific knowledge and technical innovation. Given present technology, the changes in agricultural practices that have emerged in response to population growth, increased population density, and growth in demand for food production do not appear to be sustainable in the long run.

PRECONDITIONS FOR TECHNOLOGICAL CHANGE

Expansion, then intensified production. Boserup has argued that in response to population growth and increased population density, changes occur in cropping techniques in order to satisfy the higher demand for food. These include, first, expanding the area under cultivation, or land extensification. When that is no longer feasible, intensification takes place in the form of shortening of fallow periods, then increasing labor inputs, and eventually changing the technology used in agricultural production. In addition to population growth, improved access to markets will also contribute to intensified agricultural production.

Typically the land brought under cultivation through extensification is increasingly marginal land—marginal in the sense of either poor quality soil, inadequate rainfall, or steep slopes. Boserup's view is that, once opportunities for extensification have been exhausted, increasing population density will, through the increased scarcity of land, lead to substitution of other factors of production and induce

technological change. She recognizes, however, that the adoption of improved technology as population density increases is by no means an automatic process.

Environmental damage. Indeed, Lele and Stone, based on a review of evidence from half a dozen countries in sub-Saharan Africa, conclude that:

The environmental damage from the reduction of bush fallow, the more intensive use of land without supplementary biological and chemical inputs, and the depletion of forestry resources complicates the transition from low to more densely populated areas as originally envisaged in the Boserup hypothesis.

They also argue that the prospect of beneficial effects of intensification induced by population growth may well be outweighed by the environmental damage caused by declining soil fertility and deforestation.

Shorter fallow periods and deforestation reduce the vegetative cover that retains moisture and protects the soil, thereby increasing the likelihood of soil erosion. In addition, tropical soils often do not have the same capacity for intensified production as do soils in temperate areas.

Changes in land use. Population growth also induces changes in land use that result in changes in the environment, such as deforestation. Dick Bilsborrow has argued that growing populations expanding their agricultural activities onto increasingly marginal lands and up steeper slopes—that is, land extensification—are the major overall proximate cause of the loss of forests. In addition, fuelwood production and consumption contribute to deforestation.

This brief overview of the literature suggests that population growth and increasing population density do lead to changes in agricultural production techniques that may ultimately contribute to adoption of improved technology and significantly higher food production. At the same time, however, there are clearly concerns about the environmental consequences of these changes, especially with respect to soil fertility and forestry resources.

DEMOGRAPHIC CHANGE IN ZAIRE

Looking specifically at Zaire, overall population growth rates during the past 30 years or so have been approximately 3 percent annually. These rates are comparable to those recorded elsewhere in contemporary sub-Saharan Africa.

Rapid urban growth. Since independence in 1960, Zaire's rural population has grown at the relatively modest rate of a little more than 2 percent annually on average. In contrast, its urban population has grown in excess of 5 percent annually. It should be noted though, that the rural growth can be characterized as modest only in relation to urban growth. In particular, rural population growth well above 2 percent per year substantially exceeds the overall rates of population growth in Europe, even at the peak growth rates experienced during the demographic transition.

In recent years, the disparity between rural and urban population growth has widened. For example, from 1975 to 1984, the urban population grew at approximately 7 percent per year, compared to less than 2 percent per year for the rural population. In 1984, the rural population was only about 13 percent larger than it had been in 1970, while the urban population was more than 4 times more numerous, representing in excess of an additional 9 million urban residents. An increasing proportion of Zaire's population consists of urban residents.

Two major densely settled areas. In regard to population density, the principal areas of population concentration are in the eastern Kivu region near Rwanda and Burundi and the southern band area that contains about 40 percent of Zaire's total population and serves as the major food producing area for most of Zaire's urban centers and several major regional centers.

TRENDS IN AGRICULTURAL PRODUCTION

Other things being equal, population growth of 3 percent per year will entail growth in food demand of the same magnitude. In Zaire growth in food demand has been concentrated most heavily in urban areas. Since 1970, more than 80 percent of Zaire's total population growth has been in urban areas. This trend may be changing in response to the current economic crisis, since there is some indication that people are migrating out of the cities, especially Kinshasa, as they find it increasingly difficult to survive.

Numbers of consumers rising more rapidly than producers. Nearly all rural households are involved in food production. However, the slow growth of the rural population over the past two decades means that the number of these producers has increased only very modestly, while the number of consumers has continued to grow steadily.

Increased food production. So there is increasing and persistent pressure on producers to augment food production. Data on food crop production suggest that the agricultural sector has managed to respond to this pressure with increased production. Indeed, the absence of sustained increases in the real price of food in Kinshasa does support the notion that food production has managed to respond to that pressure with increases.

Farmland expanding. At the same time, there are a number of indications that this increased food crop production has been achieved in part through changes in agricultural practices. New land has been brought under cultivation at an increasingly rapid rate. This extensification initially entails clearing of forest land, where soil fertility is greater than on open savanna. In some areas, however, forest land has become increasingly scarce, particularly in much of central Bandundu, the region that is immediately to the east of Kinshasa. The new fields that are being

opened up are found principally in more marginal savanna areas. These fields are typically located at greater distances from villages than older fields.

Changes in agricultural practices. Further, there is considerable evidence that fallow periods are being shortened, so that instead of the long fallow periods of up to 20 years and more that are required to fully restore soil fertility under traditional shifting cultivation techniques, farmers are now frequently resorting to fallow periods of less than 10 years, and sometimes only three years, especially in areas close to urban centers. In the case of Bandundu, this intensification of agriculture undoubtedly was encouraged by the improved access to urban markets following the opening in 1979 of a paved road linking Kinshasa to the region's largest city, Kikwit. The severe drought that occurred in Bas-Zaïre, the region to the west of Kinshasa, in the late 1970s also contributed significantly to the expansion of food production in Bandundu destined for the Kinshasa market.

Other agricultural practices have also changed. Crop rotations have been modified and have become less varied, as farmers increasingly rely on cassava, which does relatively well even in poor soils, but also has very poor nutritional value. Less care goes into field preparation. Less weeding takes place. There is greater variation in planting and harvesting dates, and there have also been increases in plant densities as farmers attempt to sustain and increase production levels.

Louise Fresco, a Dutch professor, did a detailed review of cassava cultural practices in central and southern Bandundu and concluded:

There has been a considerable shift in cassava cultural practices . . . over the last 30 years. A trend seems to be emerging towards reduced fallows, monocropping of cassava at higher plant densities (with limited numbers of intercrops) while ridging [a form of field preparation on savanna fields] and weeding are more neglected than in the past. Cassava is harvested from an earlier date onwards than before and planting dates are adjusted accordingly.

She describes these changes as a breakdown of classical shifting cultivation practices. A number of these practices then are likely ultimately to result in declining yields and environmental degradation.

IMPACT OF CHANGES IN AGRICULTURAL PRACTICES

Deforestation. Bringing new land under cultivation, in conjunction with the severe shortening of fallow periods, contributes to deforestation. During the 1980s, Zaïre lost over 20,000 hectares of open forest—the third largest loss of open forest internationally, behind Brazil and Sudan. Major food production areas in Bandundu and in the Shaba region in the south of the country, which serve Zaïre's principal urban centers, are experiencing a continuing loss of forest. Fuelwood demand has contributed to the emergence of deforested halos, estimated at 150 kilometers, surrounding Kinshasa and Lubumbashi, Zaïre's second largest city, as well as less extensive halos around smaller cities and overcutting of the humid upland forest in densely populated Kivu.

Soil degradation. The replacement of the forest by open savanna that deforestation entails results in an absence of tree cover; that in turn reduces soil fertility. The increased proportion of fields found on more marginal savanna land contributes to reductions in yields, and the longer travel time to those distant fields hinders labor productivity.

The shortening of fallow periods that has taken place also has an adverse impact on agricultural yields because it does not allow sufficient time for nutrients to be returned to the topsoil. Hence, soil fertility declines, and other things being equal, yields will decline as well.

Malnutrition. Less care in field preparation and less frequent weeding, which presumably reflect efforts to economize on labor, as labor is spread across greater land areas, also will diminish yields. In addition, the reduction in the varieties of food crops found in crop rotations and increasing reliance on cassava, which reflects reduced soil fertility, may very well have adverse impacts on the nutritional status of the population.

Sustainability jeopardized. Clearly the long-term prospects for sustainability of current levels of food production are not very good. Future increases in areas under cultivation will be limited because with the slowly growing rural population and current technology, labor is a key constraint on the amount of land being cultivated. This situation could change if urban out-migration continues and persists over time.

Even in the absence of the labor constraint, even if you have more people entering the rural areas, the prognosis is not good because bringing more new land into cultivation and continued shortening of fallow periods would result ultimately in more rapid and very serious degradation of soil and forest resources, with a large adverse impact on yields.

Prospect of declining yields. Until now, the effects of having more land under cultivation have outweighed the tendency toward declining yields so overall production has increased. Eventually, however, the negative effect of declining yields will outweigh the positive effect of increasing area cultivated, particularly since it seems likely that the declines in yields will accelerate, while the increases in areas cultivated will diminish.

Demand likely to outstrip productive capacity. In summary then, current agricultural practices are incompatible in the long run with continued increases in food production to feed growing urban populations. Even if one abstracts from Zaire's present economic crisis, Vernon Ruttan's observation of a few years ago would appear to be very much on the mark as it pertains to Zaire. He said, "The scientific and technology knowledge is not yet available that will enable farmers in most tropical countries to meet the current demand their societies are placing on them or to sustain the increases that are currently being achieved."

DISCUSSION

► MARTIN HANRATTY: *Shifts in Agricultural Technology*

Michael, I'd like to get a sense of the time dimension that you're talking about in Figure 8 because it seems to me that possibly what's going on in Zaire may be at an upper level in that declining system. Secondly, was there a conversion from the type of agricultural technology or cropping systems that they were using back in the 1930s to the cropping systems that we saw? This may tell us that there has to be a change in the cropping system that they use for cassava. Thirdly, if there was a change, what were the major causative factors? I notice the places you chose are very close to large urban centers and I would assume they have very good market links both for outputs as well as inputs.

► MICHAEL MORTIMORE: *Markets a Key Factor*

Changes in Machakos. The Machakos farming system moved from the downward slope through to the upper between 1930 and 1990, which was the period of our study. The crucial transition almost certainly took place in the 1950s and 1960s. There was a change from what was usually described by the colonial agricultural officers as shifting cultivation to permanent cultivation, in which they permanently enclosed the terraced fields. But the crops did not change significantly. In 1930, maize was already the number one cereal, with pigeon pea and various other subsidiaries grown. These still are the major crops.

Changes in Kano. In the Kano case, we may deduce from the little bit of fragmented evidence from colonial records that there was still some fallowing going on at the beginning of the century, but this was a residual and minor part of the system. The cropping system there has not changed significantly, except for the first dramatic increase in groundnuts as a market crop, and then its collapse in the 1970s.

Markets key catalysts. The role of the market is extremely important in both cases. The Nairobi market began to be important for Machakos farmers as early as the 1930s, but it only had significant impact throughout the district from the 1950s and 1960s. Kano, a huge metropolis at the end of the railway, was always a major market for agricultural produce—initially groundnuts for export and nowadays grain. One can't separate the market from the demographic factor. It's totally impossible to do so.

► RICHARD FORD: *Women's Groups a Major Factor in Agricultural Innovations*

Whereas I share your view that marketing and intensification have been the major means to deal with the expansion of population, I have another variable that I think is important to bring land under cultivation. I would welcome your comments. You implied that it was mostly small farmers who built the terraces and contours. My perspective is that it was a series of women's groups, called *mwethya* groups. Occasionally shared with men, these groups are combinations of 20-40 households,

depending on the terrain and the territory. I would argue that the *mwethya* groups have been as important as the other variables that you cited.

▶ MICHAEL MORTIMORE: *Mutual Help Groups*

I omitted reference to *mwethya* groups because of time constraints. They were one of the principal ways that the family labor supply was organized. But they were most effective after the compulsory terracing programs had ended. We were impressed with the importance of the voluntary *mwethya* groups as a means of raising the labor for working on individual farms. Before the 1960s, the government used *mwethya* groups as a substitute for compulsory labor and hence weakened community support for them. During the 1960s, they became better organized and more focused on community and individual needs.

▶ RICHARD FORD: *Relative Influence of Women's Groups*

Would you venture a weight of marketing versus *mwethya* groups?

▶ MICHAEL MORTIMORE: *Dynamics of Labor and Market*

Mwethya was the means of organizing labor, but it's the labor that was the important thing. Today, a lot of terracing and conservation work is being done with hired labor, and the market provides the money to pay the hired labor. Much less communal labor is being done. So the ratio changes over time. We feel, although without any empirical evidence to support it, that the *mwethya* groups' position was much more important earlier than it is now, and that commercial hiring of labor is now the principal source of conservation work.

▶ ASIF SHAIKH: *Development Programs Are Having a Positive Effect*

It is very important to fix on Michael's point. It's not just that things are going wrong. There is a lot that is beginning to work, and this is materially different from what we saw 10, 15 and 20 years ago.

Things are beginning to work at the small farmer level. Technologies, when adapted to meet people's needs, are being adopted at high rates. That's part of the basis of the policy reform movement because we have learned that certain conditions are necessary for these changes.

The Africa Bureau in particular has done a terrific job of analyzing as well as supporting natural resources management work in the field. The Bureau's indicator framework helps to understand the necessary preconditions for behavioral changes. The more we look, the more we see huge changes. Really, our task is to keep that going despite all the other huge problems that we face.

▶ PAUL HARRISON: *Adjustments to Population Pressures*

Adaptation follows worsening conditions. I think there may be some misinterpretation regarding the extent to which I and many others here adhere to

the traditional Malthusian position. Most of us have been saying that there is a process of adaptation to growing population density. Initially, population density creates very severe problems. Adaptations then occur. Subsequently, life can improve. Everything hinges around what happens on the downward part of the slope, where most of Africa is caught at the moment.

The fact that production of food and agriculture per head has declined by an average of 0.7 percent per year over the past 30 years proves that something is not quite working in this process of adaptation, or that most of Africa is on the downward slope and has not yet reached the upward bit.

Downhill trajectory can change. I think the important thing is that we cannot adhere to crude, simple Malthusianism. Things do not continue to go downhill, as if people die of famine and do nothing to respond. People don't cut down every last tree. All the projections of fuelwood trees disappearing are completely wrong because when you reach a certain point, people begin to plant again.

The question is, how far do you go before that point is reached? How many children die of malnutrition and how many famines are there on the downward slope? I think the real question is, can a slowdown of population growth achieved by entirely beneficial means—improved education, mother and child health, women's rights, and access to family planning—make the very challenging task of adaptation easier?

Appropriate technology. Another point to mention about Machakos is the existence of a very appropriate technology. They had developed the bench (*fanya juu*) terraces; this technique is a very cheap, effective, quick way of making terraces, mainly with dry season labor. I think it's critical that the technology was very appropriate and that it actually produced quite significant yield increases. That's why people were so very interested in it. We must try to reproduce these successes throughout Africa. But I personally believe that a slowdown in population growth will make the task easier.

► HENRI NSANJAMA: *Educate People on Implications of Large Families*

Birth prevention widely practiced. Building on Patricia's comment that the people in Nakuru decided they are not going to have big families because of the available resources. In response to my African colleagues who are concerned that development programs in Africa capture their goals, aspirations and expectations, it is important to point out that Africans have continuously practiced family planning. Most women in Africa get married between the ages of 18 and 20. If they didn't practice family planning, they would have 20 or 30 children. Most women come to a point where they say enough is enough, and they find a way to practice some form of family planning.

Need for informed decisions. We need to tell Africans the realities regarding environmental and population trends so that they can make informed decisions regarding family size. Family planning is not new. Every woman is doing it in Africa.

► **PATRICIA WAAK:** *Family Planning Needed to Implement Childbearing Decisions*

I try to remind people that almost every woman in the world wants the same thing: she wants her children to survive, be healthy, and have an education. It's true that women's education and gender equality are very important, but I would like to remind people that clandestine abortion still happens all over the world as women seek to prevent births and cannot obtain family planning services. It's not an either/or situation, that agencies can focus solely on women's status without providing them with methods to control their fertility.

We have to give people the means by which they make good, healthy choices in their own lives. They know what's good for them. It's a question of whether or not they have access to what they need in order to make those choices.

► **WANGA GRACE MUMBA:** *Teenage Pregnancy Needs Greater Attention*

None of the speakers has mentioned one factor that contributes to population growth in Africa: teenage pregnancies. This problem is really alarming in almost every African country. Our teenagers do not have access to family planning. We can't give them contraceptives because people believe they should not have them. Yet we all know that teenagers are sexually active. Whether we like it or not, they will become pregnant and either give birth to children before marriage or have an abortion that could kill them. How are we going to lower population growth rates without addressing key contributing factors such as teenage pregnancies?

► **JEROME WOLGIN:** *Identifying Mechanisms to Accelerate Technological Innovations*

Alternatives to modern contraception. One point I would like to make is that pregnancy can be controlled without contraceptives. My grandmother was one of 16 children, but she had only two children herself, and I don't think she had access to modern family planning.

Triggering mechanisms. I think we're very close to a synthesis about many of these questions about the interaction between population growth, economic development and environmental degradation. What I hear being said is that all kinds of pressures and degradation are taking place, but at some point people can respond. When the pressure gets greater or whatever the triggering mechanism is, there is a point at which people respond. They make investments; they reverse the degradation; they increase their incomes. Basically what we're talking about is development.

The question I have is, how broad is the experience of these kinds of changes? We have a couple of examples. Aside from a more effective marketing

system or an encouraging policy environment, do we know what the triggering mechanisms are that enable that kind of change to take place?

Agricultural output data questionable. There has been a lot of discussion about using FAO data. In particular, I believe that the data on the decline in food production per capita are absolutely wrong. Those data are made up. In fact there's a lot of evidence that agricultural output per capita has been increasing rather than decreasing at least in the last five years and probably in the last ten years. The evidence is very fragmented and not broad-gauged. Clearly, not everybody believes me. But I think we have to be very careful about talking about a decline in agricultural productivity over the past decade. I just don't think the evidence is there, aside from macrodata that are questionable, at best.

► MICHAEL MORTIMORE: *Government Policies Facilitate Market Expansion*

Connection between food shortages and land degradation is unsubstantiated. I agree entirely about the data, although I can't speak for any countries other than Nigeria. Nigeria was supposed not to be producing enough food for itself, but nobody starved. In fact, hunger has come into the Nigerian scene quite recently since structural adjustment, which was the major factor raising the prices of foodstuffs and increasing farmer incentives to produce more. As for food imports, they tell us nothing because food imports are produced by market problems and droughts cause major deficits in food output from year to year. To blame reduced food production on land degradation is taking several logical hops with very little firm basis.

Trailblazing examples. With regard to replicability of these types of cases, I think the point is not their replicability, but whether or not they are trailblazing for the rest of Africa. This is why I've been studying them myself. Clearly they are in the minority. There are very few other cases where the same trends can be found, but there are some. The University of Florida Press will soon publish a collection of comparative studies of high-density farming systems in tropical Africa where somewhat related processes are working. So they are not unique, but neither are they general.

Widespread market penetration. But surely the market is penetrating everywhere. Without exception, every village in Nigeria is increasing its market involvement. It's no longer the case that only places within a short distance of a major city on a paved road are involved with the market. Places hundreds of miles from a paved road are already deeply immersed in marketing produce, migratory labor, and other forms of exportation. We need to look at these kinds of situations as a pathway that may be followed by other systems in other places, given the right policy regime. This needs a lot of discussion.

