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Report

Economic and Environmental Trends in Sub-Saharan Africa

a study for USAID Africa Bureau Office of Sustainable Development

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Introduction

Although USAID has supported development programs in Sub-Saharan Africa for many years, the impacts of these investments are sometimes difficult to see or describe, and often difficult to measure. This situation is made more difficult by the challenges inherent in tracking the major changes in biophysical conditions and other environmental trends occurring in tandem with significant socio-economic changes in Africa. The need and the challenge, therefore, is to identify, describe, analyze and understand these development assistance impacts in the broader context of environmental change and sustainable economic development. Given a better understanding of the context in which USAID is investing and of the linkages between environmental and socio-economic changes, it may be easier to discern program impacts and to make better use of information from more detailed cost-benefit analysis of specific program investments.

In addition to its role in strategic planning, improved analysis of environmental and socio-economic trends can also help to communicate with decision-makers about the rationale for continued program investments and their potential impacts.

This report was undertaken as the first stage of work in a process to improve our understanding of environmental trends in Africa. This initial work was prompted by a number of questions, including:

What are the major, significant environmental changes and trends in Africa, with respect to the past 10-20 years, and as we look forward to the next decade?

What are the key socio-economic trends?

What are the key indicators that can be used to track these changes and trends?

How are the economic and environmental trends related to one another?

This preliminary analysis is not intended to review the costs or impacts of specific USAID programs or investments, but is aimed at improving our understanding of the context and strategic opportunities for those investments.

It begins with a brief commentary on the use of environmental and economic development indicators with special attention to Africa. Key sources of available data for some 30 indicators of biophysical, economic and social conditions are then reviewed, with a view to their usefulness in tracking trends at the regional and national level.

For a small number of key indicators, the available data has been collected and plotted to illustrate major trends. Data for a number of the indicators was compared to similar trends in other regions to help appreciate the evolving context for development assistance programs in Africa. To help illustrate the usefulness of selected indicators for trends analysis at the country

level, two contrasting situations (Botswana and Niger) were reviewed. To a limited extent, the data was analyzed further to explore possible relationships and correlation among the potentially more important factors associated with observed trends.

It is anticipated that this preliminary data collection and trends analysis will be followed by further time-series analysis of selected indicators and modeling of systems dynamics to identify the main "drivers" of certain trends, and to understand to a greater degree the causal linkages between environmental and economic factors.

This work has been funded by USAID through the Agriculture, Natural Resources and Environment team of the Africa Bureau, Sustainable Development Office.

Part 1. Data and Indicators

A. Theory and Getting the Terms Defined

Indicators are useful analytical information

The total amount of information which can be collected is much greater than can be used for management or policy decisions. Therefore the immense amount of data and information must be made into "indicators" which are tools to help us to understand situations. They model reality but are necessarily simplifications of the complexities of that reality. The purpose of indicators is not just to understand the situation quickly but to enable decision-makers to make changes and improve conditions.

> "Indicators are key statistical series that can be used to help policy-makers and the public assess conditions and trends and the achievement of specific goals. Indicators also enable policy-makers to ascertain whether existing policies are having the desired effects ... and to help clarify where problems exist in the current policy framework. ... Indicators are most valuable in the context of a specific policy concern or objective." Reid et al Biodiversity Indicators for Policy-makers

Indicators indicate status and trends

> "Indicators are measures of condition, processes, reaction or behaviour which provide reliable shorthand for complex systems. If relationships between indicators and the full sets of responses of such systems are known the indicators can predict the status of the system. Measurements of some attribute of a system may show a change over time, but explaining the reasons for change is often speculative." DPIE, Australia, A Survey of Work on Sustainability Indicators

However, indicators are not just statistics but are usually analyzed statistical information which is compared with some reference point such as stages at another point in time so as to give meaning to the numbers.

> "Indicators have been defined primarily as *quantitative* measures which 'imply a metric (i.e., distance from a goal, target, threshold, benchmark, etc.) against which some aspects of performance can be measured.' It is the use of reference points, such as targets and benchmarks, that distinguish indicators from statistics." Biodiversity Indicators and Implementation Targets Discussion Draft from GBF April 97

Of course, even these indicators and their meaning must be understood and interpreted in context and their degree of uncertainty admitted.

Comparison of general criteria and characteristics for indicators

There are many lists for what characteristics of a good indicators should be and some of these are presented in the following table. But, essentially, they may all be summarized in that they must be truthful and useful. That is, an indicator should be in the same direction and magnitude as the underlying condition it is supposed to model, and it should be of utility to the decision-makers who need to make decisions regarding the situation modeled. Beyond this, the rest of the proposed characteristics are refinements.

Below are some of the characteristics of good indicators from various sources.

Jacoby	Biodiversity Support Prog BSP	UNEP	Mason	Reid et al (WRI)	DPIE, Australia	CBD Core Set, etc.
specific	independently measurable	scientific/ quantitative	results-oriented	timely	consistent w/ existing measures	quantitative
sensitive	unbiased	adaptable	direct	accurate	modellable	simplified
relevant	sensitive	variety of scales	objective	of known quality	well-defined and accepted	user-driven
	consistent & unambiguous	simply gathered	unidimensional	avail at different levels	analyzable	policy-relevant
	condensable to single index	standardized collection	quantitative	from established programs		scientifically credible
		easily managed	disaggregated	solid science		responsive
		relevant	feasible	careful analysis		easily understood
		provide feedback for mgmt	interpretable	effective reporting		realistic
		assess effectiveness				
		provide integrated picture				

It is probably not useful to attempt to set and analyze all of the permutations of characteristics above but the selection of indicators should be a "balancing act" among these many possible characteristics.

> "Indicators should be chosen with three key properties in mind; specificity, sensitivity and relevance.... In general, these three properties can not be maximised simultaneously; they can only be optimised. For example, highly sensitive indicators are unlikely to be highly specific. Relevance is a key characteristic of indicators because managers typically have little use for specific and sensitive answers to the wrong questions, i.e., monitoring programs with pseudopower. The risk of pseudopower is high for most natural systems because we have limited understanding of the system's functioning. This risk is an important justification for retaining a broad base to ecocentric monitoring in

addition to monitoring that targets specific management issues." Jacoby "Towards a New Paradigm"

Specification of indicators

There are many aspects of indicators which need to be specified in their development. These are essentially the "metadata" of each indicator and they can function as a checklist to ensure that the indicator is correctly and completely thought out. Naturally, not all of the aspects of each indicator can be specified from the outset but need to be developed over time. An excellent system for specifying metadata was developed by the UN for their Indicators of Sustainable Development and presented in the August 1996 “ISD Framework and Methodologies” manual.
For this present study, commonly accepted indicators used by the World Bank and other international organizations are used.

B. Major international indicator efforts

International efforts

There is a large scale international effort in the development of indicators not just of biodiversity or its conservation but of the larger topic of sustainable development. There are indicator programs ranging from overall economic and social development to a single sector such as forests.

The UNCSD, for example, has been looking at developing a comprehensive set of environmental or sustainability indicators.
"Some key contrasting characteristics of various international programs were described, illustrating the breadth of focus of the various activities. For example:

- some programs are concerned with developing frameworks and models; others develop actual indicators,
- some programs approach the subject conceptually and academically; others are more practical,
- some focus on the environmental (biophysical) aspects of indicators; others attempt to integrate socio-economic aspects,
- some programs look at the conditions or state of environment components; others are incorporating measures of pressures,
- some programs develop indicators for national policy objectives; others focus on management concerns. "

Annexes for GBF April 97

More recently, since the CBD process has been gaining momentum, there is a greater effort aimed at developing a "core set of indicators" specifically for biodiversity and also for the environment and natural resources in general as well as for institutional aspects related to these. The CBD is presently working on indicators of implementation of biodiversity conservation capacity-building at the national level.

There is, contemporaneous with these international efforts, a great deal of activity in a number of

countries, principally those which are also members of the OECD such as Australia, Austria, Canada, Finland, Germany, United Kingdom, the United States, and others.

Illustrative of this, there was recently a meeting in May 1999 in Costa Rica organized by the International Institute for Sustainable Development (IISD) on "Designing Indicators of Sustainable Development". And there is about to be a meeting in July 1999 in Moscow sponsored by as many as 15 organizations on "Indices and Indicators and Sustainable Development - Systems Analysis Approach". On the agenda are practically all of the topics relevant to this study, including "Environmental Indicators, Economic Indicators, and Social Indicators in the Framework of SD Indicators". A printout of information on these is included in the Annexes.

Indicator Programs versus Data Sources as used in this study

This study uses Indicator Programs in the sense of separating programs aimed at taking a restricted set of well-chosen indicators and analyzing them in conjunction with each other in a coherent framework to produce a vision of the situation. Programs which produce indicators, that is, sets of data in time-series or not, but not analyzed in a coherent framework, are included here as Data Sources in the section on Major Sources of Primary and Secondary Data. The division sounds more neat in this description than is possible in the real world.

Pressure State Response (PSR)

In the last decade the OECD began developing the conceptual framework of Pressure-State-Response (PSR) behind the indicators (another form for this used by the UN is "Driving Force-State-Response). These are based on conceptual work done in Canada. Essentially these look at what is causing a problem or pressure -- typically anthropic activities -- what is the state of the resource which is affected -- typically biodiversity, air, water -- and what are the responses to this undertaken by countries -- typically policy changes or technology changes. A complete system of indicators for analyzing the state of the environment would include indicators in all of these areas. As this study is primarily concerned with trends in the economy and environment, it includes indicators which are primarily in Pressure and State though a few, Protected Areas, for instance, represent Response as well.

African participation in international efforts and African indicator programs

Although African countries participate in the testing of the UN ISD (Ghana, Kenya, Morocco, South Africa) as of the last reporting, their implementation of this testing was at an early stage. (See Annexes.) Some countries are developing their own indicator programs but there is no international program of development and analysis of indicators focused solely on Africa in the sense used in this study. The World Bank produces both the Africa Development Indicators and the Africa Live Database but these are aimed more at producing indicators and making them available than at analytical work applying these indicators.

Selected sources of information on indicator programs

IISD Compendium of Sustainable Development Indicator Initiatives and Publications

ELDIS Gateway to Information Sources on Development and the Environment

Millennium Institute Internet Resources on Indicators

Selected indicator programs

The following is a set of some of the major programs which does not pretend to be comprehensive. Either by searching on the Internet directly or by following links from the IISD or from ELDIS or from WRI or any one of a number of sources, many other programs may be found. (Printouts from many of these may be found in the Annexes.)