Supportive policies are critical. The Machakos study led us to the conclusion that rather than interventions, the role of governments and agencies nowadays is to create policy environments that are suitable. As Asif Shaikh said, "We can train the river by using its own force." I like that very much. This is the way things must go.

I think the reason why the Kenyans and the Nigerians did so well in this respect was not that the policy environment was ideal. There were some horrible mistakes made in Kenya and some very serious mismanagements in Nigeria. Notwithstanding these difficulties, the farmers were able to develop their systems in a logical way in relation to their factor ratios.

Danger of over-generalization. From the point of view of analytical method, I don't believe that we should generalize from farming system studies to economic studies. The downward slope in my graph showed soil fertility in a farming system under increasing population density. I would like to hold to that. It was not the picture of an economy in general.

I believe that it's the blurring of these distinctions and the failure to approach the problem analytically and systematically that has led to some of the confusion in the debate. We ought to stick to components one by one until we have a clear message, and then begin again the effort to aggregate our conclusions on a broader scale.

► DAVID SHAPIRO: *Favorable Policies Crucial to Technology Adoption*

In response to Jerry's point, I think that Zaire is a laboratory for development problems. Over the last 20 years, it's been characterized as having really poor policies toward the agricultural sector. It seems clear to me that there is a very important role for policy to encourage agricultural intensification. A variety of factors influence adoption of new technologies, including the relative cost of labor, capital and fertilizers, cost and availability of credit, the reliability of markets for inputs and for output, access to spare parts and repair facilities, and the adequacy of information and training systems. Zaire has been extremely deficient on almost all accounts. I suspect a lot of those attributes were very favorable in Machakos and Kano and helped to facilitate intensification.

► GAYL NESS: *Benefits of Modern Contraception for Women*

High costs of traditional fertility control methods. I want to stress the absolutely unique situation we face today. When the demographic transition took place in the industrialized countries from the 18th through the early part of the 20th century, mortality rates fell without any major medical changes or breakthroughs in technology. Only a few public health measures such as water control and sanitation were available. Fertility also declined without any major medical breakthroughs. Couples limited their fertility with the oldest forms of contraception we have, abstinence and withdrawal—a technology that is immensely demanding. But they also relied on abortion and infanticide, which have terribly heavy costs, especially for women.

Hardship for women. The important thing is that abortion and infanticide don't have very high costs for men. Where are the men? They are in charge of all the programs in world. Men are at the head of the anti-abortion programs, the church and other places.

In the past 40 or 50 years, mortality has gone down very rapidly due to major medical and public health breakthroughs such as antibiotic drugs, fungicides and pesticides. Only in the last 30 years has a major new contraceptive technology been available. Fertility is declining much more rapidly than it did in the past, but abortion and infanticide are still being used to control fertility. When the economic pressures on women get heavy and they don't have access to modern contraceptive technology, they will kill themselves and they will kill their children. Abortion is still an extremely widely used mechanism of fertility control.

Promoting health while protecting the environment. Paul makes the point that fertility limitation will do very good things for the environment, not necessarily directly and immediately, but in the longer term. It also does these massively important things for individual health, particularly of women and children. These two groups are always at the bottom of all the social hierarchies.

Synthesis: Case Studies

This session focused on examples of population/environmental linkages at the community level. The case studies covered Mapembe Mountain in Zimbabwe, Lake Nakuru National Park in Kenya, Machakos district in Kenya, Kano Close-Settled Zone in Nigeria, and Zaire.

PROTECTED AREAS

Farming settlements and urban expansion are putting increased pressure on wildlife sanctuaries. Humans wreak considerable damage on wildlife habitats by cutting down trees, degrading soils, and polluting waterways. Settlements of landless farmers on communal lands have increased population density and have accelerated environmental damage, since the new settlers often do not adhere to traditional conservation practices. In some areas, residents are increasingly recognizing the impact of large families on land availability and resource consumption and are becoming interested in family planning.

To conserve wildlife sanctuaries, local agencies need to:

- Press for the adoption and enforcement of appropriate laws;
- Involve the community in maintaining the protected area;

- Educate community members on the area's significance and value to them; and
- Help community members to meet their basic needs.

Furthermore, wildlife managers should recognize that ecologically sensitive areas can only be preserved if population growth in the surrounding area is stabilized and human impacts on non-renewable resources are reduced, as Patricia Waak remarked.

AGRICULTURAL PRODUCTION

Ester Boserup's classic model of agricultural intensification in response to increased population density remains at the cornerstone of discussions on African agriculture. Researchers debate the model's applicability to African countries, especially under conditions of extremely rapid population growth and unfavorable growing conditions (e.g., dry climate, weak soils). In two examples cited by Michael Mortimore—Machakos, Kenya and Kano, Nigeria—farmers were able to adopt new technologies and increase crop yields without degrading soils. Zaire, on the other hand, appears to be on a downward trajectory of degraded farmlands and deforestation, according to David Shapiro. Many other African countries seem to be on a similar downward trajectory, although the data on agricultural production are poor and hence supporting evidence is lacking.

Three key preconditions for agricultural intensification are: supportive government policies, availability of labor, and access to markets. If farmers can raise the land's productivity and sell their produce profitably, they can make the necessary investments in soil conservation and other inputs to maintain high-yield lands. The timing of technological innovations is important to the process of intensification. Much uncertainty remains regarding the triggering mechanisms—the specific policies, economic conditions, and technological inputs—that can have the greatest and fastest impact on agricultural production in Africa.

PROGRAM INTERVENTIONS

QUESTIONS POSED TO THE PANELISTS

1. What is the right set of program priorities for Africa?
2. Are our current approaches to agricultural, natural resources, health and population programs the correct ones?
3. What policy reforms are critical? Is a broad participatory planning process like National Environmental Action Plans needed? Are national population policies helpful, or is support of family planning sufficient?
4. How can environmental and population programs be structured to promote women's involvement and address their problems more directly?
5. Should governments seek to influence population distribution patterns and promote resettlement of refugees? If so, what should they do?

Moderator: William Kaschak, *Director of the Office of Operations and New Initiatives, USAID Africa Bureau*

Program Interventions: Institutional Approaches to Policy Reform

MICHAEL FURST

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EARLY ENVIRONMENTAL PLANNING INITIATIVES

Governments energized. National Environmental Action Plans, or NEAPs as we call them, are a result of some early work done by UNEP at the 1972 Stockholm International Environment Conference, which started governments thinking about environmental management problems and resource degradation. Some governments became quite excited because they realized that some of their world was tumbling down around them and they would have to do something in an organized fashion.

But the enthusiasm created by the Stockholm conference waned because there was relatively little follow-up in most developing countries due to a lack of resources. Many countries held subsequent national conferences in which they tried to

figure out what to do about the environment. At that time, they focused mainly on the relationship between natural resources and population and maintaining a balance between these two factors. Again, due to lack of resources, not much happened.

Donor interest. Then two years later, some of the donors, particularly the World Bank, began to show interest in funding some kind of a planning process. Funds were obtained from Norway, Japan and the Bank's project preparation facilities. At first, the process was called environmental assessment. Staff from the World Bank's newly-created environmental division spoke with governments about environmental assessments and the need for them to identify their environmental problems.

Africans stress action, not just research. Immediate reaction from the Africans was fairly negative. They said, "We are so sick and tired of studies. Most studies gather dust on a shelf, and you can find them 10 years later in a minor administrative office. We need something a lot more active than just another study." The idea was born to incorporate into the planning process concerted actions to solve the problems that would be identified. That is where the name originated—National Environmental Action Plan.

RWANDA'S NATIONAL ENVIRONMENTAL ACTION PLAN

As a World Bank employee, I was involved in one of the early environmental action plans in Rwanda. At the same time, Botswana, Lesotho, Madagascar, and Mauritius had already begun work on their plans. Rwanda was one of the early attempts to get a government to start thinking in concrete terms about their environmental issues. Rwanda was picked as a case in point because of the quasi-emergency situation or, you could say, population/ecological disaster.

Need for government participation. The World Bank teamed up with the World Resources Institute. When we met with the Rwandan government officials, they handed us a list of consulting firms and asked for our help in selecting a firm to develop their environmental strategy. We asked, "Do you really want a consulting firm to do this for you? Don't you think it would be better if this became a national effort in which you defined your own problems?" They were quite happy to change their approach.

We had absolutely no idea what this would cost or how long it would take. We were all learning this new process. We did agree that a careful, well-considered planning process was necessary to include as many people and sectors as possible. We insisted that it be a national effort because environment is such a broad field. Even though we talk mostly in terms of natural resources management, there are some serious urban problems such as toxic waste and garbage disposal problems and, of course, population.

Donor involvement. We enlisted other donors because we felt that a broad-based international approach was needed. In addition to USAID, the Belgian and French aid agencies were interested because they saw NEAPs as a way to identify problems and projects that they could later finance. Still, they did not want to fund the process because they were not sure that it would be worthwhile and they were uncertain about exactly how it would affect investment programs. The donors provided inputs into the process, and the Rwandans kept close contact with them. From the very beginning, the Rwandans saw this as a way to bring investments into the country.

Institutional base. Initially, we could not determine who was in charge of environment. Finally, we found a little division in the Ministry of Health called Hygiene and Environment. As far as the Rwandans were concerned, environment was really environmental hygiene: cleaning up around the house, sweeping the streets, and collecting garbage. It took a while to get everybody on the same wave length: that environment was really a holistic problem that had to do with natural resources, urban problems, population problems, and many other topics.

The process began in earnest with financing from the World Bank project preparation fund. We had about \$150,000, which provided a small stipend for the Rwandan participants in the workshops, an office, office supplies and vehicles, and some computers. After 3-4 months of preparation, a small unit was established within the Ministry of Health (MOH). Because the MOH is weak in Rwanda, the donors, particularly USAID and the Bank, pushed very hard to move the unit into the Ministry of Plan to give it much more of a coordinating role. Finally, the entire operation moved into the Ministry of Plan. When the Minister of Plan asked the other ministers to participate in the NEAP process, they paid attention.

For most NEAPs, the process is guided under the Ministry of Plan, although in some places the Ministry of Agriculture has this role. We generally recommend that NEAPs be developed under the auspices of a ministry that has a coordinated role and is slightly above the level of the other ministries to have some authority.

Multi-sectoral process. As a first step, we developed an interdisciplinary, multi-sectoral process for the government to identify the country's key environmental problems. The Rwandans organized a seminar for representatives from all ministries dealing with environmental issues, including the Ministry of Defense. The meeting included about 30 high-level Rwandans, who then developed the terms of reference for the study, leading to a national environmental strategy and action plan.

The working groups were constituted along sectoral lines, including agriculture, health, and urban problems. The selection of members of the working groups was pretty much ad hoc. There was not a single ecologist in the country, and very few people really knew anything about environmental issues. But there were agriculturalists, foresters, sociologists, defense staff, and road construction specialists. All sectors were represented. An educational process was needed to orient everyone to the entire NEAP process and its objectives.

Diagnosis. We all worked together to identify what the problems were. Each sectoral team developed a listing of its own set of problems. These lists were later integrated. We thought that the diagnosis would take about four months; in the end it took about eight months to complete.

Natural resources and population. The two working groups that had the most difficulties were: natural resources, which includes forestry and agriculture; and population. From the very beginning, the donors pushed the Rwandans to recognize that population was a major problem. At that time (1988), the Rwandans were very, very scared to even discuss the subject. While the Rwandans knew that there was heavy population pressure on the land and that soil fertility was declining rapidly, they still had a very difficult time conceiving of population programs as a broad approach. The government did not have a national population policy and considered its population growth rate of three percent to be acceptable. Rwanda is a heavily Catholic country, and the church is very conservative. An Office of Population existed, but they could not accomplish much because local priests would spread negative rumors about family planning.

We kept emphasizing that the government had to deal with the land use problem. Each farm family had one hectare of land, but within a few years each family would have only 7/10ths of a hectare. We knew that there were some people in the government who recognized that the government needed to address the population issue so we did not give up. We obtained the backing of the Minister of Plan to include population problems in the Plan.

PRIORITIZATION, STRATEGY DEVELOPMENT, AND PROJECT PLANNING

The problems identified in the diagnosis were prioritized. Then a national strategy and policy were developed from those problems. Lastly, the action plan itself was developed. The five-year action plan is really a set of projects. The problem is that it becomes like a Christmas shopping list for donors.

To prepare the plan, economists and planners were needed. However, there are almost no environmental economists. This is a very serious problem because environmental projects have various costs and trade-offs. Priorities need to be set. Both our team and the Rwandans lacked this expertise. This is a common problem for many NEAPs.

COSTS AND BENEFITS OF NEAPS

Altogether, the Rwanda exercise took almost two and a half years. Instead of costing \$150,000 as budgeted, the final cost was close to \$1 million. Most NEAPs have been costing between \$750,000 and \$1 million. Much of the cost is for technical assistance because most countries that we work in lack people trained in environmental issues. Where gaps of knowledge exist, international consultants were called in.

Consultants have been used in the NEAP process only in an advisory role. We felt that it was very, very important for local officials to have ownership of the plan. The government is in charge, and a coordinator named by the government takes charge of the process. A long-term consultant is used to ensure that the plan is developed in a coherent way, that details are not forgotten, and that time schedules and budgets are met. The consultants are generally ecologists or experienced environmentalists.

Coordination. The basic purpose of a NEAP is to be sure that a country maintains balance between natural resources and population. Also, NEAPs ensure that environmental concerns are integrated into economic and social planning. Prior to developing NEAPs, most countries lack this integration. Few sectors have been concerned with the environment; individuals who did work on environmental issues were totally disconnected. The NEAP process brought together people from different sectors and attempted to integrate them around a single issue. It worked quite well.

Focal point for public attention. The whole process is very positive because it draws national attention to environmental issues for the first time. People talk about environmental problems and understand what they are. They realize that the world around them is degrading, and they participate in the process.

USAID SUGGESTIONS WELCOMED

The NEAP process is an extremely important effort to look at the environment in an integrated, multi-sectoral interdisciplinary way. Copies of the completed NEAPs are available from the WRI Policy Consultative Group. I have copies of the Ghana and Rwanda NEAPs and the policy statement for Uganda here. We would welcome your comments to make this process much more productive. Since any planning process has lots of problems, WRI is conducting an ongoing analysis of the major issues associated with NEAPs. Some of those papers might be very interesting to you as this process continues.

Gender Issues, Migration, and Population Distribution

JODI JACOBSON

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WOMEN'S STATUS LARGELY UNCHANGED

A great deal of attention has been given to the so-called "status of women" as a factor in promoting demographic transitions, protecting the environment, and improving health and well-being. In reality, we have done very little in terms of "improving the status of women." I fear that we will miss the opportunity of the new administration's debate on development to start to look at the structural reasons for our failure to address the root causes of these issues.

Little change in conventional indicators. If we look at the global picture in terms of the conventional indicators of women's status, we can see that it has not improved very much:

- **Income.** In most countries—developed and industrial—women's income relative to men's is nowhere near parity. In developing countries, with the growth in female-headed households, women's income and their purchasing power have declined.
- **Education.** Although the share of the adult population that is literate has increased dramatically since 1970, the actual gender gap in literacy has grown, according to World Bank data. Why? We have not addressed the structural or root causes that lead families to channel more of their resources to boys than to girls.
- **Health.** Health indicators such as reproductive health and maternal mortality, that are most important to women in developing countries, have not changed dramatically. This is in large part due to politics. Obviously, we have not been effective at addressing the major causes of maternal mortality among women, such as unsafe abortion, because we do not speak of them publicly. Here in the U.S., our policies have not been conducive to speaking of them publicly or addressing them at the field level. Family planning programs have not adequately addressed women's reproductive health needs.

More broadly, all of these issues have not been looked at in the context in which development assistance is delivered. Conventional economic development strategies rate success in terms of increases in per capita income or gross national product, which do not reflect the differences between classes of people or particularly between men and women.

Women falling further behind. The gap between men and women is growing, particularly in Africa, where primary school enrollments for girls are declining and infant mortality is rising in many regions. These conventional indicators do not work. Because we have not taken account of the deleterious effects of structural adjustment policies and of debt and trade policies, we continue to try to fix with one hand what our broader macroeconomic policies are breaking with the other.

SUSTAINABLE DEVELOPMENT

When people working in development policy and programs talk about sustainable development, we talk about human numbers and the environment. We do not talk about the equity and human rights issues that are involved in development and that necessarily must be a component of sustainable development. A tremendous opportunity lies before us because the new administration is rethinking not only what U.S. aid will look like and where it will go, but also the overall context of U.S. foreign policy.

Global meetings. Three major conferences are coming up that will call global attention to some of these issues:

- **Human rights.** For the human rights conference, women's groups and human rights activists are pushing for a redefinition of human rights and new modes of operationalizing development strategies to incorporate human rights considerations.
- **Population.** Looking to the 1994 population conference, African, Asian and Latin American women's groups are seeking to redefine what we mean by "population policy" and service delivery within the context of "unmet needs."
- **Women.** In conjunction with the 1995 conference on women, women who are very powerful and active in their regions will be bringing these issues to the fore and will be challenging development agencies to respond to their needs more directly.

I think we need to use the debate over population and environment as a lever to look at these macro-issues.

Women's inputs denied. While NEAPs give us an indication of the macro-level issues, we cannot fool ourselves into believing that these are "broad participatory plans" because women in Africa are excluded from participation and democratic processes. We cannot say that these plans necessarily reflect the needs of women and poor people at the grassroots level if we continue to work only with governments that do not represent those people.

Toxic waste disposal in African countries is another issue that women are concerned about. Poor countries are being forced to accept waste from industrial countries as a way of earning foreign exchange. If we approach this problem simply as a waste disposal issue rather than looking at the patterns of consumption and production that produce the wastes and that render countries poor, then we are in effect not practicing development.

Projects ignore women. The greatest challenge is to redefine what we mean by development and participation. African women say that they are not involved and they do not feel involved. The statistics tell us this as well. Despite the rhetoric promoting women's involvement, an analysis of U.S. and World Bank development assistance programs over the past 20 years shows that women are not involved in key sectors such as agriculture and forestry. Though women produce the majority of food domestically consumed in Africa, only 3 percent of all agricultural extension agents are women, and a smaller share of agricultural extension contacts are made to women. A World Bank review of its own forestry policies and programs in the late 1980s showed that only three of the 28 forestry projects in which women were integrally related even mentioned women as project participants.

Harmful macroeconomic context. From the gender perspective, we have failed. I believe one of the reasons for this is that we continuously fail to challenge the macroeconomic context in which we are developing assistance. We need to broaden the definition of sustainable development to include the voices of the people whom we are supposedly serving. Unless we do this, we will find ourselves 10 years down the road in much the same position, with declining social and economic indicators among a share of the population and looking for yet another new approach that may solve these problems.

Agriculture and Natural Resource Management

DIRCK STRYKER

Association for International Resources and Development

IMPACT OF ECONOMIC POLICIES

I am going to look at agriculture as far as natural resource management is concerned, but I will also discuss how to devise macro-level policies that have a desirable effect on the environment. The reason for looking at this particular issue is the high cost, long time, and multiple constraints that exist in trying to deal with environmental problems through the more traditional ways of planting trees and working with farmers through extension services. At the same time, we need to look at the policies currently in place in Africa, since these policies have enormous effects throughout the economy on the environment.

Impact of structural adjustment. About two years ago, my firm did a study for the Africa Bureau on linking policy reform with natural resource management in sub-Saharan Africa. In particular, we were trying to look at the question of whether structural adjustment has had an adverse environmental impact. As part of our study, we unearthed a large amount of literature that states that structural adjustment does have an adverse effect on the environment, largely because of its adverse effects on the poor. However, if we look carefully at the empirical evidence, it calls into question a lot of this literature.