Convention to Combat Desertification (CCD) Report on work on benchmarks and indicators [for measurement of desertification]

CBD Recommendations for a Core Set of Indicators on Biological Diversity

CBD Indicators on Forest Biological Diversity

CIFOR Criteria and indicators for sustainable forest management

CSD Indicators of Sustainable Development Programme

IDRC Grassroots indicators for desertification: experience and perspectives from Eastern and Southern Africa

IPF Criteria and indicators for sustainable forest management

ITTO Process in the development of criteria and indicators for the measurement of sustainable tropical forest management

LQI Land Quality Indicators Project

OECD Development Indicators

TEPI Towards Environmental Pressure Indices for the Eu

UN WISTAT Women's Indicators and Statistics

UN STAT Social indicators for less populous countries [statistics and league tables]

UNCHS Urban Indicators Programme

UNDP Human Development Index

UNESCO Educational and Cultural Indicators

UNICEF Progress of Nations

World Bank Monitoring Environmental Progress

World Bank How have the poor fared? environment and indicators

World Bank Sectoral indicators for monitoring gender-related aspects of development policies or projects

C. Data Sources and Programs

Overview

The principal sources of data and information for Africa on economic, social, environmental, and natural resource conditions are well known, being principally the international organizations such as the World Bank and the UN system (UNEP, FAO, UNSTAT, UNPOP,...), and specialized institutions such as WCMC, bilateral organizations such as USAID and IDRC, and NGOs with an environment and natural resource focus such as WRI.

These organizations will be covered here but what will be more useful is to point out the programs which are specific to Africa either within these or in other locations. For example, within the World Bank are the African Development Indicators, and a new program, the Africa Live Database. Recall the sense in which "data sources" is used here, that is, a large database or set of databases of many individual data but without the employment of a selected subset of these data analyzed together to form a coherent picture of a situation.

Much information about data and information programs may be found at such centralized locations as ELDIS (see above) or WRI's new SDIS which has a great deal of descriptive information on the programs which concentrate on this aspect of ENR work, many other programs only maintain "links" to general programs which work in the international arena.
Again, this is only a subset of possible sources of data and information. See the Annexes for printouts and URLs for these.

Major sources of data - International Institutions

World Bank

- World Development Report/World Development Indicators The most important and most complete source of data with hundreds of indicators in time series.

- African Development Indicators A subset of indicators with an exclusively African focus. The last edition of this was 1998-99 though the CD-ROM version is just becoming available.

- Africa Live Database A new service, available by paid subscription, of the major indicators for Africa, à la the ADI, it is intended to be kept very up-to-date. Each indicator comes in a pre-packaged form, data for pre-selected groupings by regions or economic groups may be selected and graphs automatically created. This service is useful for the data novice but drawbacks are the cost of the service $500 per year, cumbersome access, large file sizes, and reduced time series as data for 1970s and 1980s are decade averages only.

- PovertyNet

- Information Bank on African Development Studies (IBADS)

UN System

- UN Statistics Division including the Cyber SchoolBus

- UN Population Division

- UNDP United Nations Development Programme

- UNEP United Nations Environment Programme Global Resource Information Database GRID Environmental Information Systems EIS in Sub-Saharan Africa

- UN Sustainable Development National Reports on implementation of Agenda 21

- WHO World Health Organization Basic Health Indicators (Health for All)

- ITU International Telecommunications Union

African Development Bank

While the African Development Bank is not as well developed as the World Bank in terms of data, for instance, it still serves offers useful information. The ADB's own Environment Department conducts studies and provides technical assistance to countries. Also, the complete SOE reports for some 20 countries, presented in a consistent, comprehensive format are provided on their site and these include good analytical information beyond the simple data which may be found elsewhere. The texts of these are included on the EETA Zip disk and the countries include:

- Botswana, Cameroon, Cote d'Ivoire, Egypt, Eritrea, Ethiopia, Ghana, Guinea, Lesotho, Malawi, Mali, Mozambique, Namibia, Senegal, Sierra Leone, Sudan, Tanzania, The Gambia, Uganda, Zimbabwe

Major sources of data - Bilateral Institutions

CIDA Canadian International Development Agency

Major sources of data - USAID

It should be unnecessary to point out the wealth of information available from USAID's own sources but it is possible that Mission or other actors in the field may not be as familiar with these as are Washington-based staff. Besides the DISC (agency-wide) and EIC are the Africa-focused sites including the Africa Bureau Information Center and Africa SD's own site. There are also programs which USAID funds or co-funds and which have a separate arm's-length existence. These include ADDS, FRAME, FEWS, CIHI, PSGE, PCG, CARPE, and others. Printouts from the "home pages" of many of these on the Internet are included in this report.
USAID

- Environmental Investments FRAME
- AFR-SD home page and links
- Africa Bureau Information Center
- Central African Regional Program for the Environment CARPE
- Famine Early Warning System FEWS
- Africa Productive Sector Growth and Environment (PSGE)
- Policy Coordinating Group PCG
- Africa Data Dissemination Service ADDS at USGS
- Environmental Information Clearinghouse EIC
- USAID Development Experience Clearinghouse (DEC)
- Economic and Social Data Service ESDS
- CIHI- Center for International Health Information (CIHI)

Major sources of data - Specialized International Institutions

- WCMC World Conservation Monitoring Center - The major location of information on protected areas, endangered species and similar topics for the entire globe.
- CIAT-World Bank-UNEP Environmental and Sustainability Indicators - An interesting use of a larger set of indicators applied in Latin America (see Annexes).
- Center for International Earth Science Information Network CIESIN

Major sources of data - Specialized Institutions

There are many specialized agencies for pesticides, health, transport, and others which can have useful information.

- International Center on Insect Physiology and Ecology

- INEM (International Network for Environmental Management) (industry)

Major sources of data - Non-governmental organizations

International Development Research Centre IDRC

World Resources Institute WRI

World Resources Report/Database - The preeminent report for science-based analysis of conditions and policies. The database presents data from the other major sources discussed here as well as from WRI's own research.

Sustainable Development Info Service - A newly-inaugurated site with descriptions of major data programs from around the world as well as information on publications, databases, maps, indicators, and other information.

World Directory of Country Environmental Studies - A complete listing of reports on environment and natural resources and related areas. These include those produced by the countries themselves, as well as by USAID, other bilaterals, UN organizations, NGOs and others. Abstracts of the documents and information on their availability is included.

Major sources of data - Individual country information on Internet

Official "home pages" of the African countries themselves have begun appearing on the Internet. These vary greatly in purpose, content, format, accessibility, etc. but like anything else just arrived in this area, they can only improve. Printouts from these and the respective URLs are provided in the Annexes.

- Algeria
- Angola
- Cape Verde
- Democratic Republic of the Congo
- Egypt
- Eritrea
- Ethiopia
- Gabon
- Gambia
- Ghana
- Madagascar
- Mauritania
- Mauritius
- Morocco
- Mozambique
- Namibia
- Nigeria
- Rwanda
- Senegal
- South Africa

- Tunisia
- Zimbabwe

Major sources of data - Internet search engines

While one can simply search on “Africa and “environment” on major search engines such as Yahoo or Lycos there are also engines concerned specifically with Africa and ones whose contents are reviewed by a specialist for their utility and applicability.

- Woyaa search engine for Africa
- African Environmental Issues on the Mining Company
- Stanford University Africa South of the Sahara Internet Resources
- Focus International
- Africa Library

Part 2. Major Trends in Africa in Recent Decades

A. Overview

On development

There is no doubt that the development record of Africa in the last 25 years is a mixed picture. A suite of indicators of development would show some more positive and others more negative. The record of any one specific particular indicator would be varied over this time and the same indicator looked at in various countries would vary. Thus, an overall generalization for Africa would be that it would be characterized by heterogeneity. Still, certain major trends which illustrate the problems and promise of Africa can be brought out. These trends, in such human-related areas as economics, health, and education and in the physical environment-related areas of deforestation, agriculture, and water will be explored.

"Degradation" and "improvement" or "progress" and "development" are not really a description of one condition but summations of changes in a series or set of economic, social, and bio-physical conditions which, in their aggregate, describe a people's reality. What the international community is trying to find in some of the programs described in Part 1 is a suite of indicators which, taken together, describe an economy, society, or landscape which is changing. This change could be negative -- a deterioration -- or positive -- an improvement -- ... or even relatively stable (i.e. little or no change).

The described conditions are not unrelated; quite the contrary, they interact and reinforce each other such that "development" is a holistic condition in which material progress is accompanied by progress in personal well-being and by improvements in the supporting environment.

For the purpose of this analysis "sustainable development" may be taken to be a continuous improvement in the human conditions, social and economic, without a related decline in the bio-physical conditions which would support this future living standard. No one truly knows if sustainable development is possible and, naturally, any sustainable development might not look the same in different economic and environmental circumstances. As one purpose of this analysis is, if possible, to judge conditions relative to this sustainability standard, positive economic growth, for example, while good, is insufficient to raise per capita incomes if it is lower than the rate of population growth.

On the value of indicators

Given the quantity and quality of the statistics available it is not possible to set out a mathematical relationship between, say, deforestation rates, and GNP growth the following year. Firstly, the changes in such areas as the economy are related to too many factors beyond physical resources, much less one particular resource. In fact, small countries are so subject to the influence of their larger neighbors and to the global economy as a whole, that even if they could get all of the conditions and policies "right" they might not be successful because of the exogenous influences. Additionally, one cannot have confidence that the measurements which we do have provide a perfectly true picture of the conditions they seek to measure. This is so

whether the indicator is GNP or cropland under cultivation.
It could be posited, for example, that increasing land under cultivation would bring about a gain in total production. But this might not be so if the land itself is of extremely marginal potential or if there is no increase in the other inputs to agriculture, among these, labor, water, mechanization, fertilizer, and pesticides, and importantly, natural resource management (NRM) practices. Further, even increasing all of these may not achieve an effective increase in the agricultural production which comes to market if there is no increase in vehicles to transport them or if there are no roads to service the newly-opened lands. Such an increase may not ultimately make an improvement in people's lives which, after all, is the purpose of development. But, with all of these factors increasing at a relative rate there can be sustained improvement in conditions in the agricultural sector which, assuming that they have the income to obtain the goods, should translate into an improvement in the lives of the country's people.
Since these improved conditions require an investment for their creation or achievement, that is, the forgoing of present consumption and use of resources to build capacity for future improvement in well-being, some of the indicators proposed here measure this commitment. Some measures, such as access to services, are direct measures of this past investment and indirect measures of peoples' lives, while yet others, such as life expectancy, are direct measures of their lives and indirect measure of past investments.

On the construction of this suite of indicators

While one could conceivably have an infinite number of indicators, each of which could be valid and valuable, there is an expense of time, effort and money involved in their collection and analysis, and certainly the marginal contribution of later indicators to an accurate or useful description of reality approaches zero.

As an initial set it might be supposed that as few as ten indicators in each of the social, economic, and bio-physical sectors might be sufficient. For comparison, the World Bank's World Development Indicators includes hundreds of indicators, largely economic and social, and the FAO's FAO-STAT has a great many, largely bio-physical in nature.