Little effect on the rural poor. For instance, the Cornell Food and Nutrition Policy Program has been looking at the effects of structural adjustment on the poor in Africa generally and in 10 specific countries. The main conclusion of that series of studies is that structural adjustment has not generally had an adverse effect on the poor. There are specific cases where it has had a detrimental effect, but in general it has not. The reason for this is that by and large most of the poor in Africa live in rural areas, while most of the policy distortions that have existed in African countries have had a bias towards urban areas. Correcting those policy distortions has entailed a combination of devaluation, import liberalizations—reducing tariffs on imports, and

reducing or eliminating export taxes. As a result, the changes in relative prices have tended to favor agricultural products and rural areas while penalizing urban areas.

The Cornell work shows that the urban people who have been hurt have been primarily in the middle- or upper-income classes, although there are some effects on under-employment or unemployment in the formal sector that need to be taken into account. The decline in income among urban middle- and upper-income classes has probably not had a very environmentally damaging effect in the sense that these people are less likely to consume products that damage the environment such as fuelwood for cooking and foods that degrade the soil.

The poor are outside the formal sector. The Cornell project also looked at how structural adjustment affected budgetary expenditures. In general, it found that budgetary expenditures were not strongly influenced and that expenditures on health and education were not seriously decreased, except in a few countries. Even where expenditures on health and education declined, the study concluded that the poor do not have very good access to health and education facilities in the first place. The general conclusion that emerges from these studies is that one of the reasons why structural adjustment has not had a major effect on the poor is because they are, to a large extent, outside of the formal sector and therefore are not very much affected by the policy changes.

Environmental impact. Given that the impact of structural adjustment on the poor has not been uniformly negative and has been less significant than has generally been assumed in the more popular literature, the question is, is it possible that the effects of policy reform on the environment have been detrimental without the poor being made worse off? The usual assumption is that structural adjustment adversely affects the environment via the poor because the poor are forced out of areas where export and other cash crops are grown and onto more marginal lands. Food prices rise, and they are therefore forced to produce more subsistence crops, putting more pressure on the land. But there may be other kinds of environmental effects of structural adjustment or policy reform that do not necessarily require that the poor become worse off as a result of these policies.

Increased prices for export crops. The general trend of the policy reforms that have taken place in developing countries has been to increase the prices of export activities particularly, both in livestock and cash crops, due to devaluation and the removal of or decrease in export taxes. There have also been some effects on the import substitution side for crops like rice, for instance, but those are less clear because devaluation tends to cause their prices to go up while import liberalization causes the prices to go down.

Positive and negative environmental effects. In regard to the environmental effects of the price increase for export crops, there is considerable disagreement about this area and much research is needed. Possible effects include:

- **Deforestation.** One view is that countries that have gone through substantial devaluations, other things being equal, have tended to cut down somewhat more forested area. For instance, in Ghana land has been cut down for cocoa crops. If you are going to cut down forests to grow crops, however, it is better to replant the area with perennial tree crops such as coffee, cocoa, rubber, and oil palm, rather than annual food crops that generally involve a lot more soil degradation and loss of vegetation.
- **Increased income.** A second effect that occurs from relative price changes is an increase in cash income. Generally, increasing incomes in rural areas are likely to be beneficial, rather than detrimental, from an environmental point of view for several reasons: (1) The cash itself serves as a vehicle for purchasing fertilizer, therefore allowing for some intensification of agriculture. (2) The fact that the farmers have more income and more resources allows them to think more of the future and to be less concerned with just getting enough to eat today. Economists would say that the marginal rate of time preference decreases, that they are less concerned with today versus tomorrow so they are more likely to invest in land conservation. (3) Finally, rising incomes leads to improvements in health and calorie availability, resulting in reduced mortality and probably fertility, which are desirable in the long run from an environmental perspective.
- **Agricultural inputs.** In general, the thrust of the policies has been to remove input subsidies. This has discouraged the use of agricultural chemicals, with their damaging effects, but it may have also resulted in the loss of soil fertility because of decreased use of fertilizer. This has not always been the case, however, because the removal of subsidies has often been accompanied by increased availability.
- **Macroeconomic effects.** The expansion of income in rural areas is going to put some additional pressure on resources in those areas. To what extent is this good or bad? Obviously, by itself it is bad, but combined with other factors such as increased incentives and capability for soil conservation, it may be good. This question needs more empirical research.

Full impacts not felt. One of the general issues that comes out of this discussion is what economists would call “the problem of the second best.” That is, we recognize that certain distortions exist in the system. There are certain market failures, or the failure to internalize the adverse effects of decisions such as cutting down forested land, overuse of pasture, and overgrazing. The fact that these lands are to some extent held in common and hence the effects are not fully internalized is the basic deficiency that can lead to environmental degradation.

The “first best” policy would obviously be to try to correct those particular market failures, for instance with a tax on timber cutting or through improved land tenure. But we know that this is a slow process. In some cases it is not easy because

you cannot enforce the various kinds of measures needed in order to correct the failures at their source.

Instead, we are confronted with a second best solution. If we correct other kinds of distortions such as an overvalued exchange rate, import controls, very low subsidized interest rates, and subsidized inputs, will we have a positive or negative effect overall on the environment? We know we do not have the policy instruments to get at the principal distortions, so we instead correct secondary distortions with policies that are available. A change in the exchange rate, for example, will be reflected in altered prices all over the country in a very short period of time. Similarly, trade policy can produce widespread, rapid changes. The question remains, however, whether these policy reforms have a beneficial or an adverse effect on the environment given the persistence of the primary distortion.

Investments in roads, schools, and other infrastructure will also have unintended effects. We need to know what those unintended effects are. Are they going to be positive or negative? They are going to be big and widespread, and they are going to take effect in a fairly short period of time.

Unfortunately, there is a dearth of empirical data on the impact of all these changes. For example, what is the effect of increased cotton prices on soils in southern Mali? My firm has tried to focus on a number of different sub-sectoral issues in what could be called case studies, although they are certainly not detailed, intensive case studies. I will report briefly on two of them.

ARID AREAS IN THE SAHEL

Limited carrying capacity. Regarding the arid areas in the Sahel, I worked for about five years with a project in Niger dealing with livestock in the pastoral zone. Many of my general observations come out of this experience. First, I think the pastoral zone is very limited in its ability to absorb additional population. We simply cannot get much more biomass out of the area. Secondly, the region is characterized by fluctuations in rainfall that periodically force animals and people off the land, down into the agricultural zone. This forced migration generally destroys the livelihood of a significant number of pastoralists. They do not have the capital base to stay in, and they do not have the possibility of coming back.

Environmental degradation around small towns. The major environmental degradation that occurs in the true pastoral zone—the arid zone—is around areas of permanent settlement, where a small town with bore holes used to water animals has been constructed. This town creates degradation of the immediate environment. In areas with the more traditional patterns of nomadic movements, there is probably relatively little degradation. There may be some pressure on woodlands (to the extent that there is wood), but the annual grasses tend to recede in drought; when it rains they come back.

Benefits of increase in livestock prices. What impact would an increase in livestock prices resulting from policy reforms have? I would argue, first of all, that it

probably would not affect the total supply of animals very much because there is not much more you can get out of this land. Secondly, it would improve the welfare of the pastoralists. Third, it would provide a better capital base for pastoralists so they can survive fluctuations in drought conditions. Fourth, the result would be an ability to absorb more population in these areas because any individual could survive with fewer animals because the price would be higher and they would need to sell fewer animals to buy millet. The price increase probably would not have an adverse environmental effect because the limiting factor is rainfall, and those annual grasses are relatively indestructible.

SOIL DEPLETION IN SEMI-ARID WEST AFRICA

The issue of soil depletion in semi-arid West Africa is much more complicated. This area is characterized by high population density pressing on the land. Use of fertilizer is constrained by high risk in low rainfall areas and low responsiveness of some of the food crops such as millet and sorghum to fertilizer application. Existing techniques such as manuring can, to some extent, maintain soil fertility for a time, but there are few good alternatives to increased use of fertilizers over the long run.

Appropriate economic policies are unclear. Are subsidies the answer? Northern Nigeria has a fertilizer subsidy. While some would argue that this was an important factor in allowing for the intensification of cultivation in the northern areas such as Kano, Michael Mortimore says that people use some fertilizer, but it is not available all the time and it is not necessarily the base of intensification.

What about increasing prices of the cash crops such as cotton? Cotton tends to deplete the soil, but it also provides for the possibility of purchasing fertilizer, which then has residual effects on food crops.

Need for empirical research. In this particular case, there is a need for considerably more empirical research to understand what a fertilizer subsidy will and will not do and what is the effect of higher prices for cotton. Cotton is a major cash crop throughout the whole intermediate rainfall zone of West Africa; it is probably the only cash crop that has succeeded. Is it having a desirable or an undesirable effect on soil fertility and soil degradation? I don't think much research has been done on this extremely important subject.

CONCLUSION

The broad conclusion here is that there are policy instruments that can be used for various purposes. One needs to know how those policy changes affect the natural environment. Most of the literature that has examined this issue—much of it not very carefully—has stated that most of these policy reforms have had a detrimental effect. I don't think good empirical work supports this conclusion, but there is certainly a need for much more empirical work before any definitive statements can be made.

DISCUSSION

► GAYL NESS: *Institution-building—Inclusion of Women and Project Size*

Involvement of women in development programs. It is very interesting to hear Mike talk about the need for institutional development in environmental planning. I remember that after the big spurt of building up economic development agencies in the 1950s, the aim during the 1960s was to persuade the economic planning ministries to include people from various social science disciplines and pull together people from various ministries. The same thing happened in the population field between the late 1960s and the early 1980s, with the focus on inter-agency coordination and institution-building. Now we find the same thing in environmental issues.

What is interesting about this is I do not recall ever once hearing the gender issue emerge in the 1960s when we were talking about economic development. The men were doing the economic planning. The gender issue began to arise a bit in the 1970s when we talked about institution-building in population programs. Now it is coming on much, much more strongly in the area of environment.

Immense, but variable progress for women. I think one of the reasons for that is the immense progress for women. It has been extremely variable in its development. For example, India and China have approached development in similar ways but with rather different political evolutionary bases. Both of them expanded primary education and increased the number of women in education. China focused on primary education with very little investment in tertiary education; all of its women are now in school. India has made some progress, but mainly in tertiary education. The proportion of primary students who are female has risen in India, but certainly not as much as in China.

China has received extremely bad press for its coercive population policies. But I do not think China could have achieved the fertility reductions it has experienced since the early 1970s if it had not built a primary health care program in the 1950s. In addition to raising female education, primary health care programs are important to address population and environment issues.

Scale of development programs. I think it is important for us to look at the organizational instruments that we have to do these programs. To what extent are these massive institutions for international development assistance capable of funding small-scale programs? For example, the World Bank uses the loan-to-labor ratio as a management evaluation tool for its project officers; this factor pushes staff away from long, protracted negotiations for a \$1-2 million loan to build up a primary health care program and toward a six-month negotiation for a \$20 million hospital program.

We need look at our own development institutions as well as institution-building in developing countries. I applaud the fact that we are now getting a much stronger voice for women in institution-building. It is marvelous that African women

are organizing to promote their own equality because that is something that cannot be done from the outside.

► JODI JACOBSON: *Lack of Indicators for Women's Work*

For some indicators such as primary education, some countries have increased women's participation—rather dramatically in some cases. My point is that when conventional measures or strategies do not take account of existing gender biases within economies or societies, we cannot tell what the differential impacts are on women and girls when things turn the other way.

Women's non-cash contributions ignored. We cannot talk about the impacts of structural adjustment policies on poor people, when the economic indicators we are using to measure those impacts do not take account of women's non-cash-producing work and do not value women's time. Therefore as the burden is shifted onto women, it may be that the reason that family welfare does not drop immediately is that women themselves are sacrificing either their time or their own nutritional well-being in order to support their families. There is evidence of this throughout the field.

Harmful effects of gender bias. Because we have failed to measure and then combat gender biases, we see harmful effects on women. For example, China's population policy may be successful, but reports are emerging of increased violence against women and girls, more female infanticide, and the purposeful malnutrition of girls because of the strong pressure to decrease fertility.

We cannot come to grips with these issues unless we develop ways to account for women's contributions. We need a similar approach in natural resource accounting systems, in which we value products of the ecosystem and calculate the true costs of degradation when a forest is destroyed. The evaluation techniques we have now are incapable of producing fair assessments of women's work. If we had those kinds of indicators, we would have to really question our own strategies.

► MICHAEL FURST: *Inclusion of Women in National Environmental Action Plans*

I wish we had more time to explore some of these subjects. The donors, including USAID, are investing approximately \$300 million in activities related to national environmental action plans. It is impossible to cover this whole subject in 20 minutes.

Regarding gender issues, the five completed environmental action plans have included women and development. The NEAP process provides a forum for women to come forward. For instance, the final policy statement in Rwanda's NEAP mentions: promotion of technologies appropriate for lightening women's load in completing the multiple tasks relegated to women; promotion of agriculture extension services for women; training female extension workers; family planning

education and training for women; reinforcement of policies to improve education for women; the reinforcement of actions that support women in rational management of water, energy and other resources; and re-establishing women's rights and dignity. These statements are now national policy in Rwanda. This is a first step. Women did participate and insisted that these points be included in the national environment policy.

► PAMELA DELARGY: *Involvement of Local Leaders in the Policy Process and Impact of User Fees for Social Services*

The NEAP process Mike described is very similar to the process of developing national population policies in Africa over the past decade—bringing together people from various ministries and organizing task forces to look at population in relation to other sectors such as agriculture, health, and women's issues.

Replicating the coalition-building process at the local level. The process in the Sudan was successful in building a network across ministries and raising awareness, but it did not have much effect when it went down to lower levels. It was only when the Sudan National Population Committee decided to replicate the process at the regional level that we really began to see what the problems were there. We discovered that the trained professionals at the national level did not have a clue about what was going on at the regional level.

Eye-opening experience. At small regional-level conferences, local people from health services, NGOs and the veterinary department started pulling together information to find out what was happening in their region. They were shocked. First, they had never had access to any of the information. It was the first time they had been able to obtain materials about their regions from the national ministries. Secondly, they had never talked to each other. Thirdly, the national-level people had many misconceptions about the regions. For instance, they had thought that there would be real resistance to family planning in western Sudan because it is a fundamentalist area. It turned out that religious leaders in that area were the most supportive of family planning, while it was a problem in the more urban East. So I just want to emphasize that sometimes the class issue is as important as the gender issue.

User fees cause shift to private sector. In regard to structural adjustment, many countries have increased school fees or introduced user fees in health centers. I do not know whether the effects of these changes have been very well studied. In Ghana, since user fees were introduced at local health centers 10 years ago, the average number of health center visits by individuals per year has declined very, very dramatically.

Does this mean that people are not getting health care? No, it does not. Ironically enough, they have shifted from the public sector where they have to pay in cash to the private sector—traditional practitioners who will barter for services or accept delayed payment. This has implications for provision of family planning information.

► MICHAEL FURST: *Local Participation in NEAPs*

In regard to participation, admittedly when we first started with the NEAPs, we did not even think in terms of the district and village levels. But we quickly became aware, through some NGO activities, that the only way a national environmental action plan could be implemented was to involve the local populations as early as possible. Participation is improving as the process is developed. Now we are thinking that the process should start at the local level and move toward the top.

Building on local-level inputs. In some instances, such as in Uganda, we have recommended that local environmental action plans be developed. These will feed into the national authority in charge of environmental management. The participatory question is very, very difficult because of the many agencies and levels involved. The villagers need to make their input early in the planning process because no one really understands the environmental problems of the districts.

NGOs as conduits for information. Local and international NGOs are very useful in obtaining information and giving feedback to the national authorities. In Rwanda local NGOs explained to villagers what was going on and asked them how they perceived environmental degradation. Villagers do not perceive environmental degradation in the same way as a national-level ecologist, so this participatory issue is extremely important.

► MARTIN HANRATTY: *Integration of NEAPs into Existing Development Plans*

Can you explain how existing plans for national economic development, population, and other sectors fit together within the NEAP process? Typically, the national economic development plan is done from the Ministry of Finance and the Central Bank down. How are these plans coordinated, and how does one set of plans impact on another?

► MICHAEL FURST: *Institutional Structure for Environmental Programs*

Integration of relevant plans. First of all, many countries do not have an economic development plan any more; the five-year plans are not as popular as they used to be. Most countries do not have a population plan. Where relevant plans such as a tropical forestry action plan exist, they are being integrated in the environmental action plan. As part of the NEAP process, a plan for a national environmental action authority is developed.

Coordinating bodies. Typically, the cabinet committee on the environment is at the Presidential level and includes ministers from the relevant sectors such as agriculture and forestry. The Prime Minister is in charge because you need very high-level political support to make this work. A board of directors, who are chosen or elected, oversee the activities of the national authority and the various operational divisions. District environmental committees are in charge of developing local

environmental action plans. A technical advisory committee also provides inputs. In order to avoid the high degree of centralization found in most African countries, we recommend that each ministry establish environmental units to liaise with this central authority.

Operational units. One of the big problems in developing these bureaucracies is that there is a distinct danger that they will turn into monsters. No one knows how to do it differently. Some governments have decided on an environmental ministry. We definitely advise against this because it is not decentralized enough. Everyone says that environment is the Ministry of Environment's problem, not ours.

Other governments have used their regular bureaucracy. Generally, these units are staffed by people with little motivation due to low salaries and limited promotion possibilities. We recommend that these units become semi-autonomous, with both administrative and financial independence, in order to be able to hire, fire, and sanction employees. In many African countries, there is no way to sanction or reward employees; without these two elements, you do not really have management.

A policy and legislation unit is needed to ensure that environmental programs are integrated with other sectors and government activities and incorporated into social and economic development planning.

► PAMELA DELARGY: *Coordination with Population Committee*

How will the environmental committee relate to the national population secretariat being developed in Uganda with almost exactly the same structure?

► MICHAEL FURST: *Relationships to Evolve*

In Uganda they are starting almost fresh in order to avoid the problems of the AIDS commission, which has people who are making \$30,000 a year in a country where the average annual salary is about \$240. The interrelationship between these committees needs to be developed as time goes on. Uganda is trying to rebuild the government that was totally destroyed during the war. The situation is not quite as serious in other countries as it is in Uganda.

► PATRICIA WAAK: *Links to National Conservation Strategies*

How does this relate to the national conservation strategies being adopted in various countries?

► MICHAEL FURST: *Broad Approach to Environmental Planning*

That is a very good question. Some of the conservation strategies, which are mostly done by IUCN, have been so effectively done that they will be integrated into the NEAP. One of the difficulties of the national conservation strategy was that it was not holistic, although they are beginning to be broader. Most of the strategies deal primarily with the traditional natural resource sector. They do not include the urban sector, and often population is not included.

But if a country chooses that road, fine. What we are trying to promote is environmental planning. It does not matter what tool is used. A NEAP can be anything that the country chooses to do.

► MICHAEL ROCK: *Identification of Problems and Strategies*

How is there any sense of whether or not the right problems are identified in the NEAPs or that the strategies to address those problems are actually on the mark? We have done some preliminary analysis of the Madagascar NEAP under the EPAT project. We came to the conclusion that the NEAP identified the wrong problems and that the strategies that they identified are not likely to have much impact. If USAID is actually tying \$300 million to the wrong problem and the wrong strategy, it seems to me we have some big problems.