For the purposes of this study of analysis and presentation, only a reduced set of indicators in each area is utilized. What is offered here is a suite of indicators which, in their aggregate, help to characterize a society, economy, or landscape and tell whether conditions are improving and may suggest possible interactions or relationships related to the indicators which may be relevant to strategic planners and development assistance agencies. Of course, other indicators may be substituted as analysis proceeds.

The indicators offered are not dissimilar to those employed by the OECD's Development Assistance Committee in their Year 2015 effort (see Annex), which is itself subscribed to by USAID's Africa Bureau in its own Report to the Senate Appropriations Committee, May 1997 on U.S. Development Assistance to Africa Over the Next Decade-- Anticipated Needs and Appropriate Responses.

Trends of the indicators are generally analyzed over time (approximately the last 20 years) and versus other, particularly developing regions according to what is most illuminating and, where

appropriate, some exceptions to the rule or trend are highlighted. Graphical illustrations are at the center of the analysis.

Further, these indicators are also explored for two countries, Botswana and Niger, as a way of illustrating a situation generally "better than the trend in Sub-Saharan Africa" and one "worse than the trend in Sub-Saharan Africa", respectively. They were compared with each other and with Sub-Saharan Africa as a whole as appropriate.

The procedure followed in developing this analysis was that a list of possible indicators illustrating important trends in Sub-Saharan Africa was developed by the author, contained in an outline of the entire study. The trends and indicators were discussed with IRG and USAID. The data in secondary format were obtained from the World Resources Report database for 1998-99 as a base; this is the best compilation of data and complete historical trends. These were then supplemented by data from the World Bank's WDI, ADI, and ALDB which contain data and estimates for the most recent years. Data for Africa were extracted and approximately 100 spreadsheets were created (which itself represent an important resource for those working in Sub-Saharan Africa). In some cases further analyses were performed to obtain figures for SSA where there existed figures only for Africa as a whole, for example. These were then graphed and explanatory text created regarding the indicator, its importance, and of what it means for Sub-Saharan Africa.
The three areas of bio-physical, economic, and social may be thought of as the three legs of a tripod in which only if all parts are strong can the object last. But if there can be a "most important" leg then it would be the bio-physical. Thus, this analysis begins with this sector.

B. Trends in Bio-physical Conditions illustrated with indicators

On the choices of bio-physical indicators

The choices for bio-physical indicators here reflect several conceptions.

One is that the major use for the land is agriculture and that the treatment of agricultural land and its condition will be the major influence on Sub-Saharan Africa lives for the foreseeable future.

The lack of indicators of flora and fauna, for example, reflects the author's estimation of the quality of the data. Rough estimates of the number of species, of the percentage of endangered and of the percentage of their endangerment would show that Africa is a very important place for conservation of biodiversity. But such estimates are so imprecise that they could not be used to indicate changes in conditions with any degree of reliability. If estimates are subject to, say, an inaccuracy of 20%, then changes on the order of 5% or even 10%, while apparently significant, might fall well within the indicators' degree of uncertainty. What is "certain", of course, is that Africa is so important in terms of its biodiversity that the returns to knowledge and conservation would be of the highest order if much more attention and resources were directed there.

A third observation is the lack of an indicator of legislation, policies, or institutional structures. It may be argued that getting the policy right is a fundamental first step but there are specification, measurement, and interpretation problems. As important as it is to have good legislation or good

policies, no one can specify what is one which is “sufficiently good” or “very good”. And further, having policies is worthless -- or even illusory -- if there is poor or non-existent implementation or enforcement, something which is quite difficult to measure.

On bio-physical development

There is development of the economic, of the social, and of the physical environments. A balance among these could be regarded as development and analysis applied and judgement rendered as to its sustainability.

Unlike the social environment where the point at which “too much development” might be difficult to recognize or which, in practical terms, might be impossible -- think of too much literacy or too much health -- in fact too much cropland or too much water use or too much fertilizer use can happen and can have both immediate and long-term consequences.

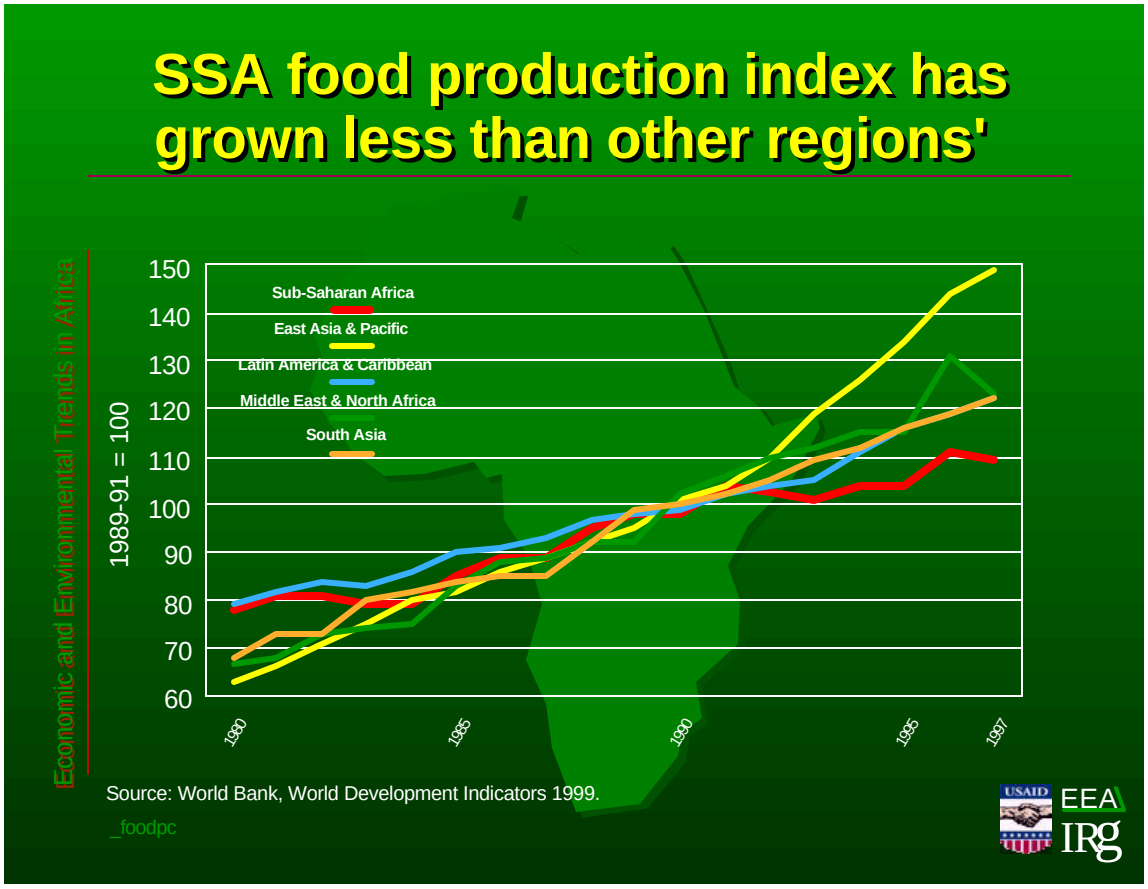
Nevertheless, development can be described for the physical environment as well. It would include determining appropriate uses of resources and then using them for these most appropriate uses such that land most suitable for agriculture is in agriculture, that for grazing in grazing, and that which merits protection for its environmental services such as protection of water supply, is protected. It would mean applying inputs to agriculture so as to maximize productivity in the short and long term. Such inputs includes land, labor, mechanization, water, fertilizer and pesticides, improved seeds, and appropriate techniques and practices.

Assuming an anthropically-centered purpose, the measures proposed here for the bio-physical sector measure over time the overall productivity of the sector and then, holding the land constant, measure the productivity of the land which, to an extent, measures the productivity of all of the other agricultural inputs. Then, various inputs are examined. The ideal position would be to be able to individually look at each input’s use and its effectiveness and also to make judgements about its long-term sustainability, about the supply of the input and whether it can be continually be increased, and whether it has consequences for other aspects of the physical environment, such as pollution, which should limit its use.

The overall analysis of the bio-physical sector is not very positive, particularly if compared to the performance of other regions of the globe. Food production has grown slowly, yields are generally low, the use of agricultural inputs other than labor, such as mechanization and irrigation, is low, deforestation is relatively high on a continent on which many areas are already lacking this resource, traditional fuel use is high (which may be related to the previous point), and the level of protected areas is below that recommended (with the understood doubts about the effectiveness of actual protection). An analysis of each of these conditions follows.

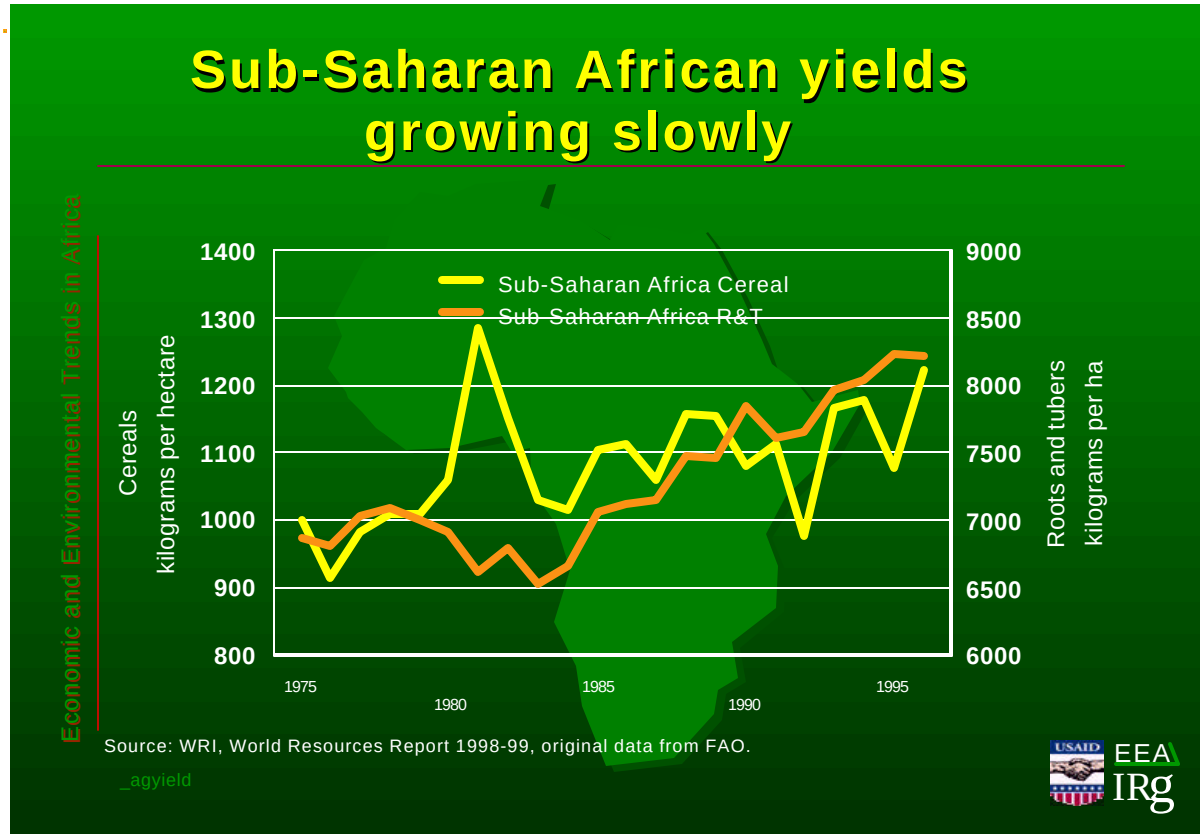
Food production per capita

Based on the expansion of land under cultivation and increases in other inputs (fertilizer, etc.) as well as improvements in management practices, there has been an increase in food production per capita over the last two decades. Such an increase, though, has been less than that enjoyed by other developing regions. Is Sub-Saharan Africa failing to take full advantage of advances in the quality of these inputs?

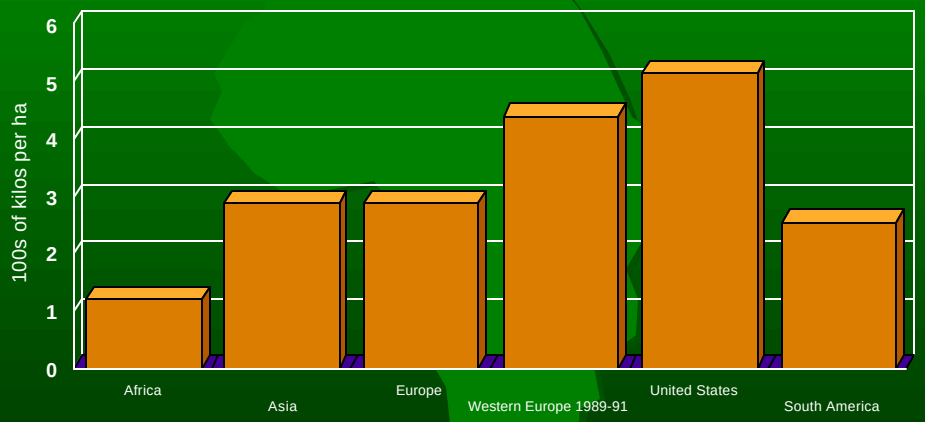


Agricultural production yields

Yield (production per unit of area) is the fundamental measure of productivity and reflects the application of inputs to agriculture in a given place. Cereals and Roots and Tubers are the two principal groupings. Shown here is the situation that yield has been increasing slowly but that the actual yield from each hectare of cultivated land is well below that of more-developed areas and also below those of other developing areas such as Asia or South America. Whether this is due to the quality or quantity of inputs remains to be decided. The situation between countries is quite heterogeneous as significant increase have been enjoyed by some counties and significant decreases suffered by others as illustrated in the figures.



Cereal yield in Africa

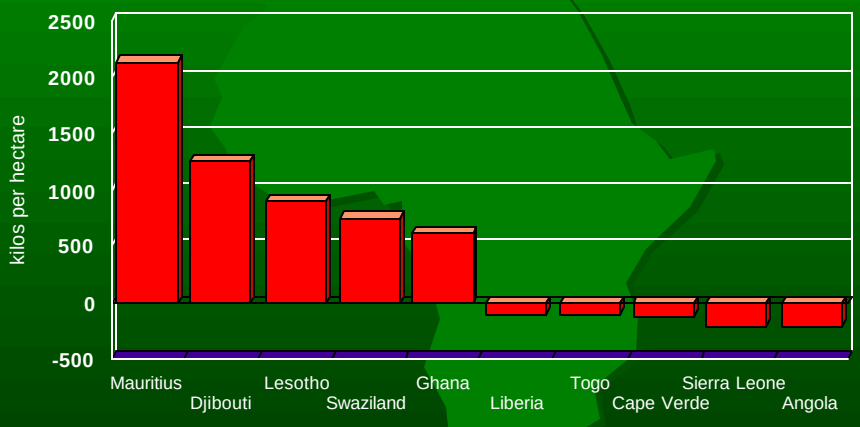


Source: WRI, World Development Report 1998-99, originally from FAO, FAO-STAT.
Central America figures unavailable; "Europe" and "Asia" include former Soviet Union.

_agyieldcer

Economic and Environmental Trends in Africa

Greatest gains and losses in yields of cereals in SSA



Source: WRI, World Resources Report 1998-99, original data from FAOSTAT. Years are 1975-96

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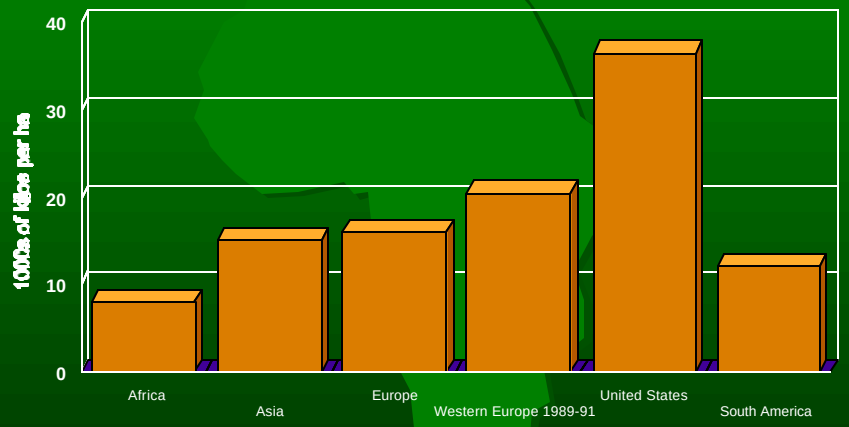
Economic and Environmental Trends in Africa

Roots and Tubers yield in Africa



Source: WRI, World Development Report 1998-99, originally from FAO, FAO-STAT.
Central America figures unavailable; "Europe" and "Asia" include former Soviet Union.

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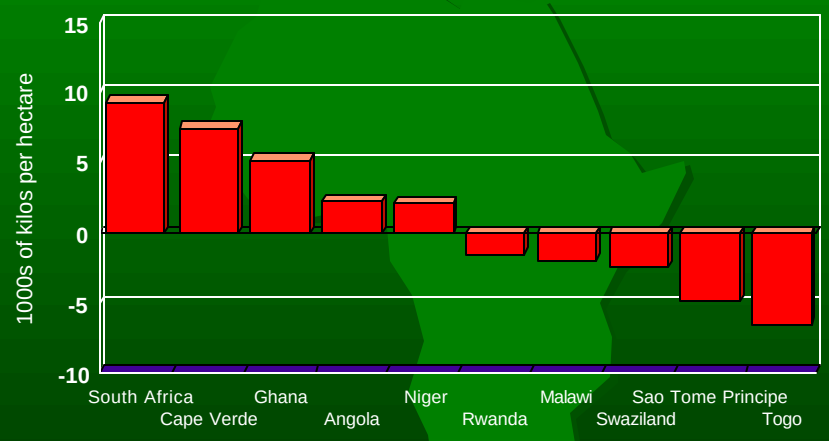
EEA IRg

Greatest gains and losses in yields of roots and tubers in SSA



Source: WRI, World Resources Report 1998-99, original data from FAOSTAT. Years are 1975-96

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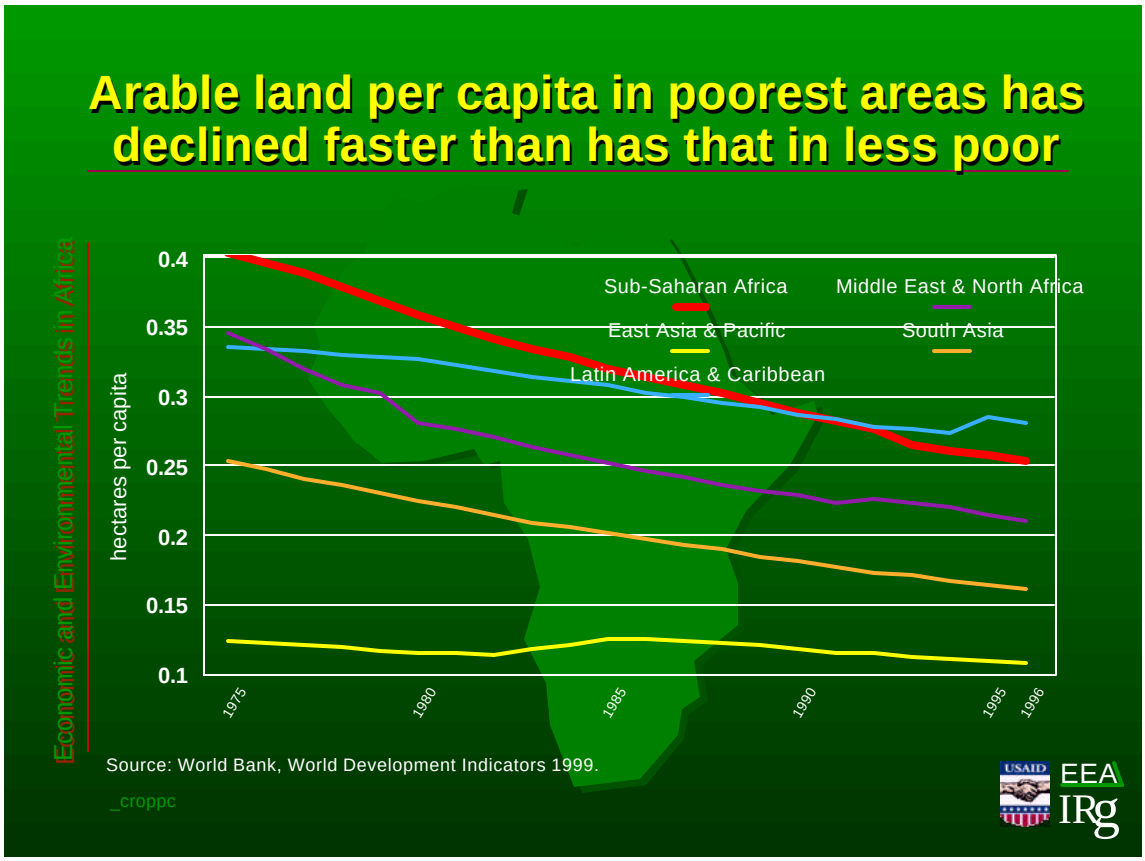
USAID EEA IRg

Cropland per capita

Land for growing food, whether classified as arable land or permanent cropland, is the most fundamental input to agriculture, the principal way of life in Sub-Saharan Africa. While intensification with better seeds, more fertilizer, more mechanization, or even more labor, may also increase production or output, the simplest and least expensive input - besides labor - especially for poor farmers in a poor country, is increasing the land under cultivation. Unfortunately, it is also true that newly-opened lands may be immediately or shortly less suitable for cultivation and therefore provide only a marginal increase in production in any but the short term.