► MICHAEL FURST: *Role of Country Leaders in Problem Identification*

I think you make a very good point. It depends on who identified the problems. Madagascar is the first effort, and unquestionably a lot of mistakes were made. But you have got to leave some of these decisions on what problems are to the country itself. After they identify their problems, it is very difficult for donors to second-guess them. This is what we have been doing for 30 years. I think we need to leave identification of issues and problems to the people who have to live with them.

We can help by guiding them toward those things that we feel are important to be addressed, but I think we are really talking about subjective issues. For instance, I consider the population problem to be the number one environmental problem, but not everybody agrees with me.

► MICHAEL ROCK: *Criteria for Problem Identification*

There is lots of work all around. For example, a cost-benefit analysis in Eastern Europe looked at whether to put resources into reducing two types of air pollutants—total suspended particulates or sulfur dioxide. The study found that the cost of dealing with the sulfur dioxide problem is enormous, while the health benefits from reducing it are small. Hence, that is probably not a big priority.

Any time you try to deal with correcting a resource problem, you have to have some sense as to what the benefits and costs associated with dealing with the problem are. It is not at all clear that the NEAP process is very good at identifying benefits or cost-effective strategies. If neither of those are being done, then what are we doing?

► MICHAEL FURST: *Need for Cost-Benefit Studies*

Again, I think you make a very good point. First of all, there are so many environmental problems that need to be addressed. Secondly, there is also no question that most environmental actions in Africa will be financed by donors. The issues are discussed further at the donor roundtables that generally follow each

NEAP's completion. There has to be general agreement on the issues and problems before they can be attacked. Thirdly, it has been extremely difficult to find local economists who can do cost-benefit analysis and make prioritized choices. That is where we need a lot of external inputs, but there is also a limit to how much external input you can impose on this whole process.

► **MARIA BEEBEE:** *Integrated Rural Development Programs*

Agenda 21 as an organizing tool. In terms of tying together all these various action plans, the Philippines has subsumed them all under its Agenda 21 action plan that has sustainable development as the main goal. Then they put their environmental action plan under the conservation action plan, the forestry action plan, and others.

Breaking down sectoral barriers. Several speakers have stressed the need for female education, but how many of us working in population or conservation programs are willing to say, "Okay, take my resources and put them into primary education for females."? A related question is, who sets the priorities? Whose prescription do we take, or do we go back to the community to adopt a participatory process? If we say it is the community, are we willing to listen to them?

In my research, I found that development workers valued cooperation and participation, whereas farmers valued their family, farms, and the environment. Their farms were important to support their families, and the environment was important because that was the backdrop that enabled them to farm. Above all, they wanted help with their farms, access to credit, and access to resources so that they could have non-farm income. At the same time, they wanted education for their children and something for their wives. They wanted basically a multi-faceted program.

Integrated programs. The question is, do we go back to the integrated rural programs that disintegrated in the 1950s and 1960s? Or are there things happening out there at the grassroots level that we could draw lessons from? There are several cases in which grassroots community groups have used various entry points. For instance, in Kenya they started with population and then added income-generation activities. In Liberia they started with income-generation activities and then added private-sector family planning and maternal and child health clinics. In the Côte d'Ivoire they started to develop secondary towns in order to draw people away from the cities and ensure that there was a market for farm produce. So the demand is there for multi-faceted programs.

► **JODI JACOBSON:** *Need for Increased Spending on Human Needs*

People want integrated strategies and programs. These issues are at the core of questions on development. It is clear that one of the challenges of people in "development" is hearing what they want to hear versus what people may be saying to them. We can see this in population and family planning because the

evidence now exists that integrated strategies are what people say they want. Integrated strategies that work toward responding to women's and men's needs—whether at the actual service delivery level or in terms of policy, priorities and spending for contraceptives—need to address maternal mortality and morbidity, sexually transmitted diseases, and adolescent fertility.

Shift in funding priorities. People have argued that contraceptive distribution has worked and is needed because populations are growing and fertility is still too high, and we cannot spare the money to offer these other services. The issue is not taking the dollars from family planning programs. It is, what are we doing with the tens of billions of dollars spent elsewhere? We are spending it on military assistance and on other projects that do not necessarily respond to peoples' needs. The issue is not of dividing up 0.01 percent of the U.S. foreign aid budget, but of starting to approach the larger context of development programs.

► MICHAEL FURST: *Democratization and Meeting Women's Needs*

Government suppresses local initiatives. I worked for six years in Mali as the World Bank's representative to the government and obtained a very good understanding how a despotic government works. Such a government can suppress any kind of local activity or voice. The recent coup in Mali gives me some hope that things will change.

We talked a little bit about some governments that have democratization. I think it is absolutely essential to make a change at that level before anything can happen. We have been supporting a lot of corruption and corrupt governments for a long, long time. Africa is changing; maybe we can do a better job of it in the future.

Listen to women. The women's issue is a critical one. Mali is at the bottom of the list in terms of women's rights. I do not think much will change in Mali until that is recognized and the women have a voice in what happens to them. They are setting the priorities themselves, and we just have to listen. I agree with you 100 percent that we have to listen in communities and start there. I really think it is essential.

Priority to female education and family planning. I agree that if I were to make choices on resources, priority would go to women's education and family planning. Funds would go to the very things that lessen the burden on African women. The fact that African women die early and die in childbirth needs to be addressed much more than some of the big projects donors have funded for the last 30 years.

► MARGARET BONNER: *Initiatives Regarding Women and Participation and Funding Restrictions*

Gender issues. The African Bureau is very interested in gender issues. We are also concerned about how our programs are going to impact at the local level. Each

mission is expected to put together a planning program that lays out its objectives, targets, and plans for reaching the people we hope to affect. Collection of information, to indicate how well these objectives are being attained are to be gender desegregated. These results are then factored into future planning.

Soliciting input on local needs. We are still trying to understand how you listen to people. About six months ago we issued a policy to all of our African missions stating that encouraging participation and listening to what the needs of the people are expected to be a part of not only strategy planning but also project planning and implementation.

I do not believe that we know how much is really going on in our missions. We did a four-country study and now have an Africa-wide study underway in order to learn how missions are listening to local people and how they are using this information. We expect to be able to pull together some lessons learned. The first indications are that there is a lot more going on than we know here in Washington.

Earmarks limit funding flexibility. In regard to integrating programs, there is a difference between the approach that we as developmentalists believe is best versus what outside pressure groups force us to do. In this past budgeting process, the Africa Bureau agreed that an integrated approach to health, family planning, and AIDS made sense. And yet our money is based on earmarks for health and child survival. We may want to do an integrated program that covers all of these things but our money is directed towards child survival, which is very narrowly defined (e.g., immunizations to those under five years old).

So we do not have complete control over our activities. We can try to deal with Congress and our own Administration in terms of changing the earmarks, but that also requires the influence of outside groups. The problem right now is a lot of the outside support comes from population groups who want funds to be spent solely for population programs. We need to make more resources available and look more closely at the results of our money rather than the inputs.

► **PATRICIA WAAK:** *Authenticity of Community Inputs*

When we say listen to the community, whose voices are we really hearing? People are appointing themselves as the spokesmen for the community who do not necessarily come from or represent that community. When communities themselves are involved in the designs of their programs, you can be assured it is what they want.

You are absolutely right about the political pressures out there. That is why it is all the more important to be able to state that communities in Africa have identified their own needs and USAID programs reflect those needs.

► **PAUL HARRISON:** *Participation by Local Leaders and the Poorest Groups*

I would like to second that. In regard to participation, I would like to relate an anecdote about Lesotho's conservation plan, which was drafted by consultants from

the World Bank and the IUCN. The existence of this draft was denied at the national conference on the plan, which was meant to be a very participatory affair. The conference included mainly traditional chiefs, many of whom were women but most of them were over age 50. They expressed deep resentment at any idea of having a population component.

Survey the poor. We must remember that political and class structures have an influence. Elites always try to grab hold of any process. I think that we should build into the participatory process some type of survey approach that will give the poorest, who are often women, a voice that they probably would not otherwise get. In every political system, the poorest do not participate in any way and sometimes are prevented from doing so.

► RICHARD COBB: *Donor Involvement in Political Liberalization*

We had a seminar three weeks ago on political liberalization and its relationship to economic development. Participants consisted of both political scientists from the U.S. and Africa and the donors who participate in the Special Program for Africa. The political scientists have moved ahead of the more traditional developmentalists and donors. Two themes were emphasized heavily: (1) that the donors have a responsibility to participate in constituency-building and consensus-building around issues of political liberalization and economic development; and (2) that responsibility is to provide analysis and expertise. The Africans themselves have to adapt coalition-building to the specific situation in the country, but there has to be a process of consensus-building around either political or economic issues with diverse groups: parliamentarians, the press, trade unions, farmers' associations, and community organizations.

Avoid top-down programs. I don't think we can deny the fact that these NEAP programs are top-down and donor-driven. It seems to me that we have to back away from this and learn from the discussions regarding political liberalization that we have got to be more involved and more concerned with the whole constituency- and coalition-building process.

► FATHY SALEH: *Economic Development Needed to End Dependence on Donors*

It seems to me that African countries are made to be dependent on the donor. What they need is some independent way to generate their own resources by economic development. Certainly they have resources to be developed, if we can move toward regional planning and combat the problems with drought, water scarcity, and the lack of technical expertise. Donors should try to help these African countries develop themselves economically so they will find revenues to support education, family planning, and health care.

► JEROME WOLGIN: *Funding Earmarks, Limitations of Participatory Processes, and Lack of Data*

Earmarking results from political pressure. I wanted to emphasize what Marge said in terms of what hamstrings us in making choices in resource allocations. Our funding is in particular functional accounts because a lot of the institutions represented here clamor for it that way. We are defining the problem in terms of inputs rather than outcomes. If you believe that there is a broader set of solutions than the ones advocated by specific sectors, bring that lesson back to the people you work with.

Need to assess results of participation. Participation is now a buzzword in this administration. We all have a feeling that there are substantial gains to be had from allowing local folks to control their own destinies. But we should not be romantic in believing that all local institutions and communities are bastions of democracy. In fact, villages can be more repressive than national governments. With small groups there is more danger of demagoguery and political authoritarianism. Just as we analyze NEAPs carefully, we have to look at what participatory inputs are actually teaching us. We have to do that at every level of our work, and that includes participation.

Lack of data affects program quality. Finally, we have no data on income in Africa overall, let alone for women separately. Similar to the lack of comprehensive data on the environment, there is a real gap here. We cannot develop effective policies or programs until we have much better information. Many of us have the tendency to generalize from a very limited amount of information.

► HENRI NSANJAMA: *Involvement of Women in Strategic Planning and Impact of Structural Adjustment on Natural Resource Management*

Women's inputs needed. In Zimbabwe when they started family planning and ignored men, there was some success, but it was not enough. But then the women themselves designed a strategy for men. Once they did that, the success of family planning was increased. I believe that women's issues are the same: they will be sorted out by both women and men. I have been to meetings in Africa where issues about women have been discussed, mostly by men. If women can develop a strategy for men to look at this issue, I think we can make a lot of progress.

Removal of subsidies takes a toll on natural resources. In regard to structural adjustment, I have a lot of difficulty believing that it has no impact on the poor. I do know that it definitely has an impact on natural resources management. When subsidies have been removed, many farmers move from intensive to extensive farming. People are cropping more ground because they cannot afford fertilizer. More poaching is going on; when educational subsidies are removed, people poach to make money to send their children to school. Furthermore, the government

infrastructure may not be maintained. Many of my conservation colleagues in Malawi have not been paid for four months. The natural resources sector is the first one to suffer. We cannot simply say that nothing happens because we know that a lot happens.

► **JEROME WOLGIN:** *Benefits of Structural Adjustment*

Medicine for ailing economies. In regard to structural adjustment, it is very important to distinguish between the medicine and the disease. The disease has been mismanagement and a whole series of economic mistakes that have led to an economic crisis. When the economy is sick, when there is no money left in the till to pay anyone, when inflation is running at 30 or 40 percent, and when there is no foreign exchange, then the patient goes to the doctor. The doctor diagnoses the problem: "You have no money. How do we cure this? You have to begin to make changes in the way you spend money and levy taxes."

The impacts you mention are impacts of the disease and not the medicine. The medicine is a way of becoming cured over time—returning to a more balanced environment.

Positive and negative aspects. Structural adjustment covers a multitude of sins: mechanisms to reduce expenditures, changes in exchange rates, and expansion and liberalization of markets. By and large, demand contracts because the government has to get the economy and inflation under control. But there is also a liberalization part. It opens up opportunities for people and reduces the role of government in telling people what to do, what they can buy, and what they can sell. It reduces taxation.

In Africa, structural adjustment has changed the balance of incentives between urban and rural areas. It has made farming more attractive and more profitable, and it has reduced waste in industrial resources and altered import controls that have not been effective. In the long run, structural adjustment has to be positive. It opens up economies to people and allows them to make more decisions by themselves without being dictated to by the government.

Donors compensate for cuts in social programs. Admittedly, parts of the medicine are difficult. Governments are forced to spend less. They may decide to spend less in environmental protection. Generally, USAID has come behind these programs with more investments. We have worked in education sectors to make them more oriented toward primary education, and in the health sectors to make them more oriented toward primary health care. The structural adjustment process is not just the macroeconomic process, but there is a sectoral process as well. There are lots of places where it is not implemented well and where there are problems. But in general it increases freedom and opportunity for folks, and that has got to be good.

► DIRCK STRYKER: *Economic Development Needed to Limit Environmental Degradation*

More services for the poor. As part of structural adjustment, user fees are imposed partly to deal with general budget pressures, but also to increase the flow of services. In other words, if fees are charged for drugs or services, it is to make them more available. One very good study of medical centers in Cameroon showed very conclusively that people at the bottom end of the income spectrum actually benefitted from the imposition of user fees. They continued to use the medical facilities and even increased their use of drugs and services that had not been previously available to them.

Population growth and poverty drive resource degradation. Regarding the issue of development, I want to reiterate that population growth is driving environmental degradation. Probably for the next century, this degradation will continue to be driven by population growth. In the absence of economic development to provide the means for people to deal with population pressures, we are going to see nothing but more and more degradation. There is no other way around it because the poor do not have the resources to conserve soil and forests. They simply have got to take what is there and exploit it in order to survive.

Economic growth is essential. The only hope is to promote policies that are going to promote economic development generally. We need to pay attention to aspects of development policies that have adverse consequences on the environment. We should try to correct those policies, but certainly we cannot throw them out and say no growth is a better way of dealing with the problem, because it is not. The problem is going to get worse. In the absence of growth, we will only see degradation, so growth is absolutely fundamental to solving the problem of natural resources and the environment.

► JODI JACOBSON: *Various Dimensions of Development*

We need to define what we mean by economic growth and economic development to begin with. To make a blanket statement that population growth is driving environmental degradation ignores the multiplicity of factors discussed in the World Bank's extensive study. We need to be more honest with ourselves about what we mean by development. If we have the courage to recognize that some of our paradigms do not work, we will make more progress in the future.

► GARY BOMBARDIER: *Definition of Development*

Could you explain what you mean by development?

► JODI JACOBSON: *Priority to Human Needs*

I don't think we can measure development by gross increases in production, foreign exchange, or various economic indicators. Development should be mea-

sured in terms of human resource needs, education, decreases in poverty, and increases in gender equity. These are the issues that affect people at the grassroots level. Trade policies and other macroeconomic policies operate against human needs in the first place.

▶ **TIMOTHY J. BORK:** *New Directions for the Africa Bureau*

Democratization. I think that the Africa Bureau is looking for balance between the macro-approach and grassroots activities. We are probably paying more attention to grassroots issues partly due to outside pressure, but also the opening of opportunities for building civil societies. At one time, USAID's leadership was crucial to promote liberalized markets. Perhaps it is now time for USAID to support the building of civil society. People in the Africa Bureau are giving a lot of thought to this new initiative. We are also asking, have we gone too far in our nearly total support for the public sector? Shouldn't there be more attention to the private sector?

More attention to implementation. Regarding implementation, I have attended several conferences that have educated us on the policy side but have said little about the implementation side. We are bad implementers, and the reason is because we should not be implementing these activities. We have not learned how to create ownership, which is what we really ought to be doing. I would suggest that future conferences focus more on the implementation side. It is our Achilles' heel in this whole process of development. We love to talk about policy, but we cannot stand to deal with the issue of how we actually do things.

Better indicators needed. We must create better indicators and hit the policy button a little harder. It is really African ownership of these initiatives that will make the difference in development.

Synthesis: Program Interventions

NATIONAL ENVIRONMENTAL ACTION PLANS

Five African countries—Botswana, Lesotho, Madagascar, Mauritius, and Rwanda—have completed National Environmental Action Plans (NEAPs), and Uganda has developed an environmental policy statement. NEAPs are developed during a multi-sectoral, interdisciplinary process consisting of problem identification and prioritization, strategy development, and project planning. The NEAP process can take several years and can cost up to \$1 million, according to Mike Furst.

NEAPs ensure that environmental issues are integrated into economic and social development programs. From the NEAP process, an institutional structure to

coordinate and implement environmental programs is developed. Ideally, a cabinet-level environmental committee should be established to coordinate programs. Each ministry should have its own environmental unit to implement programs. If possible, these environmental units should be semi-autonomous to ensure effective management. A separate ministry of the environment is not always effective, since inputs from each sector are needed to address the range of environmental issues.

Critics of NEAPs point out that they may not necessarily identify the most critical problems and they often lack cost-benefit studies that can clarify the most appropriate and cost-effective interventions.

WOMEN'S STATUS

Despite the attention given to women's issues in recent years, women's economic, educational, and health status has hardly changed, according to Jodi Jacobson. The gap between men and women is widening in Africa.

Women's inputs into development programs are not solicited or are ignored. Many programs funded by foreign donors have excluded women, even in sectors where they play a major role such as agriculture and forestry.

ECONOMIC DEVELOPMENT

Because subsistence farmers deplete soils and forests in their day-to-day struggle for survival, economic development is an essential part of environmental programs in order to generate the necessary resources for the poor to undertake conservation measures. Where prices for agricultural commodities have risen, the increased income has enabled farmers to purchase fertilizer and invest in land conservation. Increased farm income may have other beneficial effects such as reducing migration flows to urban areas, improving health, and promoting conditions that may lead to reduced fertility levels.

Opinions differ regarding the impact of structural adjustment. Some studies found that structural adjustment had little impact on the poor because many of them are living in rural areas and are outside the formal, cash economy, according to Dirck Stryker. Structural adjustment has mainly affected middle- and upper-income urban residents. Similarly, Stryker asserts that structural adjustment has not caused serious environmental damage because the increased prices for agricultural goods have permitted farmers to invest in conservation and support themselves with fewer livestock. Nevertheless, the appropriate economic policies to promote natural resource conservation remain unclear.

On the other hand, Jodi Jacobson argues that the effects of structural adjustment are evident, especially in placing a greater burden on women to support their families. These hardships are not measured by the traditional economic indicators, which ignore women's non-cash contributions and overlook gender biases. In regard to environmental impacts, Henri Nsanjama gave examples of more extensive farming, increased poaching, and lack of funds for conservation staff.

IMPLICATIONS FOR DONOR AGENCIES

Democratization. As political and social changes sweep across Africa, donors must be attentive to the larger context of foreign assistance programs. USAID and other donors need to support the process of democratization and be more involved in the coalition-building process in regard to political liberalization and economic development, according to Richard Cobb and Timothy Bork. In addition, USAID must look for ways to make the project planning process more participatory. Instead of the predominantly top-down projects of the past, USAID should develop projects from the grassroots up.

Participation. Input from low-income groups should be obtained, possibly from surveys or information-gathering work by non-governmental organizations. Ensuring that participatory processes accurately reflect the views of villagers is complex. By monitoring the participatory processes underway, USAID can develop effective techniques for learning first-hand about the perspectives of low-income groups and providing them with feedback regarding project development and implementation.

Program priorities. Integrated rural development programs may provide a way to address the underlying factors that are contributing to population growth and environmental degradation. Similar programs implemented during the 1950s and 1960s were generally considered failures, but some of the past problems could be alleviated through grassroots participation and stronger management. USAID is hampered in its ability to implement broad, multi-sectoral programs because much of its money is restricted by Congressional earmarks. Furthermore, each sector has been reluctant to give up its funds to outside programs such as female education that affect social and economic conditions.

According to Mike Furst, female education and family planning should receive highest priority in development programs. Participants agreed that increased funds are needed for social programs in general—education, health, population, and related areas.

Project size. Donor capacities and the scale of development projects need to be examined, according to Gayl Ness. Donor policies and procedures are geared to multi-million-dollar mega-projects, when what is most needed in Africa are small projects such as developing a primary health care system, supporting village educators, and providing farm credit.

Data limitations. The lack of high-quality data on environmental and economic indicators in sub-Saharan Africa is a serious hindrance to the development of appropriate strategies and programs. Clearly, donors need to invest more in data collection and analysis to understand conditions in Africa and make program judgments.

PROJECT INTERVENTIONS

QUESTIONS POSED TO THE PANELISTS

1. What have we learned from local-level project interventions?
2. Are these interventions adequately addressing household and community-level issues?
3. Does looking at this issue as one of household decision-making lead to different conclusions about what interventions make the most sense?
4. What are the synergisms involved in various types of investments?
5. To what extent should population and environmental programs be integrated or pursued separately, and in what situations is each approach most effective?
6. What is the most effective way to interest policymakers in environmental and population issues? What are their major concerns?

MODERATOR: Judith Gilmore, *Acting Director, Sahel and West African Affairs, USAID Africa Bureau*

Influencing Policymakers

WANGA GRACE MUMBA

Executive Director of the Environment and Population Centre of Zambia

IMPORTANCE OF POLICYMAKERS

Key decisionmakers. When I was asked to speak about influencing policymakers, I first asked myself, who are the policymakers? Based on my experience, community policymakers—head men and chiefs—are very important. At the district level, governors are the policymakers. At the senior government level, members of parliament, cabinet ministers, and the President decide on policies.

Supportive role. The other question I asked myself was, why do we think it is important to influence policymakers? Basically, we seek their support for our work. NGOs supplement government efforts in carrying out population and environmental programs. Policymakers play a key role: they can be either supporters or an obstacle to achieving program goals. They give us much support for our population programs, which emphasize the full involvement and responsibility of

women and men as individuals and as couples in making and implementing decisions related to reproductive choice.

We need to insure that they understand population and environmental problems. Policymakers have many demands on their time, and these problems may not rank high in their priorities. It is important to provide them with facts and research findings so that they can become aware of these problems. If policymakers are not aware of your work, they may think that you are a political rival trying to win the next election. Policymakers should realize the importance of democratic systems of governance and the support for popular expression as well as the empowerment of civil society through grassroots organizations.

Donor-funded programs. Even when donors provide funds for programs, if policymakers do not understand the importance of the program, they tend to cut it out. Instead of building more schools or clinics, policymakers would rather continue the present state of affairs. On the other hand, governments will support a dam that displaces people from their homes. These are the realities.

Many donors, including USAID, do not release their funding directly to NGOs to implement their programs. Funds are channeled through the government, and NGOs have found this requirement very difficult. If we have to share some of our funds with the government, we have to make sure that the policymakers understand what we are trying to do.

Community-level programs. Before embarking on a community-level program, it is essential to obtain the support of the village head man or chief. Only with his support will the community become involved and deal with their own problem. If you leave the chief and head man out, you will not be welcome in that community.

It is important to help the community to formulate and promote effective programs and policies that respond to basic health needs. AIDS is causing a lot of confusion; people do not know much about it.

Adolescent programs. My NGO advocates policies and programs for adolescents that provide accurate and accessible information about sexuality and contraceptives to adolescents. We also support provision of safe abortion if the need arises. This is a very crucial issue. In my country right now, we are losing a lot of teenagers from illegal abortion. Our government policies say that teenagers should not have access to contraceptives. Today, girls and boys do not listen to their parents. We know that they will be sexually active whether or not we give them contraceptives. Is it better to prevent them from becoming pregnant or to let them get pregnant, have an illegal abortion, and die from it?

Recently, a mother came to see me about her 16-year-old son, who had impregnated a girl. The mother was afraid that her son would be expelled from school, as the girl had been when her pregnancy was revealed. When I talked with the boy, he said that he thought he was too young to make a girl pregnant. Many

teenagers lack information about sexuality and its consequences. In order to include this type of education in our schools, we need a green light from policymakers.

ENLISTING SUPPORT FROM POLICYMAKERS

In my experience, the most effective tactics in persuading policymakers to support your program are:

- **Ask for their help.** It is important to take the initiative with policymakers. My NGO is often in need of transport to reach certain areas. When I hear that a minister or member of parliament is addressing a large group, I will ask for a lift. Through this contact, I will take the opportunity to brief him on population and environmental issues.
- **Involve and inform them.** Even when they do not want to be involved and are not supportive, it is still useful to give policymakers information about your issues and programs. Some policymakers may become supporters, and others may not block your program if they understand its objectives.
- **Praise them lavishly.** Sometimes policymakers will be supportive if you praise them for something they said or did, or even something you wish they had done. For example, in front of a large audience I thanked the Minister of Environment for his support to our Centre. My remarks were reported in the newspaper. The next time I was summoned to his office, he pledged his cooperation and agreed to give some funds to our Centre. Even if policymakers are not doing something good, after being praised they may later support your work.

It is important to learn how to approach policymakers effectively because they are very influential. You cannot ignore them, so it is better to deal with them directly.

Community Participation in Environmental and Population Programs

RICHARD FORD

Professor of History and International Development, and Director of International Development Research, Clark University

COMMUNITY PARTICIPATION, SUSTAINABILITY, AND INTEGRATION

Structure is essential. The buzzword of participation should entail systematizing and bringing structure to participation. Participation that is unstructured, unsystematic or disorganized is chaos. Probably the most participatory society in Africa right now, at least for the last 24 months, has been Somalia. However,

Somalia's participation is not necessarily focused in ways that can bring sound and sustainable development.

So far, we have not really talked about sustainability or integration. Externally designed plans, interventions and technologies have a reasonably low likelihood of being sustainable. Local ownership and involvement must come from some internal operation or activity.

Farmers know local conditions. We must recognize that farmers have a great deal of information. They do not know everything. They need a lot of additional information, but we have to start from the premise that farmers know more about what they are doing and where they are doing it than outsiders do. Farmers have better information about the microecology, microeconomy, and micropolitical and cultural sectors within which they are working than outside government agencies.

Sustainability depends on local institutions. If we are going to talk about sustainable development, I think we have to look at local institutions and their roles. Local institutions are one of the fundamental organizing units for sustaining the various programs and activities that development agencies promote. Local institutions do all the work that we have been discussing. We know that the donor budgets will not continue. Many development institutions are based upon external support of one kind or another; that will not be sustained.

Donor assistance goes a lot farther when local institutions design and implement programs. When they do half to two-thirds of the work themselves, it brings far more effective impact from donor assistance. The prospects of sustainability are highly increased when local groups feel ownership of the process.

We have an institutional dilemma. At the top level there is an interaction between governments, donors, technologies, the private sector, and NGOs. Most of these groups, in different ways and degrees, are unsustainable. Governments by themselves are not automatically sustainable. Donor agencies do not always sustain their grassroots programs. For example, USAID has cut back on its grassroots programs in Kenya. Technologies are unsustainable in various ways.

This gap between the national macrolevel and the people must be bridged, and there are many ways to do it. A cluster of community-based institutions at the local, regional and, in some cases, national level exist in every country. We need to know more about what these institutions have been doing, what their potential is, and how they can reach it. Examples of these civic and community institutions include: women's groups, religious societies, grazing associations, age sets, primary health care groups, school parents' groups, village development committees, self-help groups, catchment associations, and councils of elders. In Somalia, we are training councils of elders to organize community participation activities. In the absence of a government, there are few other structures in place.

Advantages of community institutions. Community institutions have several important characteristics. First of all, they are already established and organized; we do not need to create a lot of new community institutions. Their potential for development work needs to be assessed, since some of them function more effectively than others. Secondly, many of them already have the trust and respect of their constituencies. In most cases community members trust them more than they trust the government or external donor agencies. Also, they are visible in the community.

Many, but not all of them are sustainable from local resources. They represent local constituencies, unlike many of the NGOs that have sprung up in Africa over the past five years. Many of these newer NGOs are funded by donors and have not yet built constituencies that will support their work. Community agencies tend to be action-oriented, and they elicit participation in a whole variety of ways that we need to understand better.

PARTICIPATORY RURAL APPRAISAL

Participatory rural appraisal (PRA) is a process for supporting community institutions. They can be made far more effective in promoting sustainable development if we help them to do four tasks:

- **Structure participation.** They need to do more to solicit feedback from their constituents systematically.
- **Organize village information.** We can help community institutions to organize the information that they already have. Information is power, but only if it is well-organized. Our participatory appraisal methodology has various ways to organize and structure that information.
- **Mobilize community institutions.** Community groups are not automatically mobilized and organized to do jobs. As far as development is concerned, community institutions are among the most under-utilized partners in the development system. We have many case examples of groups in Madagascar and Kenya becoming mobilized.
- **Let the community set the agenda.** When the community sets the agenda, programs are more likely to be sustained. Action plans should contain activities that large elements of the community can support and implement.

Organizing information. To organize the information, we work in small groups of 6-10 people—sometimes as many as 20 or 30. The groups consist of diverse cross-sections of both men and women, young and old people, and people from different class, ethnic, and religious groups. We have various techniques to put together groups.

We use essentially visual instruments to collect the data. Only rarely do we use questionnaires. Even if people are illiterate, they can talk about issues and look at graphs, charts, maps, seasonal calendars, and organizational diagrams. Within small groups, people can discuss trends in water and education, changes over time, and relationships among problems. These discussions provide an opportunity for the external technical people—experts in water, health, family planning and other topics—to interact with villagers using their own scope of reference.

We help villagers organize four types of information:

- **Spatial information.** We have exercises for developing seasonal calendars, which are sketch maps that show how people lay out their village. The maps help people to organize their problems and ways to address them.
- **Temporal information.** Changes over time are reviewed. In some villages, the elders recalled events from 200 years ago that had been passed down through the community's oral tradition. That is important information for them to use as they are putting together their plans.
- **Institutional information.** We help villagers to identify the most important institutions in their community and to determine who works with whom.
- **Technical data.** The village is not the only repository of the technical data. Extension officers, outside agents, NGOs, and other groups have enormous contributions to make on the technical data.

Mobilizing institutions. We have a series of ranking exercises that are used to involve different constituencies in problem identification and program planning. These exercises do not work perfectly. Every village has enormous conflict and tension—class and gender conflicts as well as other disagreements. Still, these ranking techniques can give order to what the community identifies as its list of problems. We have done PRA in 30 or 40 different communities, and we generally obtain consensus on most severe to least severe problems.

The second part of the ranking exercise addresses what the community is going to do about its problems. The villagers talk a very different tune when the onus to take the first step is put in their shoulders. They will start ranking a whole series of options or possible solutions. We then have the technical officers talk through the implications of these options. This interaction between the technical people and the community groups is a learning process for both groups. But it is set in the community's terms, not those of the technical officer.

Developing an action plan. Ultimately, the purpose of the participation, data gathering, and community mobilization is to create a community action plan. In this respect, PRA differs from rapid rural appraisal, which does not develop a plan. Although we draw heavily from its techniques, rapid appraisal basically takes information out for analysis someplace else. With participatory rural appraisal, the

information stays in the village and the people own it. Accordingly, the plan that the village comes up with will be owned by the community institution. Community action plans can be incorporated into national environmental action plans to attract external support.

BENEFITS OF PARTICIPATORY RURAL APPRAISAL

What are some of the strengths of PRA? First, it certainly can integrate sectors. We have done a lot of that in terms of population and environment. Secondly, it integrates social and the technical inputs, with the community providing social, institutional, and cultural perspectives and NGOs or government extension workers providing technical inputs. Thirdly, it integrates institutions because having a common goal and developing solutions to a particular problem helps them to cooperate with each other.

With an action plan in hand, the community need not wait to initiate action. Development professionals have done a big disservice to suggest that communities have to wait for external support to take action. When plans are organized and resources are focused, the community does not have to wait at all. The PRA process also creates local leadership. I believe that this process is far more sustainable than some projects that are planned externally and brought in from outside.

Research needs. Our work to date has revealed four areas that need more research in order to improve the PRA process:

- **Scaling up.** Expanding the process from one village to an entire region is a challenge. We are working on this in Madagascar and Kenya.
- **Stratification.** We still have problems with community stratification; there are still disparate elements—class, gender, religion, age, education, and income. We need more research on how to make this work effectively.
- **Implementation.** We need much more research on implementation, especially in managing the follow through.
- **Monitoring and evaluation.** Participatory techniques have a huge potential for conducting cost-effective monitoring and evaluation. Again, we are just getting started.

CONCLUSIONS

In areas where we have used participatory rural appraisal, we have been able to link local institutions with those at regional and even national levels. The PRA methodologies are known. They are simple; case examples are available. African institutions are now running their own training courses.

PRA is not an ultimate solution. It is an analytical tool. It has aches and pains and shortcomings. It is not the end-all, but it is a way in which people can organize

and mobilize their own information and energy. It is a means to develop local ownership of population and environmental programs.

PRA is needed to strengthen local institutions because they are at the center of community development. Also, keep in mind that PRA is a part of that larger mix of government and donor agencies, all the way down to the people.

What do we need to do about PRA? There are four hypotheses that need further analysis in the context of community participation:

1. Does an increase in income equal an increase in conservation?
2. Do increases in income decrease fertility?
3. Do increases in participation increase conservation?
4. Do increases in participation decrease fertility?

Those four questions would be a marvelous research exercise to carry out if we want to integrate environment and population.

We need to focus on the nature and capacity of community institutions. We also need to help institutional partners to initiate pilot projects, do more training, and conduct more research on scaling up, stratification, implementation, and monitoring and evaluation.

Biodiversity and Rural Development Programs

WILLIAM WEBER

Director of Conservation Operations, Wildlife Conservation Society

BIOLOGICAL CONSERVATION IN RWANDA

I will presume that most of you are familiar with the predominant paradigm in the conservation field during the 1980s, which is the attempt to integrate the interests of conservation with those of human development. This was a very interesting process that involved about two parts theory and one part empirical data.

In Rwanda, we developed a project that combined conservation and development. The Virunga volcanoes in northern Rwanda form the boundary between Rwanda, Uganda and Zaire. The ecosystem is montane rain forest, but a very low diversity rain forest. The rain forest is at the end of its altitudinal and ecological limits as it rises as high as 14,700 feet. In Mount Karisimbi, the forest disappears entirely and snow falls occasionally.

The Virungas are home to the last remaining population of mountain gorillas. To a large degree, international concern about these gorillas is due to the work of George Shaller, Dian Fossey, and others at Rwanda's Karisoke Research Centre. They showed that the gorillas are very peaceful creatures. They live in very large, stable, generally polygamous family units, maintain a vegetarian diet, and have a peculiar affinity for humans.

International attention. This very special creature, however, is disappearing. Between the late 1950s and 1973, the population of mountain gorillas was cut almost in half, primarily due to habitat loss and direct hunting to sell curios to the tourists. Although people continued to do research on gorillas during this period, no one was really studying the reasons why local residents did not care about the gorillas. Through a series of films, articles, and books, worldwide support for mountain gorilla conservation had been developed. Yet conservationists had not tried to understand local interests, needs, and outlooks, nor had these very important local groups been mobilized in the interest of conservation.

Research on causes of gorilla losses. In 1977 we conducted a mini-interdisciplinary study to find out what was really happening to the gorillas. Amy Vedder studied the gorillas living in the park and found that the gorillas were reproducing very nicely, at a rate of roughly 2 percent per year. The problem was that other impacts were killing them off faster than they could naturally reproduce themselves. She also looked at their basic requirements. Given the habitat losses, were there enough food resources left to maintain the population, particularly if their numbers returned to higher levels? Basically she found that they live in a salad bowl; whatever they want is almost always within reach.

My work was primarily to assess pressures from human settlements outside the reserve. The inhabited area surrounding Volcanoes National Park is very densely populated, with more than 400 people per square kilometer, particularly up in the very productive lava zone. Farmers in this area care for the land and manage the farm resources well, although there are areas with gully erosion. The problem now is that people are moving increasingly into very steep marginal areas. Even there they are trying to put in terraces and hedgerows, but it is extremely difficult. Adding to this pressure on the land was a lack of non-farm employment in a rural economy.

Low priority to conservation. We surveyed the people in this area regarding their perceptions of the land shortage problem and other concerns. I have to point out that biodiversity did not rank in their top 10 or 20 concerns. Their major concerns are land, water, poverty, and education. When they were asked specifically about wildlife concerns, they had little direct interest in conservation. They did recognize the value of the watershed and the potential economic benefits of tourism development, but more than 50 percent of the people in this area still thought that the park should be abolished completely and turned over to agricultural settlement.

Tourism and local initiatives. These research findings led to establishment of the Mountain Gorilla Project in 1979, which supported a three-pronged initiative involving park security to prevent poaching, tourism to generate income and employment, and two-way communication with villages. We found that people from around the world will pay up to \$200 a day to sit near a group of free-ranging wild mountain gorillas. We also learned that people enjoy getting out of zebra-

striped mini-buses and hiking through an area; they don't have to see gorillas. This observation became the basis for what later was called ecotourism, which we have also applied to several other forest projects in Africa.

We found that you can make a lot of money from gorillas. In 1989, tourists paid more than \$1 million in direct park entry fees and spent an additional \$3-4 million while visiting Rwanda. These funds were generated by only 7,000 visitors a year. Thus, the ecological impact on the park was very low. Consequently, the gorilla population that had fallen to 250 gorillas bounced back up to 320 within 10 years of the project's initiation. This is a very rapid turnaround for a large, slow-breeding creature.

More supportive attitudes. While local Rwandans may not have turned into gorilla huggers, they have much more positive attitudes. Follow-up surveys found that more than 80 percent of the people think the park is a good thing, generating economic benefits and employment. The education program has passed on other values as well.

Pressures on land resources remain. Outside the park, however, many problems remain. Demand for land and fuelwood remain high. At my urging, USAID established a project to look at land resource issues in the watershed that covers most of the administrative region of Ruhengeri. For three years I worked with a team of Rwandans looking at soil erosion, deforestation, wetlands drainage, lakes, road construction, urban growth, health issues, and the park in order to identify approaches that could lead to healthy, ecologically sound development in this region over time. The government of Rwanda, USAID, and the donors acted on several of our recommendations, but, at the moment, all of these activities are on hold because of the civil war that started in 1990.

CHALLENGES TO THE INTEGRATED CONSERVATION AND DEVELOPMENT MODEL

Our experiences in Rwanda helped to formulate the integrated conservation and development model. Our approach was well-suited to a very fragile area with special biological resources. The area has many endemic species and is very densely populated. The same context exists in the highlands area of east central Africa—in Uganda, Rwanda, Burundi, and eastern Zaire. The model applies well in these areas.