This indicator is also expressed on a per capita basis so that even opening new lands will not result in an increase in the cropland per capita unless it is at a rate higher than the still-high growth of population. Other regions have seen a similar trend.

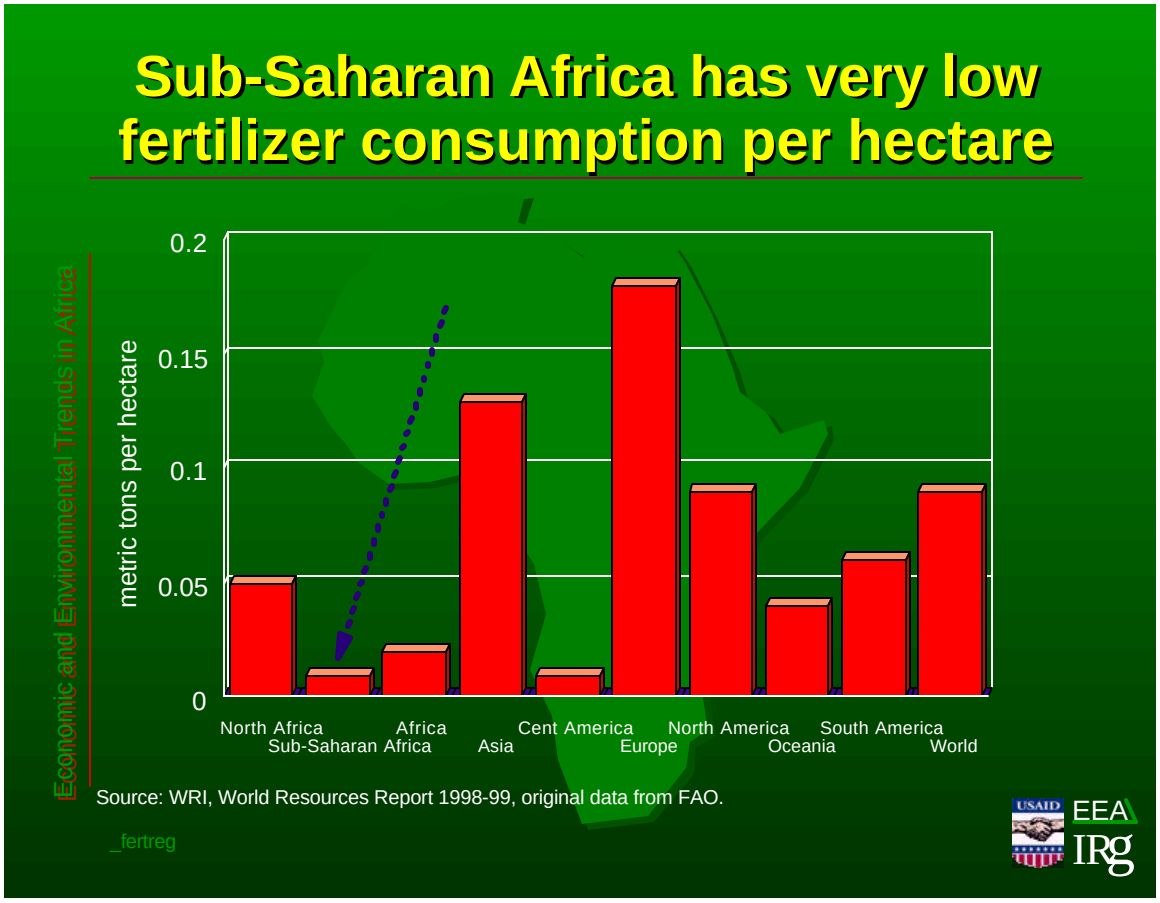


Fertilizer and pesticide use

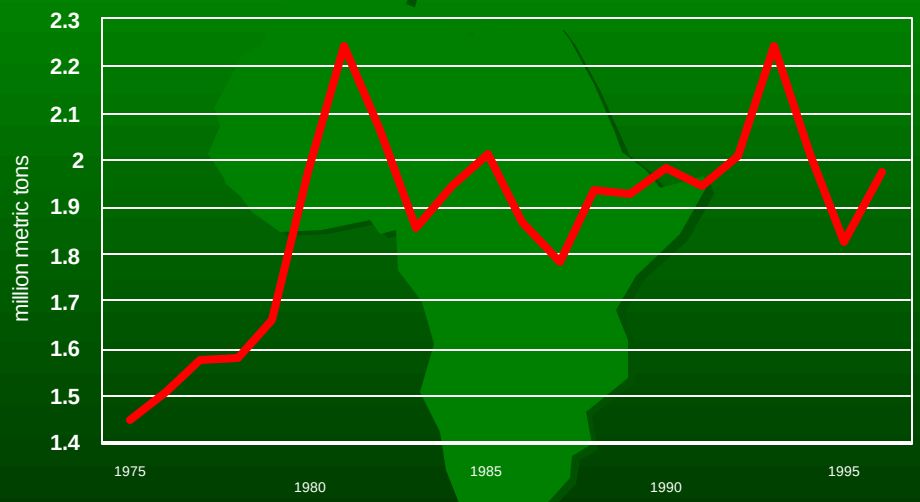
Fertilizers and pesticides are necessary ingredients for increasing productivity. But, they are relatively expensive and risky and are not purchased by many poorer farmers. Increasing fertilizer-use efficiency through the use of various NRM practices is one way to reduce the expense and risk and to increase the likelihood that more farmers will invest in fertilizers.

Sub-Saharan Africa uses a very small amount of commercial fertilizer when compared with other regions, developed or developing, and this has increased very little over the past two decades. The region also imports about half of the fertilizer used which may impose a financial burden on the countries.

Unfortunately, statistics on pesticide use are exceptionally difficult to obtain or rely upon.



SSA fertilizer consumption has levelled off in last two decades



Source: World Bank, World Development Indicators 1999.

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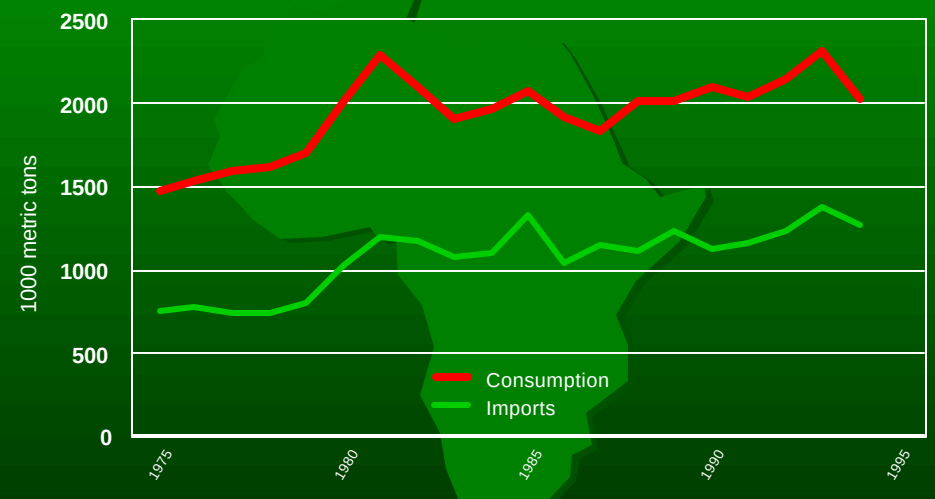
Economic and Environmental Trends in Africa

Sub-Saharan Africa imports about half of fertilizer consumed



Source: WRI, World Resources Report 1998-99, original data from FAO.