However, there are other areas that challenge the integrated conservation and development model. Some problems with its application can be observed in several areas.

Preserving traditional cultures in Zaire. In the Ituri Forest in eastern Zaire, we are looking at the causes for the near total conversion of the rain forest cover to agricultural land along its eastern edges. People are migrating out of the more densely populated highland. Some of them come all the way from Rwanda. The road creates a linear frontier through the forest, and all along it you see the impacts of new migrants on the forests, wildlife and traditional cultures. Many of the

indigenous Mbuti pygmies and other local people would like to maintain their traditional lifestyle.

The Zaire government has recently agreed to create a reserve here. Decisions are needed regarding the type of reserve it should be and the kind of development to be promoted in the area. Many tough questions remain, such as: should the traditional cultures be frozen as a kind of living museum piece, or allowed to pursue modern development options like other people? If so, how far can they develop and with what impacts on the forest and its wildlife? Also, should the development focus be on the forest fringe, the migrants, or the highlands from which they came?

Dilemmas in promoting conservation. Several other issues remain:

- **Hunting.** How does development deal with hunting? This is a concern in several projects. For many men, their whole way of living is wrapped up in being a hunter. What will they do if they are unable to hunt?
- **Logging.** Logging is a potentially important but totally mismanaged sector in most countries. It opens up the forest, which has major impacts on wildlife. For example, the highest concentrations of elephants in Africa are not on the East African savannas; they are in the rain forests, particularly in southeast Cameroon. Yet logging roads open up areas to market hunting. Logging also affects indigenous forest peoples through boom-bust economic cycles, social disruptions, disease, and prostitution. No one is controlling logging operations. If the major donors abandon forestry projects, some private logging consortium will come in and clear the area without any concerns.
- **Rationale for donor support.** Our project in northwestern Congo provides another problem for integrating conservation and development. The Congolese government has agreed to set aside 5,000 square kilometers of rain forest in the Nouabalé-Ndoki area for a reserve. This very pristine forest has incredible wildlife populations—elephant, bongo, and many other species. But there are no permanent settlements in the area. A village of about 200 people is located on one side, and a village of 50 on the other. Where do you put the development emphasis? Do we have to have a development focus on these conservation projects to qualify for USAID money? Or is the U.S. interest in global biodiversity conservation sufficient?

These situations raise some very tough questions.

CONCLUSIONS

Sustainable use. Integrating conservation and development poses some problems. One is definitional. It is difficult to define development. I don't think most people accept qualitative definitions of development. Mostly, it involves some

increased production or consumption component. In trying to protect very sensitive rain forest areas, we are trying to develop modes of sustainable use. However, sustainable use is not the same thing as sustainable development. Sustainable use involves exploitation of excess biological production. We may be able to work out forms of sustainable use for certain kinds of forest resources such as plants and animals, but we cannot use these areas as engines of development. So we really ought to change our terminology on this critical issue.

Protecting wild areas. The second problem I have is spatial. While we do not know the rules of the sustainable development game yet, we have decided that the playing field is these last remnant wild areas. Let's start focusing sustainable development programs on already converted areas. Let's apply sustainable development principles to existing agricultural areas to improve farming practices and develop industries in similarly appropriate areas. Perhaps we need to sacrifice some areas to achieve some heavy-duty development. But let's not put all the development onus on these remaining rain forests. They cannot bear that burden. Furthermore, they are not appropriate areas: they tend to be in remote areas therefore lack access to markets as well as a developed human resources base.

Education is highest priority. Does that mean that those of us working in biological conservation are ready to forego donor funding so that aid agencies can return to the more traditional agenda of agricultural and human resource development? Particularly in the area of education, I would say yes. I would rather not go without the money, but all of my surveys show that the people who have the most conservation-oriented attitudes are those with higher levels of education, i.e., at least six years of primary schooling. Comparable education levels have also been shown to be correlated with support for family planning, improved agriculture, enterprise development, and other key activities. In the long run, it is the best thing we can do for conservation and development in Africa.

Conflicts between conservation goals and local development needs. Finally, there are inherent conflicts between conservation and development that must be acknowledged. If we were going to change development in this country, which we should, we would go first and foremost to the agricultural heartland and the industrial zones, not to Yellowstone. Also, if we were to go to Yellowstone, we would not give the local ranchers total control over management at that national park. I think that is for the better. Dealing with local populations in the conservation of biologically and ecologically sensitive areas is difficult. The question and degree of participation needs to be looked at carefully.

We will go a lot farther in this grand experiment we are now conducting if we acknowledge those conflicts, monitor what we are doing, and develop improved systems to reduce those conflicts as much as possible over time.

DISCUSSION

► DAVID SHAPIRO: *Contraception as a Means of Preventing Abortion and Impact of Education on Fertility*

High incidence of abortion. In regard to Wanga's points about abortion, I have been studying fertility behavior in Kinshasa with a colleague from Zaire. As part of a broader pregnancy history, women rather freely reported their previous abortions. We found an incidence of abortion of about 15 percent of all women who had ever been pregnant. This figure probably understates the actual level because the survey misses women who do not survive illegal abortions. Our findings are consistent with some of Wanga's points. There is a distinctly high prevalence among relatively younger women. There are also positive associations between the incidence of abortion and schooling as well as employment in the modern sector.

These findings have some implications with respect to both the demand and supply sides of family planning. I would argue that in the early stages of fertility transition the lack of ready access to modern contraceptives among urban populations is likely to lead to increased abortion, reflecting the demand for controlling fertility. From that perspective, increased contraceptive availability should ultimately have the effect of reducing women's recourse to abortion.

Modernizing effect of education can increase fertility. In regard to the importance of education for fertility reduction, I want to emphasize that many national surveys and other studies in sub-Saharan Africa have found that women who have had some primary schooling often have higher fertility than those with no schooling. This difference has been attributed to essentially a modernizing effect that contributes to erosion of extended breastfeeding and post-partum abstinence. When these traditional birthspacing practices are curtailed and not replaced by contraceptive use, fertility increases.

We should not assume that provision of universal primary education in and of itself will lead to declining fertility. If schooling is viewed as a means toward fertility reduction, policy makers must be prepared to provide secondary-level schooling.

In addition, couples need ready access to family planning services. Conservative attitudes still prevent people from using contraception. For example, I was worried that the 18-year-old daughter of my close friends in Kinshasa might become pregnant. When I asked her older brother whether anyone in the family had discussed with her the risk of becoming pregnant, he replied that his family did not want to talk to her about it because she would think they approved of her behavior. I felt as if I were in a time warp back in the 1950s in the United States. This short-sighted approach can only lead to more unwanted pregnancy.

Reducing fertility in rural areas. My comments pertain more to the urban sector than to rural areas. Since most of Africa's population lives in rural areas, strategies to stimulate fertility reduction in rural areas will be important. The linkages between population and the environment are most pertinent in this

respect. Education and development programs that provide alternatives to living off the land are imperative in order to bring about fertility declines in rural areas.

► **WANGA GRACE MUMBA:** *Traditional Methods of Family Planning*

In regard to encouraging rural people to reduce their fertility, the key is to provide access to family planning. It has taken a long time, but peoples' attitudes about family planning are changing. People already know a great deal about traditional methods. We need more research to determine which methods are effective and safe. If we have a breakthrough in identifying effective traditional methods, we can tell people about all available services and leave the choice to the couple or individual.

► **FATHY SALEH:** *Political Aspects of Deforestation and Techniques for Ensuring Local Participation*

To what extent does deforestation have a political overtone, and what do we do to convince a local government to seek economic alternatives to deforestation?

Also, how do you effectively gain the participation of the locals? Do you employ some of the staff in your project? Do you market the ideas or do you seek advice from national leaders in encouraging local participation?

► **WILLIAM WEBER:** *Controls on Logging Essential*

With regard to deforestation resulting from logging and clearing of rain forests, I am not sure there is an economic alternative unless valuation systems are radically changed. There are extremely important reasons at all levels—local, national and global—for continuing to focus on biological diversity. But in the short term it is very difficult to come up with alternative values. For example, we estimated that the standing value of the hardwoods on the reserve in northern Congo was close to \$80 million. Asking the government to forego these revenues is a huge sacrifice for them to make.

I believe the logging sector in Africa is important. It will be developed by somebody, and I would like to see some international efforts to make it a more rational system that actually brings benefits to governments, not just to a few people who get paid off—where taxes are paid and local employment is generated. We also need to smooth out some of the bumps that come with what is almost by definition a boom-bust economic activity.

Our role is to work with these governments to identify the most biologically important areas in their countries, set up reserves, and devise conservation systems such as parks or programs that involve working with the local populations. Once the government has set aside 8-10 percent of those areas, they are going to log. I think they ought to log. The task is to come up with good systems of sustainable, economically viable forest use. The private companies will not do this. Unless rules and controls are established and conservation agencies become involved, the forestry sector will be very badly managed.

► RICHARD FORD: *Encouraging Local Participation*

In terms of how to get participation started, the most effective means that we have is to get one village going. It is an interesting process because the participation group does not bring money and does not give any signals regarding its sectoral interests, such as a tree or water spigot on the door of the land rover. In some cases the community does not know what to say because they are used to sector-specific assistance.

Villages figure out the synergy of the process pretty fast. Once they organize themselves, they can obtain assistance from technical experts and NGOs. The system expands throughout an area. We also consciously move people from one village to another to share their experiences, especially between people with similar roles or expertise.

► JEROME WOLGIN: *Rationale for Conserving Rain Forests*

Bill's presentation leaves a real question: why should anyone in these places protect rain forests? They have less economic value than the logs and are not able to provide a sustainable income for the people living nearby. In whose interest is it to save the rain forests? How can you create an incentive system that saves them?

► WILLIAM WEBER: *Local and Global Benefits of Conservation Programs*

I think there are definite interests for local populations. In regard to sustainable use, these forests have served as the basis of not just local economies but the development of local cultures over time. It is the forests that will allow them to continue to pursue their own options. Maybe they will decide to move farther down the development path in the future. As long as the ecosystem is there, they preserve their options.

Compensation for preserving rain forests. On a global scale, there are many other values. Recognizing that among many other inequities in the world the South has the overwhelming mass of biological diversity on our planet, a transfer of funds from the North can be justified. We live in a very impoverished ecosystem in this country, and that is one reason we can get away with abusing it. We have to recognize that we are asking the South to make sacrifices for the global good. The U.S. has exercised our global interests in many other ways in the course of my lifetime that I do not support. This is one that I think is highly defensible.

The institutional mechanism for transferring these funds is unclear. Ideally, it would be preferable for it to come from the private or NGO sector, but we cannot raise enough funds to offset these costs. When you ask the Minister of Forestry to forego the use benefits on \$80 million worth of logs, it is important to specify the benefits associated with a conservation program. In northern Congo, these take the form of multi-million dollar assistance package over many years, and other benefits will accrue in the long term.

Overlapping sectoral interests. I am only arguing against overlapping conservation with development programs. Recently, programs such as biodiversity have become popular and received special earmarks. Then aid agencies put other development programs under this category in order to reach the earmarked spending level.

► JEROME WOLGIN: *USAID's Domain*

I don't disagree that the U.S. may have an obligation to support biodiversity as a global resource in which we partake, but should USAID, whose focus should be on development, be financing these programs?

► WILLIAM WEBER: *Need for Mechanism to Support Biodiversity*

One of the problems in international conservation right now is that many U.S.-based advocacy groups do not work internationally and think that every last individual plant or animal, let alone species, has got to be saved. That is impossible, as we all know.

I believe that it is in the interest of the global community as well as the U.S. government to put funding into this area. The proper mechanism for that is unclear to me. I have watched very good people in USAID try to deal with elephant earmarks and other species-specific mandates; this strikes me as absurd. Somebody needs to sort out where this money is coming from and the most efficient mechanism for providing it. It may not be USAID. Perhaps it is another agency, or more direct transfer through credible NGOs.

► JEROME WOLGIN: *Value of Products from Rain Forests*

Do you think that there is sufficient value in the medical or genetic materials found in rain forests? Would it be worthwhile to preserve rain forests if you could somehow transfer the ownership of genetic material found in them to the government?

► WILLIAM WEBER: *Complexities of Calculating and Distributing Benefits of New Drugs*

The plant that so far shows the greatest potential for combatting AIDS was discovered last year in a forest reserve in western Cameroon, by Duncan Thomas from Missouri Botanical Garden. We are dealing with a lot of uncertainty and long time-frames. That is the problem with the economic calculations of the potential value of drugs. If drugs are developed, are the governments going to benefit? If those governments benefit, are they going to remit those benefits to the people who actually live in that area? These are very complicated issues.

► RICHARD FORD: *Community Receptivity to Conservation Programs*

There is not always an inherent hostile tension between parks and people. Often the communities adjacent to the parks have a positive attitude toward preserving the trees, animals, and other resources. It is a question of where you start

and how you take the initiative to promote conservation. In our project in Madagascar, we did six community assessments surrounding the park. In every case, the farmers who are contributing to habitat destruction are prepared to look at a whole range of alternatives.

► GARY BOMBARDIER: *Sustainability of Conservation Programs*

If I am a local farmer or a government minister, why shouldn't I be interested in preserving the forest for as long as you will provide resources to me? When you no longer provide resources to me, then I will have the forests to do with as I wish. Are investments in biodiversity and conservation likely to be sustainable in the long term?

► WILLIAM WEBER: *Balancing Immediate Needs and Long-Term Benefits*

Ecotourism. Let me point out that in the face of a civil war the Rwandans have continued to invest in the Virunga park. When revenues are generated directly, such as in tourism, people will support it. In fact, that park pays for all the guards in two other protected areas. It has not been mentioned that Rwanda has 16 percent of its land in natural areas. They really deserve more credit than they get for that. They spread the money around.

Developing ecotourism in lowland forests is really hard. I just did a review of all the rain-forest-based tourism projects in Africa. Once the scene shifts from gorillas and highlands, tourism drops off to virtually nothing. Not many people are interested in swamp stomping for a vacation.

In many cases, governments are not going to make a fortune from protected areas. This is where logging could come in. We shouldn't put these wild areas on the dole forever.

Long-term value. I think people do come to recognize the value of these areas over time. But these are very difficult times for Africans, and it is difficult for them to put biodiversity at the top of their priority list. Given the overwhelming interest we have in protecting these areas, we ought to invest in it.

If the forestry sector could generate some income, these funds could be recycled into conservation over time. It does not take much to pay for forest management, particularly if local communities see some interest in these areas and have some options regarding their use. If communities are supportive, then governments do not need to have lots of guards with guns and airplanes and the long-term maintenance costs will not be that high.

The forests have very high potential in the long term. In the future, more sustainable forms of development may be devised. Meanwhile, we shouldn't use these areas as testing grounds for uncertain technologies.

► GAYL NESS: *Forests a Major Source of Water*

We do not have to value forests just for their potential exotic medical supplies. One of their major products is water, not logs. If we could simply value that water

more effectively, there would be good economic reasons to preserve forests. It can be clearly demonstrated that when forests are cut, the water supply dries up, and crops cannot grow.

► WILLIAM WEBER: *Weaker Effects in Lowland Areas*

Regarding the value of water, I think that people in mountain areas pick up on that very quickly, but water shortages do not seem to show up as quickly in lowland areas.

► ASIF SHAIKH: *Strategies for Sustainable Development*

Importance of biodiversity per se. I agree that at some level we have to separate biodiversity from development. Otherwise, you lose the essence of the biodiversity argument if we are just talking about sustainable use. Eventually you get into maximum use in a very short term. The time frames we are talking about are longer.

Balancing environmental and development goals. But we really have to think about the idea that we may want to focus development somewhere else and pollute some areas heavily. How much are we willing to give up elsewhere in the environment? One strategy for sustainable development—clearly not a very workable one—is to say that we want everything simultaneously to be sustainable at all times. An alternative strategy is to focus our attention on what we want to preserve. If we cannot say what we are willing to pollute and which natural systems and trees we are willing to lose, then we cannot really make the case for what we want to preserve.

Process for making choices. The toughest issues for a policymaker are choosing among these alternatives and allocating resources. Policymakers constantly face the problem of what to do with a limited and diminishing pool of resources. As development assistance diminishes and possibly ends in certain countries, the least we can do is to recognize the function of external agencies in that process. Many governments are very dependent on donor money. As USAID pulls out, it is important to avoid disrupting the programs that are left behind. Rather than focusing our money on today's priorities, we should help governments develop a process of strategic decision-making. Part of our legacy should be a decent process for making choices.

► PAUL HARRISON: *Compensation for Communities near Preserves*

When we preserve an area as a wildlife sanctuary, most of the costs actually fall on local people rather than on national governments. Donors need to make sure that local people are compensated as effectively as possible. One \$4 million project in Madagascar that I observed allocated only about \$100,000 for community

initiatives for local villagers. The rest of the money was spent on salaries and housing for U.S. nationals, student visits masquerading as technical assistance, and imported furniture. If locals are not adequately compensated, they will develop resistance and turn into poachers.

► WILLIAM WEBER: *Monitoring Systems and Continuity of Funding*

Assessing progress in conservation. We are entering a period of great experimentation in terms of trying to make wild areas sustainable and identify economic benefits. Right now, it is more of a cohabitation between conservation and development rather than a marriage. As with any good experiment, we ought to monitor what is going on. We are doing extremely little of that. We have almost no good baseline data. No self-respecting ecologist will tell you he/she really knows how to take the pulse of a rain forest. We cannot determine whether a rain forest is doing any better today than it was five years ago, unless it is cut down. Similarly, we can track species extinction only after a species totally disappears.

Barefoot biologists. We need baseline information and monitoring systems that are replicable, comparable between areas, and doable by local people. Then we need a training program for “barefoot biologists”—local people who can monitor environmental trends over time. People with a Ph.D. are not needed for these jobs. Monitoring may not be a major source of employment, but it is a sustainable kind of employment and can be continued through the private sector.

Moderate income flows. The Wildlife Conservation Society worked in ecologically sensitive areas before USAID had a biodiversity program, and we expect to be there after USAID is gone. We are much more interested in sustainable flows of moderate levels of income than we are in trying to spend millions of dollars in a very short period of time. You are asking common garden-variety garter snakes to swallow massive amounts of food like big boas. In a lot of cases, we are choking on it. Everybody is better off with a steady flow of income.

► RICHARD FORD: *Conservation as a Catalyst for Intensification*

In Madagascar, we were told that the farmers had no interest in converting from slash-and-burn techniques to intensive agriculture. That is not what the farmers said at all. They are ready to intensify. They wanted access to inputs and were willing to pay for them; their concern was to change the system so that inputs could become available in isolated and remote areas.

If we can use the need for park preservation to accelerate the process from extensive to intensive agriculture, with external funds paying only to energize the system, that is a fantastic accomplishment. And the park may survive as well.

This social, economic and cultural change is internally generated. That is by local choice and not by some external imposition.

► MARTIN HANRATTY: *Linking Community Needs to Government Services*

Ten years ago when I worked in villages in Bangladesh, there was a great deal of discussion about the problems associated with extending participatory development and linking it with much broader government institutions that could deliver services. There seems to be little progress in this area over the past decade. Why do we know a lot about working in villages but very little about how to get the government to support these programs?

► RICHARD FORD: *Need for Common Problem*

This is a very complicated area that we need to know a lot more about. We have been able to do it in several cases. In Machakos, Kenya roughly 20 villages joined together to address the problem of lorries from Nairobi scooping up sand and destroying their water systems. They joined together because they had a common problem.