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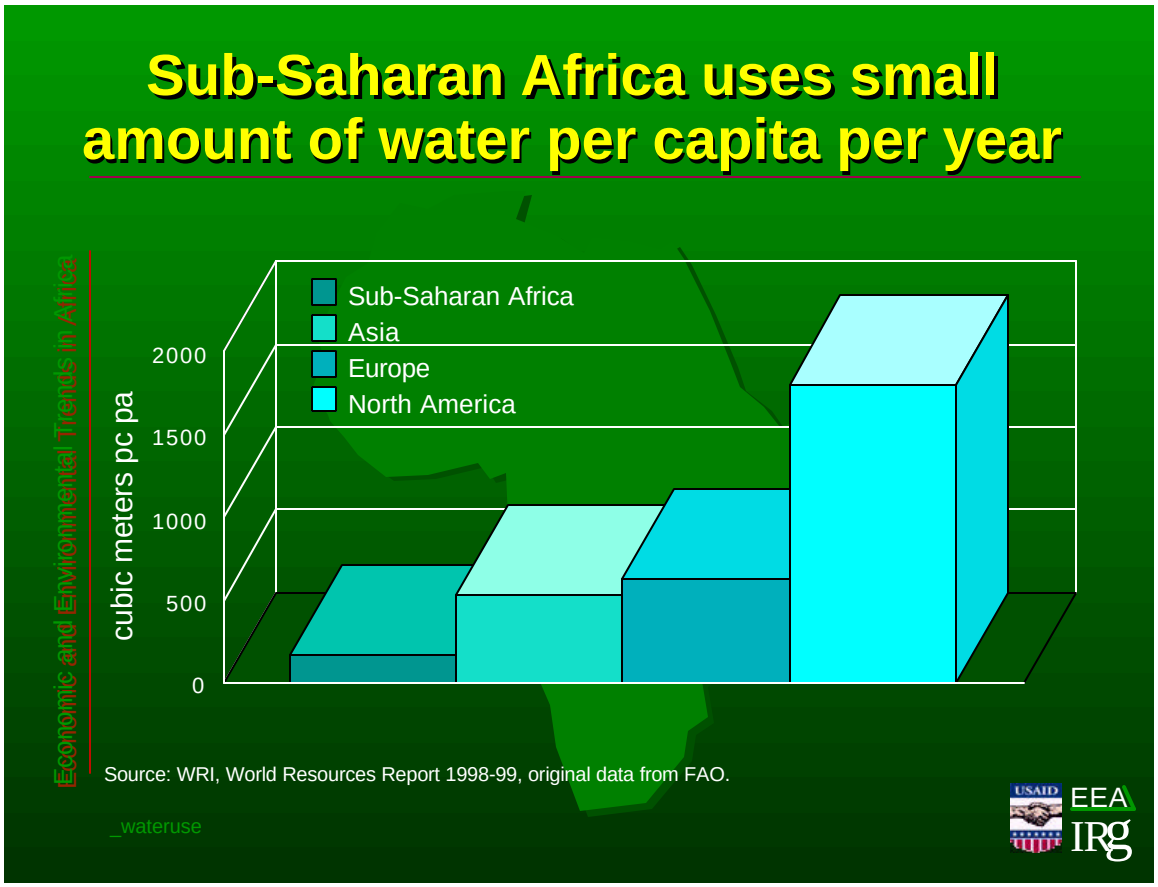
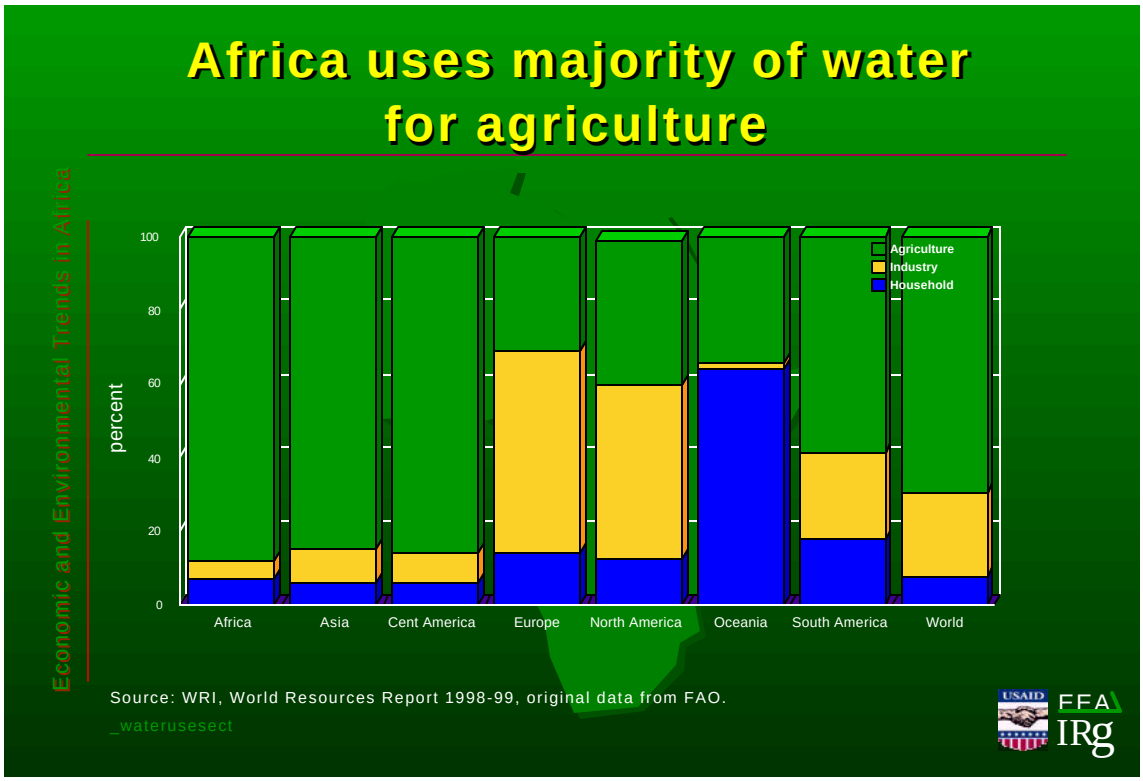
Economic and Environmental Trends in Africa

Water use as percent of available

Clearly, water, beside being an indispensable input to agriculture, is fundamental for all of life itself. Lack of water has implications for sanitation and thus, human health. For example, the health of people cooking or washing with or in water which has previously been used for agricultural or industrial purposes, will be compromised. Only a very small amount of water in Sub-Saharan Africa is treated in sanitation facilities, for example.

While Sub-Saharan Africa uses only a very small percent of the available renewable water resources per year, (most countries use between 0 and 10 percent) which would imply the existence of a reserve of enough of the resource for continued expansion, increasing use for agriculture or for households is dependent on investment in infrastructure which is an expensive and long-term solution. At present only about half of the households in Sub-Saharan Africa have access to safe water and the figure is much lower for rural households (see social indicators).



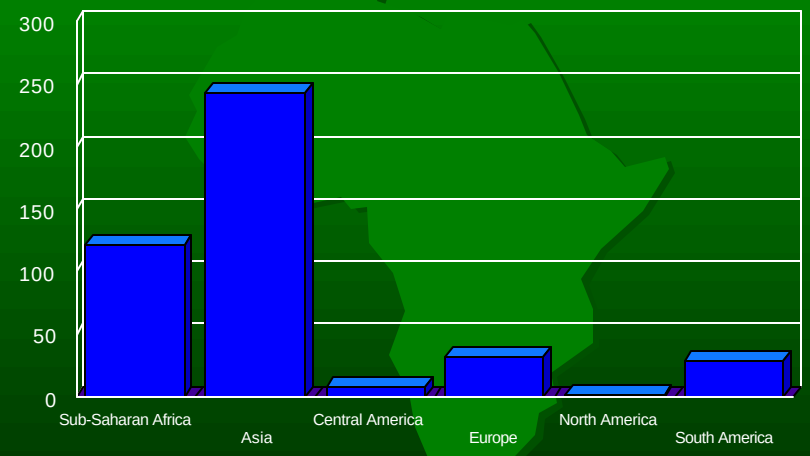


Agricultural labor and mechanization

Inputs to agriculture are, to some extent, interchangeable, depending on availability, price, or other factors. In agriculture Sub-Saharan Africa uses much more labor per 100 hectares than Central America or South America, for example, but less than Asia. Yet Asia also combines labor with mechanization, employing several times more tractors per 100 has. Tractors are not the only form of mechanization as harvesters or other large equipment can also be employed. Except in one or two places such as South Africa, this equipment is non-existent in Sub-Saharan Africa.

The agricultural inputs graph combines irrigation (percent of 100 has of cropland irrigated), agricultural workers (per 100 has), tractors (per 100 has), and fertilizer use (metric tons per 100 has) on one graph (all data are for 1994 or 95). While these are not strictly comparable or substitutable, putting them all together on the same graph does show the relative mix.

Agricultural workers per 100 ha



Source: WRI, World Resources Report 1998-99, original data from FAO.

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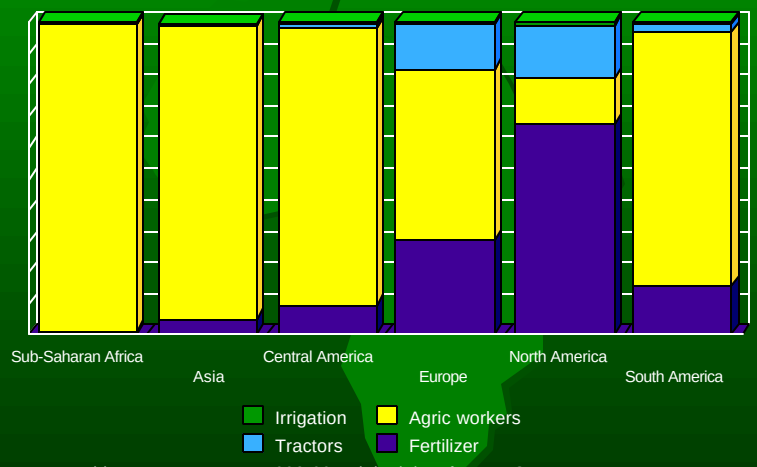
Economic and Environmental Trends in Africa

USAID EEA IRG

Agricultural inputs per 100 ha by share



Source: WRI, World Resources Report 1998-99, original data from FAO.

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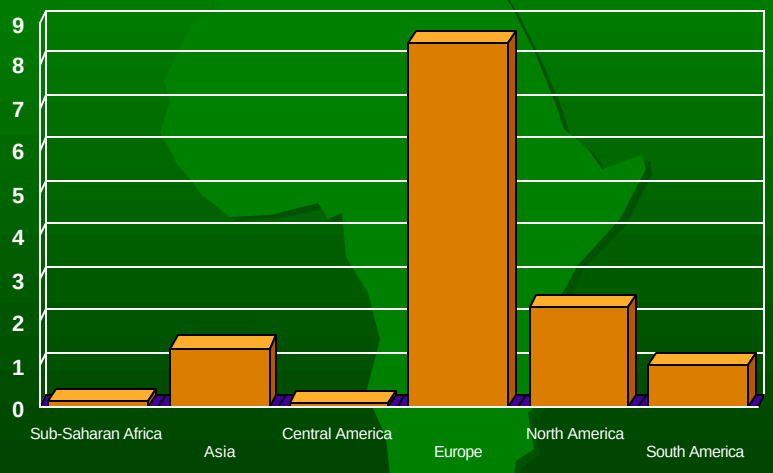
Economic and Environmental Trends in Africa

USAID EEA IRG

Agricultural tractors per 100 ha



Source: WRI, World Resources Report 1998-99, original data from FAO.

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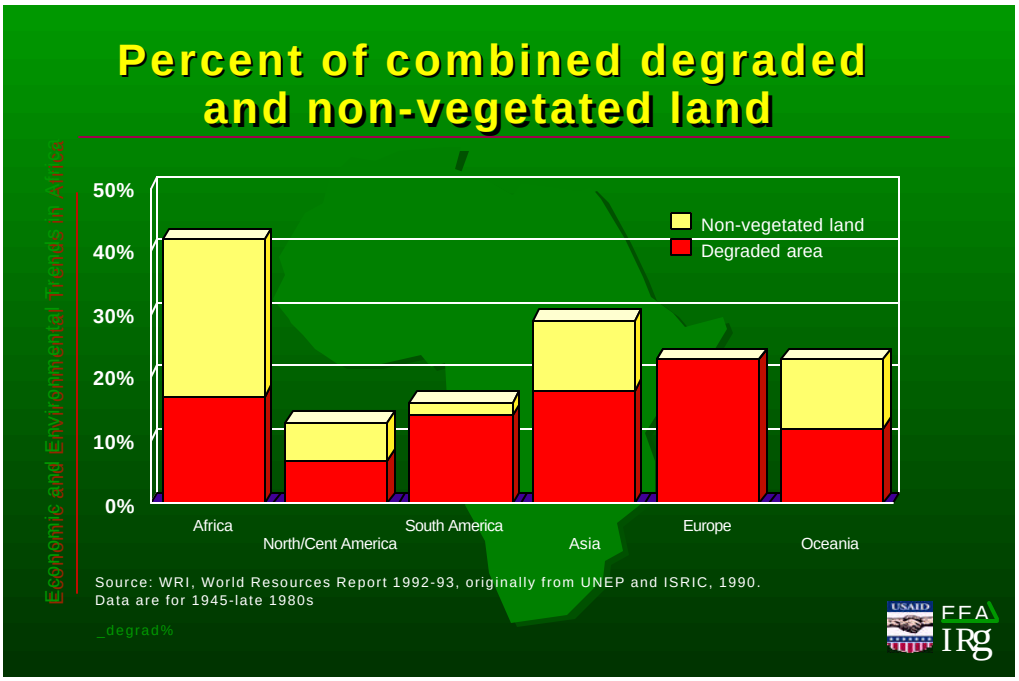
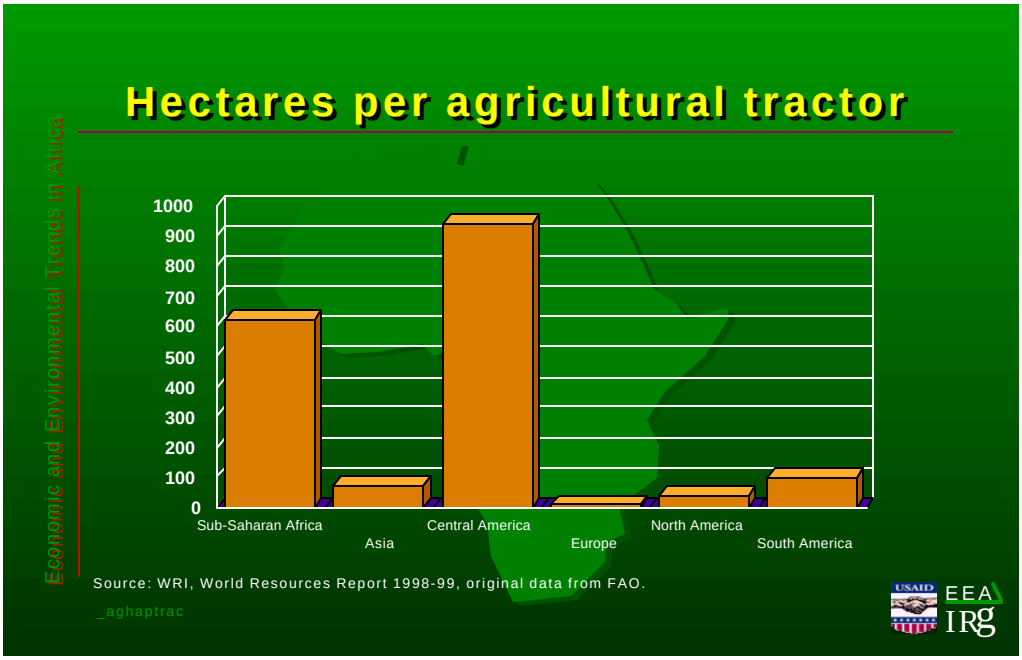
Economic and Environmental Trends in Africa

EEA IRg

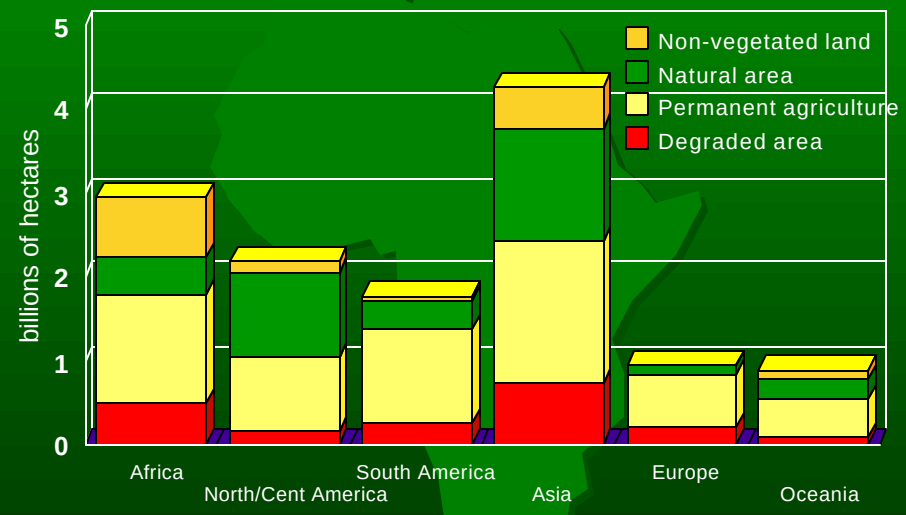
Loss of soil or soil fertility

The situation for being able to expand agriculture or for grazing is especially acute for Africa as more than 40% of the continent is non-vegetated or degraded through overuse or through inappropriate practices. (Sub-Saharan Africa could not be extracted from these figures for this study.) Statistics on soil loss or fertility loss for the region as a whole are exceptionally difficult to encounter. Those for individual countries or sub-national areas do exist.





Sizes of degraded and undegraded lands

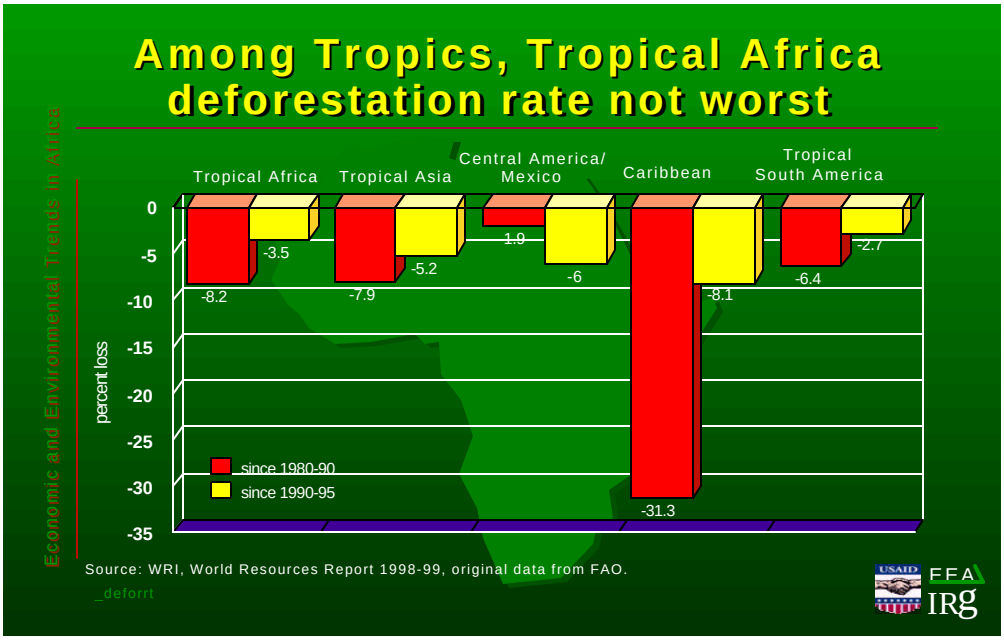


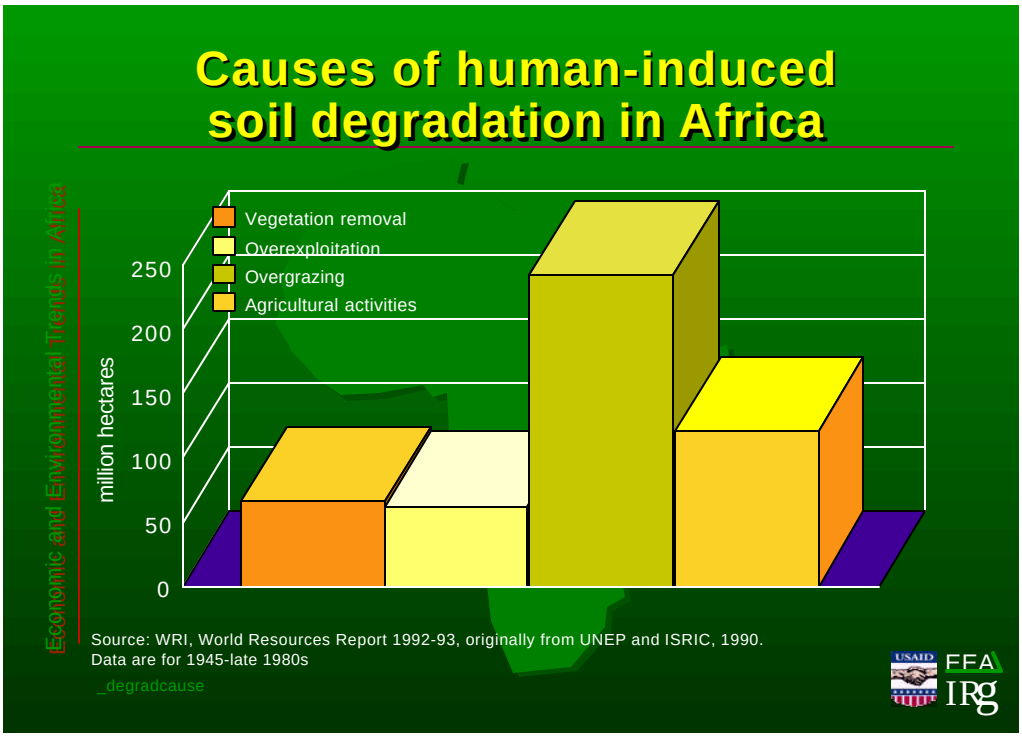
Source: WRI, World Resources Report 1992-93, originally from UNEP and ISRIC, 1990.
Data are for 1945-late 1980s

_degradarea

Deforestation rate

Loss of forest resources is important because these are an important source of environmental services and because they represent a store of important biological wealth, which, once over-harvested or destroyed, cannot be rebuilt in their former complexity. Forests in Africa also represent an important global resource.