Local institutions need to have reasons to come together. I am not convinced that there is an external way to do it. We need to understand much more about the constituency and about the synergy needed to bring these groups together.

► MARTIN HANRATTY: *Achieving Consensus on Regional Problems*

If you do not come in with a prescribed set of problems that people are going to address, how do you get closure on a problem that can be dealt with over a region?

► RICHARD FORD: *Organizing Communities to Address Regional Problems*

Sometimes there is no closure on it, and sometimes we have to subdivide an area so that it is not an administrative region. Sometimes the area is a river basin and the common theme may be soil degradation. Problems do not always follow administrative lines, so we need to have different ways of organizing groups and institutions.

There is no problem getting the people to identify what they want to do and how they are going to do it. The question is how to develop clusters of activity around the various issues such as soil, family planning and health. We need to keep it flexible.

Synthesis: Project Interventions

POLITICAL INFLUENCES

Policymakers influence every stage of international development programs, including setting funding levels, earmarking funds to specific activities, deciding how projects will be structured and implemented, selecting implementing agencies, organizing community members, and linking institutions. Just as USAID's programs

are constrained by political mandates, so are development programs shaped by the views of national, regional and local policymakers.

Much can be done to enlist the support of policymakers. They can be valuable allies or immovable obstacles. Hence it is better to keep them informed of your programs and ask for their assistance, rather than ignoring them, according to Wanga Mumba.

INTEGRATED CONSERVATION AND DEVELOPMENT PROGRAMS

Conservation agencies are seeking ways to preserve ecologically sensitive areas while generating income for local people. Sometimes this intersection of interests is beneficial, but in other cases it is problematic because of conflicting objectives and priorities, according to Bill Weber. For example, ecotourism has worked well in northern Rwanda, where a relatively small number of tourists generate large revenues while preserving the mountain gorilla's last refuge. However, ecotourism seems to work best in highland areas with special biological resources. Lowland areas are not as attractive to tourists, and other sources of income must be developed.

Conflicts arise when cash-strapped governments look for ways to raise incomes, create jobs, and provide farmland for growing numbers of landless peasants. Wild areas are seen as the last frontiers whose resources can be exploited for quick profits. The biological value of ecologically sensitive areas such as rain forests cannot be easily measured in monetary terms. Biological assets include rare plant and animal species, water retention, and substances that could yield important drugs and other commercial products. In contrast, logging appears to be a faster, surer source of revenue, even though it usually destroys the forest in the process.

Protecting biodiversity is globally beneficial. If developing countries are asked to forego the immense revenues associated with logging, governments and local communities should be compensated for preserving forests and other wild areas. Rain forests can generate some income for local communities through low-impact tourism and sustainable use of forest products, but it should be recognized that they are unsuitable as the mainstay of economic development programs. Prospects for raising incomes are still greater in areas already used for agriculture and industry.

Governments need to decide which wild areas should be preserved and to establish controls over commercial logging. Income generated from ecotourism and forest products should be invested in conservation programs and shared with local communities. Communities that derive some benefits from nearby preserves are more likely to protect them. Security becomes less of a problem, thereby reducing maintenance costs. Special attention should be given to ensuring that traditional cultures are not harmed by logging, road-building, land-clearing and other development activities.

COMMUNITY-LEVEL PROGRAMS

Local institutions are the key to sustainability. When local groups are actively involved in project design and implementation, they take on ownership and are more likely to continue the project when donor funding ends, compared with externally imposed projects. Community involvement is also more likely to lead to integrated programs than external initiatives.

Promoting community participation must be done systematically, according to Dick Ford. Outside experts should respect the fact that villagers know a great deal about local conditions. Participatory rural appraisal is a tool to develop community actions. It has four steps: soliciting inputs from community members; organizing information about the village; mobilizing community institutions; and developing program priorities and an action plan to address community needs. This process can serve to integrate sectors such as population and environment and to create community ownership of the resulting projects.

IMPLICATIONS FOR DONOR AGENCIES

Program priorities. Female education is associated with conservation-oriented attitudes, and hence could benefit biodiversity and forestry programs. Since it is also beneficial for other sectors such as family planning and agriculture, both environmental and development experts believe that female education should receive high priority for donor funds. One caveat should be kept in mind: increased female education could increase fertility in the short term, since women with a few years of primary school are less likely to practice prolonged breastfeeding and post-partum abstinence. Unless these traditional birthspacing measures are replaced by modern contraception, fertility will rise or women will resort to clandestine abortion.

Strategic planning. Donors should assist governments in developing a decision-making process for deciding on development and environmental priorities and determining which areas of the country will be developed or protected. This process involves inherent compromises; some areas may become severely polluted.

Funding for country projects. Donors should make sure that the lion's share of project funds remains in-country and that local people living near preserves are compensated for the loss of those areas. In general, it is better to have a moderate flow of funds than a large windfall that cannot be absorbed and is unsustainable in the long term.

Training and research. Monitoring and evaluation are major weaknesses of most conservation programs. The most effective way to provide careful observation of ecosystem changes over the long run would be to train local people as "barefoot biologists."

Adolescents. Donors have given scant attention to the problem of adolescent pregnancy. Many young women are risking their lives to undergo a nonmedical abortion and are dropping out of school once their pregnancy is revealed. Young men also feel the impact of unwanted pregnancy.

A.I.D. SENIOR PANEL DISCUSSION

QUESTIONS POSED TO THE PANELISTS

1. What have we learned?
 2. Are our programs going in the right direction?
 3. What changes might we make?
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MODERATOR: Cameron Bonner, *Deputy Director, Office of Analysis, Research and Technical Support, USAID Africa Bureau*

Margaret Bonner

DIRECTOR OF THE OFFICE OF DEVELOPMENT PLANNING
Africa Bureau, USAID

In reflecting on the past few days, I find that most of the views presented reinforced what the Africa Bureau believes. I will highlight the areas of consensus and discuss what we at USAID can and cannot do about these issues. I also want to mention some of the internal and external problems that we have in trying to respond to these issues.

AREAS OF CONSENSUS

Interdependence of population and environmental problems. One of the main points is that we cannot look at population or environment as a vertical problem, nor even as a horizontally linked problem. The two are really very interdependent, not only upon each other but on a lot of other areas of development. Female education came up over and over again. In addition to these sectors, we also have to worry about policy, both at the macrolevel and at the sectoral level.

Preconditions for change. Kevin Cleaver suggested that perhaps we should not support programs to address population or environmental problems unless some of these other conditions are already in place. Although there is not full agreement on this viewpoint, we are going to need to take it into account as we look at our programs.

Integrated programs. Even though there was general agreement that we need to look at population and environmental problems in an integrated fashion, that does not mean that we need to return to doing rural development programs. Still, we need to push programs and countries to set up organizations that can

provide integrated services. At the local level, an integrated approach makes sense to address the many problems facing communities. Program support need not come from one ministry or organization, but these different groups should work together to address the problems.

Country-specific approaches. We cannot use packaged approaches to family planning or to the environment. Those approaches are not going to work. We as an agency have to look more at field-oriented, mission-oriented development strategies. We cannot adopt a global approach and be effective. We have to look at the country context and see where that country is in its development process, what the problems are, and whether other problems need to be worked on in order to have an impact on population or environmental trends.

Another rationale for the country approach to programming and design is the strong support for community participation, whether through NGOs, local organizations, or individuals. Program design and implementation have to take the needs and desires of local communities into account. We cannot do that unless USAID field missions are closely involved in country programs. Outside mandates for vertical programs also make it difficult to implement community participation.

IMPLEMENTATION

USAID has several problems in trying to implement an integrated approach tailored to each country:

- **Funding earmarks.** Our funding is oriented toward sectors and inputs. Under the Development Fund for Africa, the earmarked funds for this year include: 10 percent for family planning, 10 percent for health—including \$63 million for child survival, 10 percent for natural resource management and the environment (narrowly defined), and \$92 million for basic education. It is very hard to say if these programs are really going to have an impact.
- **Internal policies and structure.** USAID is organized by geographic areas and sectors, so it is difficult to bring together the necessary decision-makers to promote integrated programs. For nearly two years, an internal debate has been taking place regarding USAID's overall approach to development problems: Should we identify global problems such as population or the environment and then work primarily in those countries most severely affected, or should we focus on individual countries and seek to address their major problems in the context of their overall situation? I heard a lot of support for this latter approach during this meeting.

In regard to global problems versus local needs, Pamela DeLargy mentioned the problem of refugees in Ethiopia. I was there at the time, but USAID was not involved. The problem was that thousands of villagers faced with cyclical droughts would gather in refugee camps and be dependent upon the government and

donors. Yet they were unwilling to move from their drought-prone areas. How do you reconcile the desire of villagers to remain on degraded land that can no longer support them with the continuous pressure put on the government and donors to provide food for them? Long-term planning might convince people to move eventually or enable them to adopt better agricultural methods to improve crop yields, but it will not help when the drought returns within two years. Part of our problem will be reconciling global and country requirements with individual desires.

What can we do about it?

- **Country-level programming.** First, we need to continue to do country-level programming.
- **Strategic planning.** Secondly, we need to review carefully each country's five-year strategies to ensure that they are looking at the environment, population, and related problems. Although USAID may not operate in all sectors, other donors or government programs would be supportive of an integrated, country-specific approach.
- **Female education.** Thirdly, we will continue to emphasize female education, which has received more attention in the Africa Bureau in recent years. We may want to study the level of female education needed to have an impact on development. If primary-level education is insufficient and women need to attend secondary school, extending school attendance will greatly increase the costs for donors, particularly for countries with low levels of funding for female education.
- **Participation.** Finally, the "P" word came out very strongly. A few years ago the "P" word was private sector; now it is participation. We have been trying to look at this area, but we have a long way to go in terms of knowing how to do it. How do we as donors actually become involved in working with individual villages? Are we going to promote this approach within the public sector? USAID did support this approach for Indonesia's population program, which was a broad, participatory program with heavy emphasis on rural areas. In the early stages, we had 3-5 U.S. direct hires to monitor the program. However, most missions have only one U.S. direct hire for population programs, or often none at all. We have to balance this staff-intensive approach with the real constraints that USAID Missions face.

Another issue associated with participation is that it may not be easy to respond to the problems identified by individual groups. For example, Dick Ford mentioned that people near the forested areas of Madagascar were asking for agricultural inputs. This is not an easy task: the roads leading to those areas are poor, even in the dry season. Until new roads are built, or the old ones at least improved, it will be difficult to deliver inputs. It is very easy to say we need to listen to what the local people want. But that has to be put in the context of what we as donors are able to deliver.

► JEROME WOLGIN, *Director of the Office of Analysis, Research and Technical Support, Bureau for Africa, USAID*

I have been incredibly impressed with the quality of the discussion and the willingness of people to incorporate other perspectives in their thinking. We will take you up on your offer to take money from population and environment and put it into education.

I am very surprised at the amount of consensus, at least at the broad levels, about the key issues. I am heartened to see that Ester Boserup's insights still have relevance. The framework that Paul Harrison presented is a helpful way of looking at these issues. Then the question is what are the specific feedback systems and blockages to those systems?

I am also very pleased that both Paul and Michael were able to come from England because they have really helped in this discussion. The fact there are environments in Africa where people have managed to turn things around is very hopeful. We need to study those situations very carefully to understand the institutional, political and economic factors that led to those changes.

AREAS OF CONSENSUS

There are several areas of broad consensus:

Education. Education—building human capacity—is of primary importance because we know that it increases peoples' ability to earn income, both in the informal and formal labor sectors. There is also a lot of evidence that education, particularly for females, has important impacts on both improved child health as well as increased demand for smaller families. There is some question about the levels of education needed and the marginal rates of return, but there is no doubt that education is a primary building block for development. It is also important for democracy and political pluralism as well as conservation and the environment.

Land security. Land security is a fairly complicated issue. Nevertheless, there seemed to be strong feelings that unless people have security in the resources they manage they are not going to make investments in them. Applying this principle in specific legal and traditional environments raises a lot of questions. But there seems to be a great deal of consensus on the broad issue.

Policies supporting strong markets. If the feedback mechanisms depend on good signals, then clearly there needs to be well-working markets. Most of the constraints to well-working markets come not from market failures, but from inappropriate government interventions. One of the first things to look at is the way in which governments control markets and affect them, keeping them from signalling that there are scarcities or other issues so that people can respond. The reason that we do not value forests because of the water that they protect is that

the market does not internalize the watershed. Markets may not succeed in reflecting the total value of natural resources.

Family planning demand vs. supply. In terms of population issues, work needs to be done on both the demand and supply sides. Kevin Cleaver reminded us of our propensity to push supply before there is a demand. On the other hand, population experts contend that there is a large unmet need for family planning services. Unmet need is defined as all those women who would like to limit or space their children but are not using contraceptives. Does that mean that if we had contraceptive services available that they would use them? We should not automatically assume that because there is a 20 percent unmet need that contraceptive prevalence rates would rise by 20 percent if we just provided the services. Nevertheless, it seems to me that increasing the availability of family planning services provides a high payoff for relatively low costs. The projects costs of family planning services 10 years from now are daunting. I do not believe that they can be met without contraceptive users sharing some of the burden.

Time frames. I was interested in the question of time frames. John May talked about the fact that different issues had different time frames. Some were 100 years, some were two years, and some were six months. Many environmental issues have conflicting time frames, such as the 29th day argument. You do not get the signals that the system is in crisis until it is almost too late to act. We did not discuss time frames very much here, and I do not know in what sense the concept is valid.

Participation. There was much discussion about participation. We have to be careful with it. It is important to define the roles of the various participants in the development process—government, local communities, individuals, and donors. All bring certain strengths to the process. It is clearly not true that everything could be done at the local level, nor could everything be done at the macrolevel. Defining each group's roles and determining their strengths and weaknesses is an important issue that remains to be resolved. Donors bring a broad range of experience in other places and other times. Their advice is useful, although certainly experts do not know everything. It is a matter of bringing all those folks together to share information.

UNRESOLVED ISSUES

This meeting resolved many of the larger issues in my mind, but there are many specific issues that need to be resolved:

- **Resource allocations.** The most important one is how to make choices in allocating resources among the various interventions we have talked about and within each country. How do you compare the trade-offs between educational and environmental programs?

- **Community representation.** Secondly, how can we insure that this participation process is really representative of the people in the community?
- **Need for technology transfer and development.** Thirdly, we did not discuss the issue of technology very much. I do not know whether there are technologies on the shelf waiting to be used, or whether there is a need for developing new technologies.
- **Data analysis and monitoring.** Lastly, we have talked about the lack of data and the importance of identifying trends and monitoring change. Gayl Ness emphasized that data actually influences policy-makers. We have to do a better job of monitoring both the environment and the economy.

DISCUSSION

► GAYL NESS: *Community Participation, Factors Affecting Demand, Monitoring and Technology Gaps*

Value of dialogue among experts. I started sitting in meetings like this in 1965 when we created with USAID the Southeast Asia Development Advisory Group. The aim of the group was to create a sustained dialogue between academics and USAID staff working in Southeast Asia. It worked very well, and I would commend the idea of organizing a group of people to work on Africa. I do commend you greatly for setting up this meeting, which has been extremely useful.

Participation. In nearly three decades of sitting in meetings like this, the one thing that has changed is the sex ratio. That has been very good. This morning I counted 10 females out of 38 people. In 1965, there were zero females and 20-40 males. But the issues have remained the same—institution-building, program implementation, management issues, and participation. It is really quite striking. Participation has been high on the agenda all the time.

These remain issues that people have to pay attention to. Each new group of people becoming involved in development activities must be concerned about the dimensions of participation—how to initiate it and find the right people at the local levels. You must be constantly concerned about not only how you make decisions but also how to implement them in the field and build up local institutions.

The country context is important. Organizational and management studies have found that there is no one best way to organize anything. Organization depends upon the situation and the terrain. There is no silver bullet that you can design in Washington and apply in all the countries. You must look at the country context first and see what needs to be done.

Quality of services affects demand. On the issue of demand versus supply in family planning programs, I think that sets up a rather unfortunate mechanical dichotomy that we should avoid. If any kind of human service delivery program is implemented well, that helps create the demand for those services. When we find

low clinic attendance, it does not mean there is no demand. It could well mean that the delivery system is not well-organized. I would caution against a too facile division between the supply and the demand for family planning.

Monitoring. Markets are not the only signals we have. We must do a lot of other monitoring. For example, land use changes are very important tracers through this population/environment dynamic. They tell us when things are happening and what is happening. We can look at land use changes extremely well through electronic remote sensing. As social scientists, we typically look at arrays of statistics and make inferences about causal connections from regression coefficients. When you look at the physical distribution of areas from the air, you can see a lot more than with just the statistics. I know USAID is already using remote sensing in famine early warning systems and geographic information systems, but I would encourage you to push ahead on it.

Technology gaps. We should have talked more about technology gaps. There are many technologies that can be very important in Africa. For example, solar energy, wind energy, and biomass could be greatly expanded in Africa. Much of the research is being done in Asia under Japanese leadership. The Japanese are well ahead in solid state physics, and they are doing the best work in photovoltaics. Thousands of villages in India have been electrified with solar collectors.

► **MARIA BEEBEE:** *Global and Local Dimensions*

First, in reaction to Marge, for some environmental problems there is a need to think globally regarding causal factors but to act locally to find solutions. There are problems that have global consequences, such as unsustainable use of natural resources. By the year 2000 half of the world's people will live in urban areas, so urban and industrial pollution problems will grow. Then we need to consider global warming.

The Office of Environment and Natural Resources is part of the Agency for International Development. Our goal is sustainable development which is consistent with the goals of every regional bureau. In addressing global problems, we are trying to look at the root causes. We are saying that people need more options, whether through education or training. We are also stressing public participation, increased equity and access, and integrated policies, institutions and practices. That can be done globally, regionally, nationally, and locally.

► **DIRCK STRYKER:** *Setting Funding Priorities and Exploiting Existing Data*

Land security. I am concerned about the cost of the various measures we have discussed. For example, in regard to land security we do not even know whether the lack of land security is of major importance or not. People talk a lot about it, but we do not have any good microstudies that would really tell us whether it has been a major problem in the past. Perhaps Michael Mortimore could

tell us whether land security was a major issue in the case studies he presented. I think it was important.

Actually, land security is a very difficult problem to deal with. Developing codes and classifications is a start, but resolving localized problems of land security is a major undertaking, the solution of which is a long way off.

Community participation. Local participation is highly desirable, but it is very, very intensive in human capital. Do governments really have the resources devote to this?

Education. The nice thing about education is that you know what to do—how to set up schools and train teachers. We know that education has an impact, but we do not know how big that impact is. We do not have any quantities to measure. We do not know whether we are better off putting our money into education or into fertilizer subsidization. We really have no idea about the quantitative magnitude of these various effects.

Better use of existing data. In regard to monitoring, I had a recent experience in Rwanda with wasteful, duplicative research systems. We were supposed to set up a system to measure the impact of structural adjustment in rural areas. The World Bank was planning a huge survey, which looked as if it would not generate any results for at least five years. Furthermore, the government was already collecting most of the necessary data through existing surveys. Time-series data on market prices, which were gathered at 40 different locations around the country, could easily be compiled and analyzed. The Ministry of Interior gathered data on expenditures by the local communes; they were relatively well organized.

We have not begun to exploit all of the available data that are already collected. At a relatively low cost, we could use these data to define these questions or identify gaps that have to be filled. Ultimately, some of those gaps may have to be filled with surveys. Satellite imagery is a relatively inexpensive way of collecting data, if you can organize it. Many of the questions that we asked are really unanswerable unless you look at microconditions at the local level.

► MICHAEL MORTIMORE: *Land Tenure Systems in Kenya and Nigeria and Diversity in Resource Management*

Secure access guaranteed. To answer Dirck's question, both of the case studies are in situations where secure access to land and trees is guaranteed. These systems revolved within the boundaries of the customary traditions but have been consolidated under modern market conditions. In Kenya the government supplemented this system with land registration, which we considered to have marginal impact. In Kano, there was even a more marginal intervention in the 1930s.

Donors should support diversity in resource management. In regard to technology gaps, traditionally much donor activity has been devoted to plugging what we thought were technology gaps, only to find that the plugs were faulty. Practically every single detailed empirical case study comes to the conclusion that the technical resources of the managers of the environment are greater than had previously been imagined. They are more sophisticated and more adaptive. This does not mean that they are sufficient, however. In the Kenya case study, we found pluralistic technologies; they brought in innovations from anywhere they could get them, added them to the menu, mixed and matched, and came up with increasingly diverse options of resource management. The same thing has happened in Kano. I believe that the role of donors is to supplement and support that diversity and leave the decision-making to the managers.

► PAMELA DELARGY: *Difficulties in Expanding Female Education*

USAID constraints. First, I agree that earmarking makes it complicated to administer assistance. With the hiring freeze at USAID, it is remarkable that anybody can get anything done in Missions.

Tasks entailed in raising female school enrollment. We have talked a lot about female education as a partial solution to some of these problems. We should remind ourselves that female education is not a simple issue either. In regard to formal education, it is not just a matter of providing school places for girls. Other considerations include:

- **Costs of maintaining the current enrollment level.** Most countries cannot maintain their current primary school enrollment levels, much less improve them, because of the growing numbers of children in these age groups. Having enough schools, desks, books, and chairs is a major problem.
- **Changing attitudes about female education.** Improving female education will require tremendous efforts in raising awareness and changing attitudes within the family about the importance of educating girls. That is something we are not quite sure how to do, and it would be very expensive.
- **Household labor.** None of this will happen unless support is provided for families and households so that girls can be relieved of the chores they are doing now instead of going to school or doing their homework. These chores include fuel gathering, water collection, child care, grain grinding, and food preparation. If there are no girls at home to do these things, what does this mean for the mother? Does she want to add to her burden by sending a daughter to school? So this means real support at the household level in all of these other areas, not to mention improving the economic situation so that parents can afford to pay school fees and buy books.

- **Teacher training.** We have talked about the need to encourage girls to attend not only primary school, but also secondary school. Higher education is also very important. Most African countries need more female teachers to provide more female role models in the schools. That will require at least secondary education and perhaps additional training.
- **Gender biases in schools.** Changing gender biases in schools in many places will be a real challenge. In Ethiopia they completed a big study on gender bias in textbooks, and they are trying to rewrite the textbooks. Imagine the cost of printing all new textbooks just to change the examples they contain. They are also working on changing the attitudes of male teachers. Surveys revealed that male teachers had very poor attitudes toward female students and their attitudes were affecting the students' academic performance.
- **Employment opportunities.** When girls become educated, what are they going to do? Is there any point to investing large sums in providing primary education to girls who will not have access to employment or other opportunities to use their education?

The combined pressures of household chores, negative attitudes among family members and teachers, and lack of future prospects lead many girls to do poorly in school and drop out. Creating a supportive environment for girls is a complex undertaking.

► JEROME WOLGIN: *USAID Initiatives on Female Education*

In a few places, USAID is seeking to influence constraints on female education that can be changed. For example, in Malawi the system stipulates that if girls continue in school they do not have to pay school fees. The Ethiopian gender bias study is a sign of progress.

► MYRON GOLDEN: *Need for Continued Support of Agricultural Production*

Throughout this workshop, it has been fairly clear to me that agricultural productivity is a central part of the nexus between population and environment. All of these societies are still agrarian-based. We still need to promote greater agricultural productivity and improve agricultural technologies wherever possible. Where are we in this process? We seem to have backed away from emphasis on the agricultural sector and now we are talking about population and the environment in major ways. How can we achieve our objectives in those sectors if we are not heavily involved in the agricultural sector?

► JEROME WOLGIN: *Funding Limitations for Agriculture*

Agriculture is the one area of USAID funding that is not earmarked. The more earmarks are placed on other sectors, the less money is available for agriculture.

► MARGARET BONNER: *Linkages to Economic Development*

The purpose of this meeting was to look at how population and the environment mesh together. The previous two meetings focused on agriculture. Still, our discussions about population and the environment seemed to be separate from any concern about overall economic growth and equitable distribution. The role that population and environmental programs play in the grander scheme of things did not come across.

► MICHAEL FURST: *Need for Increased Capacity-building*

Another issue that we did not deal very strongly with in this session is capacity-building. The availability of trained Africans has not changed much in 30 years, while technical assistance has increased by about five-fold during this time. USAID used to do a beautiful job of training people but became disenchanted because people were not able to use their training on the job. Perhaps that has changed. USAID should consider major increases in funding for training Africans so we can reduce finally our own presence in African countries.

► JEROME WOLGIN: *Extensive USAID Support for Training*

We still spend an enormous amount on training, both in specific training projects and in training components of other projects. Right now, 3,000 people from Africa are in the U.S. for training.

The real issue is the institutional base in Africa. We have pulled away from dealing directly with African higher education institutions because of the morass that they are in. We have been working more indirectly to build small interventions with various networks as the opportunity arose. There is no doubt that higher education in Africa is a disaster and needs to be rebuilt, but I don't know where to start.

► MARGARET BONNER: *USAID Emphasis on Training Women*

We are continuing a lot of training in the U.S. USAID previously required that at least 25 percent of the trainees be female; that level has been raised to 50 percent. Training is designed to complement USAID programs, so some Africans are being trained in environmental topics.

► PATRICIA COFFEY: *Health and Human Rights Rationales for Family Planning, Cost Recovery, and Contraceptive Technology*

Health and human rights concerns. People have mostly discussed family planning programs in relation to demographic concerns. But people are also interested in family planning as a means to improve maternal and child health and to protect basic human rights. When we are talking about policy issues that are translated into programs, women's lives are actually affected by our actions. There is a lot of need for family planning in Africa. Much of the unmet need for family planning is for child spacing rather than family limitation, which suggests that the

maternal and child health rationale is widely recognized. The large numbers of unsafe abortions occurring in Africa attest to women's strong motivation to prevent unwanted pregnancy.

Need for subsidized family planning services. In regard to user fees for health services, the Office of Population has done some research on cost recovery, primarily with private-sector clinics in Latin America, where the programs are more developed than in Africa. The preliminary results show that family planning clinics can recoup a substantial amount of their costs by raising prices. However, a significant number of people do not return to the clinic for services but instead go to government services that are free. There will always be a need for free or subsidized family planning services that are easily accessible to low-income groups. The need for donor support for subsidized services is likely to continue for some time to come.

New contraceptive technologies. Regarding technological gaps, there are a lot of gaps in contraceptive technology. The Office of Population has been supporting research to develop new, more user-friendly contraceptive methods. Women's health advocates would like more woman-controlled methods of fertility regulation, and some methods under investigation will meet this need. The U.S. Food and Drug Administration has just approved the injectable Depo-Provera and the female condom, so new methods are becoming available. Having a broader selection of methods will increase contraceptive prevalence.

► **WILLIAM WEBER:** *Need for Consistent Program Priorities*

In regard to changing priorities, USAID and other donors are characterized as switching from sector to sector and doing something different every few years. If you are considering moving back into rural development or increasing support for education, it is important to be prepared to stay in these sectors for the long haul. It is hard to maintain a commitment to such long-term efforts because there are no immediate results. Donors want results. You cannot always show them. Three years from now, will there be another set of meetings with yet another new set of priorities? The cumulative effect of these shifting priorities is starting to show up in many of the countries where I have worked. In wildlife management, we change our approach gradually, but in the past 5 years maintaining consistency in our programmatic area has been difficult because of shifting donor interests.

► **PAUL HARRISON:** *Donor Allocations to Human Resource Development and Africa*

Regarding funding priorities, the amounts allocated to human resource development are low. Only about 25 percent of official development assistance from the OECD DAC is allocated to human resource development. Two years ago, USAID allocated 15 percent of its foreign aid to this area. It should be raised very substantially—at least doubled or tripled.

Furthermore, only 12 percent of U.S. foreign aid in 1991 was allocated to Africa, compared with 48 percent in the U.K. right up to 60 percent in the Nordic countries. Africa is the neediest region in the world. We should all push to increase the U.S. percentage right up there with the European countries.

► MARTIN HANRATTY: *Differential Foreign Policy Interests*

We will if you accept that we have also contributed to Israel and Egypt.

► JEROME WOLGIN: *Decentralization Contributes to Cyclical Effect*

I agree with Bill Weber that one of the worst things we have been doing is going through fads. USAID goes through even larger shifts than other agencies because we change at the center, then the message gets out to the periphery and they change, they move too far, we change, and the pattern repeats itself. For the most part, the USAID staff knows what to do, but our leadership keeps on changing. Buzz words change.

► MARTIN HANRATTY: *Funding Mandates from Congress*

It is not the leadership. Basically the earmarking system restricts how we spend our money.

► PATRICIA WAAK: *Value of Political Support for New Directions*

I was on Capitol Hill when the earmarks were placed on the Development Fund for Africa. They occurred because the USAID representative told Congress that if he had flexibility, he would use all of the funds for agriculture. Members of Congress and the public want a broader approach, and hence the earmarks were imposed.

Foreign aid allocations involve a political process. Advocacy groups are willing to support good programs in the field, but they need adequate information about them. They are not willing to have one political judgment imposed, especially when they are working in the same countries and they realize that is not the approach that should be used or that the local people want for themselves. There has to be a partnership between the government and the private sector if development is going to work.

► JEROME WOLGIN: *Concluding Remarks*

On that note, let me thank you all for coming and making this an exciting meeting. I really appreciate your active participation and the fact that you all stuck it out to the end. Thank you very much.

Synthesis: A.I.D. Senior Panel Discussion

PROGRAM PRIORITIES

Designing interventions to address population and environmental problems is very complex because they are highly interdependent and closely linked with other areas of development, according to Margaret Bonner. USAID programs must balance the need to address underlying causal factors such as poverty, lack of education, and women's low status and time constraints with the need for direct interventions such as family planning and reproductive health services, soil conservation, and protection of forests and ecologically sensitive areas.

Female education is one factor that influences many development sectors, including population and the environment. In order to raise the level of female education, USAID-funded programs must address various cultural and economic obstacles, including conservative attitudes, the cost of schools and supplies, gender bias, and the need for girls to do household labor, according to Pamela DeLargy.

Raising agricultural productivity while protecting soils, forests, and other natural resources is especially challenging. USAID program managers need to study the few examples in Africa such as Machakos and Kano where agricultural intensification and resource protection have succeeded in order to apply the lessons learned to other areas, as Jerry Wolgin suggested. Key factors to look at include land security, capacity-building, appropriate government policies, markets, and infrastructure such as roads.

Despite USAID's desire to remain on the cutting edge of development programs, Bill Weber cautioned that a constant shifting of priorities is harmful to country programs. He urged USAID to set its course and stay with it for several years.

PROJECT DESIGN

Clearly, interventions to address population and environmental problems, as well as their underlying causes, must be tailored to each country. As Maria Beebee said, "Think globally regarding causal factors but . . . act locally to find solutions."

Including community participation in program planning and implementation is clearly essential, although doubts remain regarding its cost and feasibility. In developing programs, USAID Missions need to take the needs and desires of local communities into account and to be closely involved in programs. Given their staffing limitations, these objectives will be difficult to implement.

Capacity-building through formal and nonformal education is greatly needed in Africa, especially in the environmental sector, according to Michael Furst. USAID should try to ensure that trainees are able to use their new skills on the job when they return home. African universities need to be substantially restructured in order to meet training requirements.

As the costs of providing social services mount and donor funds diminish, cost recovery will become a key consideration for governments. While governments

should seek to collect fees whenever possible, the need for public subsidies in sectors such as family planning and female education is likely to continue for some time.

FUNDING ALLOCATIONS

To address adequately the problems that developing countries will face in the next few decades, foreign assistance for human resource development must be substantially increased, according to Paul Harrison. Currently only 25 percent of overall development assistance and about 15 percent of USAID's funds are allocated to human resource development. Sub-Saharan Africa receives only about 12 percent of USAID's funds, whereas European donors commit roughly half of their foreign aid to Africa.

The ability of USAID to develop comprehensive programs that address the range of issues faced by individual countries is further constrained by earmarks that designate funds for specific sectors. As the number of earmarks grows, the amount of discretionary funds for key sectors such as agriculture dwindles. Furthermore, some earmarks are narrowly defined, making it difficult to fund programs in related areas.

STRATEGIC ISSUES

USAID leaders need to be cognizant of the time frames associated with population and environmental issues. A delay in addressing these issues decisively now could result in much larger population sizes and more intractable environmental problems down the road. Often the signs that environmental systems are in trouble are difficult to detect and may not be evident until their collapse is imminent.

Compounding the timing issue is the lack of basic data on environmental and economic conditions in Africa. Available data, including satellite images, could be better analyzed and exploited, as Dirck Stryker noted. Nevertheless, the lack of information on key variables makes it difficult to decide how to allocate funds among sectors, since the most serious obstacles and the likely effect of specific interventions cannot be readily discerned. Additional information would also help to determine areas in which technology gaps exist and where new technologies are needed.

Given present funding constraints, USAID leaders will need to decide on strategies likely to have the most impact. For example, Kevin Cleaver stated that donors may decide that it is better to support only those countries that have preconditions likely to lead to fertility declines and strong environmental safeguards, rather than assisting countries that have not yet reached this stage. Other criteria for determining country priorities might include the degree to which democratic processes are observed, the existence of government policies conducive to economic growth and environmental protection, and the viability of government administrative structures.

APPENDIX: WORKSHOP AGENDA

AGENCY FOR INTERNATIONAL DEVELOPMENT
AFRICA BUREAU SENIOR MANAGEMENT WORKSHOP

SUSTAINABLE DEVELOPMENT: POPULATION AND THE ENVIRONMENT WORKSHOP AGENDA

Welcome:

James Michel, *Acting Deputy Administrator, Agency for International Development.*

I. **Keynote Address.** Wednesday Evening, May 19, 7:30 p.m.

Sustainable development in Africa—the simultaneous need to raise per-capita-income growth, lower population-growth rates, and reduce environmental degradation in order to attain sustainable development in sub-Saharan Africa.

MODERATOR:

Jerome Wolgin, *Director, Office of Analysis, Research and Technical Support, A.I.D. Africa Bureau*

SPEAKER:

Paul Harrison, *Development consultant and author of The Greening of Africa and The Third Revolution, London, UK*

II. **The Demographic Challenge:** Thursday, May 20, 8:30-10:30 a.m.

OBJECTIVE:

To provide an overview of the key population issues on Sub-Saharan Africa.

MODERATOR:

Timothy Bork, *Deputy Assistant Administrator, A.I.D. Africa Bureau*

SPEAKERS:

1. Overview of population trends, alternative population projections, and factors affecting fertility in Africa—Alene Gelbard, *Population Reference Bureau*
2. Implications of rapid population growth, with Rwanda as an example—John May, *Futures Group*
3. Population distribution, migration, and refugees in Africa—Pamela DeLargy, *University of North Carolina*

III. The Environmental Challenge: Thursday, May 20, 11:00 a.m.-1:00 p.m.

OBJECTIVE:

To describe the nature and magnitude of environmental problems in Africa.

MODERATOR:

George Lewis, *Deputy Director, East African Affairs, A.I.D. Africa Bureau*

SPEAKERS:

1. Overview of major environmental problems in Africa—Tom Fox, *WRI*
2. Agriculture—Kevin Cleaver, *World Bank*
3. Overview of Deforestation and Biodiversity—Henri Nsanjama, *WWF*

IV. Population/Environmental Linkages: Thursday, May 20, 2:30-4:00 p.m.

OBJECTIVE:

To discuss the ways that population growth and density affect key environmental problems.

MODERATOR:

Keith Brown, *Director, Southern African Affairs, A.I.D. Africa Bureau*

SPEAKERS:

1. Overview of Population/Environmental Linkages—Paul Harrison, *London, UK*
2. Population-Environment Dynamics—Gayl Ness, *University of Michigan*
3. Sahel NRM Studies—Asif Shaikh, *International Resources Group*

V. Case Studies: Thursday, May 20, 4:30-6:00 p.m.

OBJECTIVE:

To present case studies showing population/environmental linkages at the household and local community levels.

MODERATOR:

Myron Golden, *Director, Coastal and Central West African Affairs, A.I.D. Africa Bureau*

SPEAKERS:

1. Ecosystems: protecting natural areas in Kenya and Zimbabwe—Patricia Waak, *National Audubon Society*
2. Agricultural Transformation in Kenya and Nigeria—Michael Mortimore, *Cambridge University, UK*
3. Population Growth, Changing Agricultural Practices, and Environmental Degradation in Zaire—David Shapiro, *Pennsylvania State University*

VI. Program Interventions: Friday, May 21, 8:30-10:30 a.m.

OBJECTIVE:

To focus on major program and policy interventions being used or proposed to promote sustainable development. Panel will discuss: What is the right set of priorities for Africa? Is a broad participatory planning process like National Environmental Action Plans needed? Are our current approaches to agricultural, natural resources, health, and population programs the correct ones?

MODERATOR:

William Kaschack, *A.I.D. Africa Bureau*

SPEAKERS:

1. Institutional Approaches to Policy Reform—Michael Furst, *NRM Policy Consultative Group, Bend, OR*
2. African Policy Responses to Population Problems—Ben Gyepi-Garbrah, *African Population Advisory Committee*
3. Gender Issues, Migration, and Population Distribution—Jodi Jacobson, *Worldwatch Institute*
4. Agriculture and Natural Resource Management—Dirck Stryker, *Association for International Resource Development*

VII. Project Interventions: Friday, May 21, 11:00 a.m.- 12.30 p.m.

OBJECTIVE:

To focus on major project interventions to promote sustainable development and the lessons learned from these. Panel will discuss: What have we learned from local-level project interventions? Are these interventions adequately addressing household and community-level issues? Does looking at this issue as one of household decision-making lead to different conclusions about what interventions make the most sense? What are the synergisms involved in various types of investments? To what extent should population and environmental programs be integrated or pursued separately, and in what situations is each approach more effective?

MODERATOR:

Judith Gilmore, *Acting Director, Sahel and West African Affairs, A.I.D. Africa Bureau*

SPEAKERS:

1. Influencing Policymakers—Wanga Grace Mumba, *Executive Director, Environment and Population Centre of Zambia*
2. Community Participation in Environmental and Population Programs—Richard Ford, *SARSA, Clark University*
3. Biodiversity and Rural Development Programs—William Weber, *Wildlife Conservation Society*

VIII. A.I.D. Senior Panel Discussion: Friday May 21, 1:30-2:30 p.m.

PANEL WILL DISCUSS:

What have we learned? Are our programs going in the right direction? What changes might we make?

MODERATOR:

Cameron Bonner, *Deputy Director, Office of Analysis, Research and Technical Support, A.I.D. Africa Bureau*

SPEAKERS:

1. Margaret Bonner, *Director, Development Planning, A.I.D. Africa Bureau*
2. Richard Cobb, *Deputy Assistant Administrator, A.I.D. Africa Bureau*
3. John Hicks, *Acting Assistant Administrator, A.I.D. Africa Bureau*
4. Jerome Wolgin, *Director, Office of Analysis, Research and Technical Support, A.I.D. Africa Bureau*



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