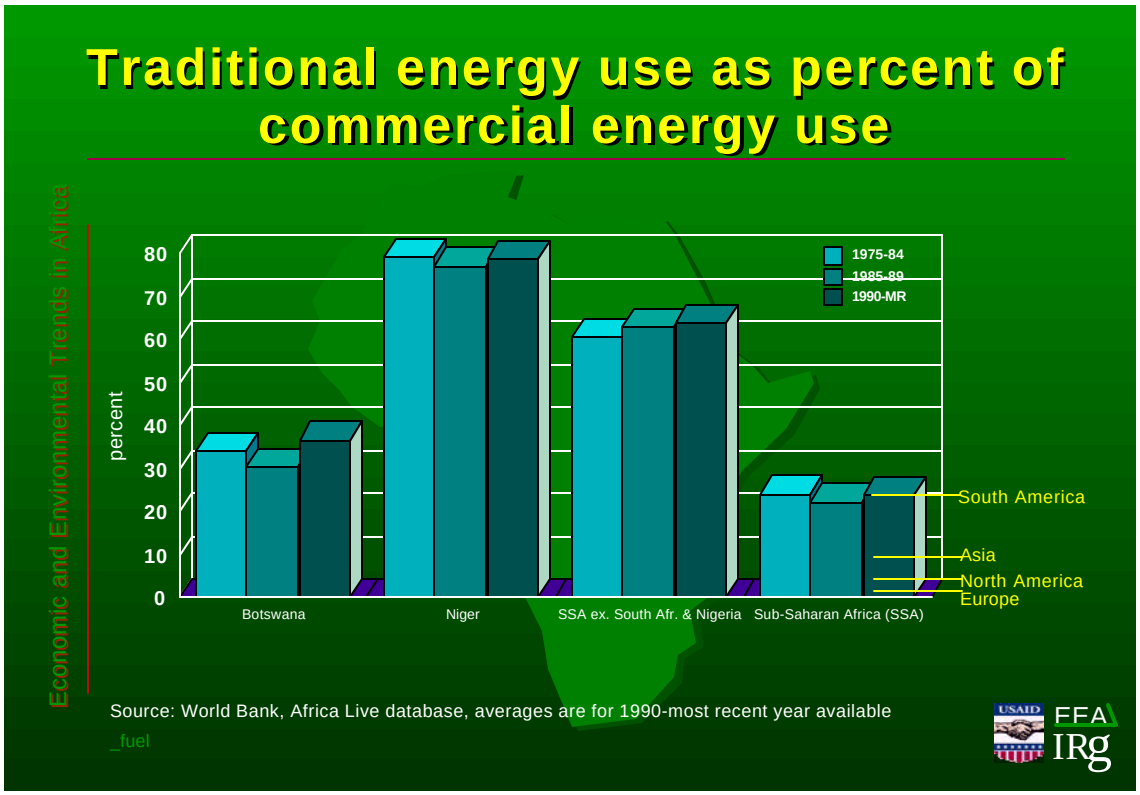


Commercial vs. traditional fuel use

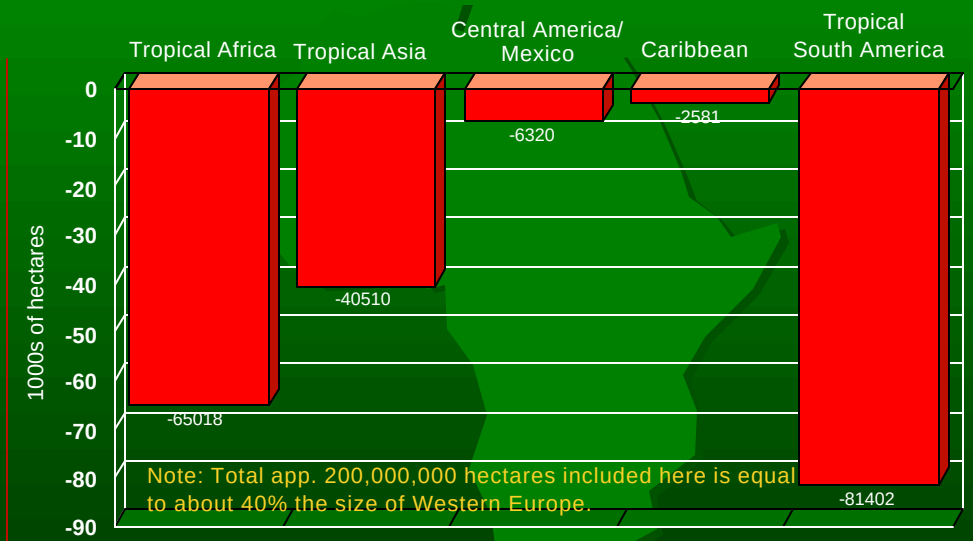
In general, use of more energy is considered an important aspect of development and improvement of living conditions and usually the form of energy considered most important is commercial energy.

However, all production and employment of energy has consequences for the healths of people and of the environment. Those from the use of more traditional fuel such as wood are more obvious and include smoke from indoor cooking fires and deforestation from wood gathering. But the effects of hydroelectric dams and of the burning of petroproducts in power plants and vehicles should not be discounted.

Sub-Saharan Africa obtains a very high percentage of its energy from traditional sources especially when compared with other developing areas and when South Africa and Nigeria are removed from the calculations.



Among tropical areas, Tropical Africa forest loss second largest



Economic and Environmental Trends in Africa

Source: WRI, World Resources Report 1998-99, original data from FAO.

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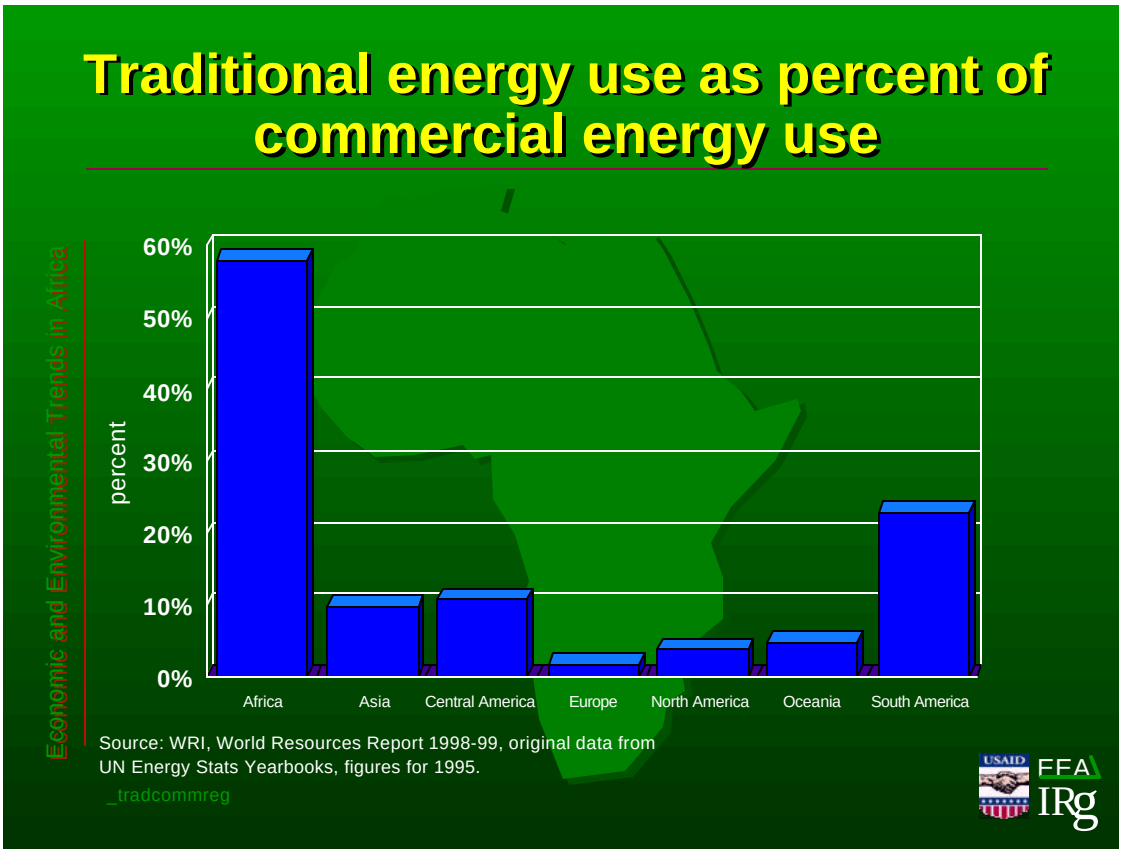
USAID EEA IRG

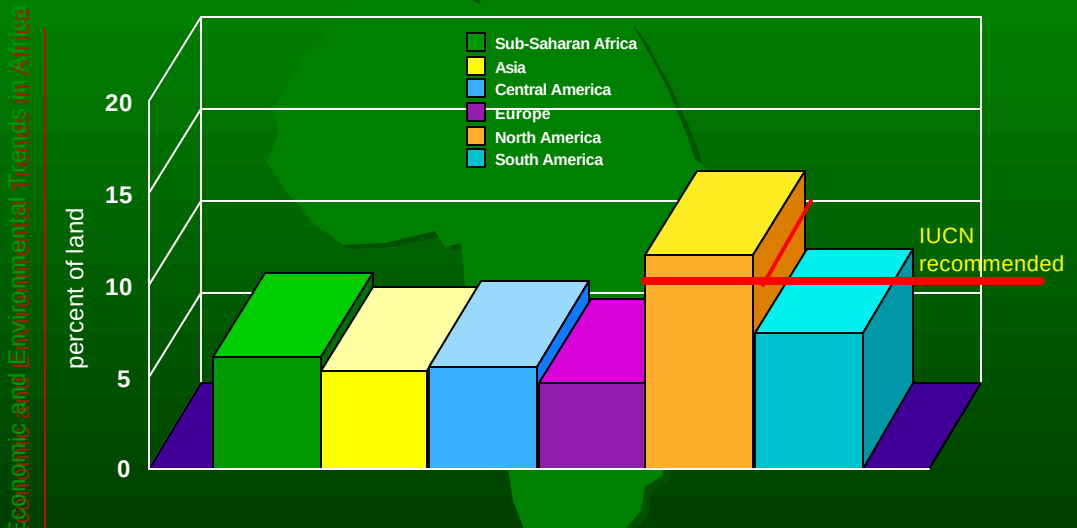


Protected areas and conservation

Declaration of areas for protection for their importance, whether for their intrinsic value or for their environmental services to humans, is a valuable response to the perceived loss of these resources, employed by all regions of the world and sanctioned by international institutions. The total of protected areas for Sub-Saharan Africa represents perhaps 6% of the land area which is comparable to that of other developing areas. This total is certainly deficient as the recommendation is for 10% of each of the major ecological types to be protected not just 10% of the land. Less than 1% is protected in Somalia, Lesotho, Djibouti, and Guinea while Botswana,Tanzania, Rwanda, Namibia, Senegal, Malawi, and Burkina Faso all have more than 10%.

However, there are levels of official protection and use, from officially strict to officially permissive, and declaration does not automatically bring protection. There are various international efforts at developing measures of effectiveness of protection but the next aggregate indicators to be employed allowing simple first-glance comparison might be "financial resources per hectare of protected area" or "human resources per hectare of protected area".

SSA protected area comparable to other developing regions



Source: WRI, World Resources Report 1998-99, original data from WCMC.

Economic and Environmental Trends in Africa

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C. Trends in human economic conditions illustrated with indicators

As in the bio-physical the record in the economic sector is somewhat mixed with very little progress being made in improved incomes, as measured by per capita income, or in the diversification of the economy, into industry as well as agriculture. The value added of workers in agriculture may even be declining. This lack of improvement is happening despite the fact that more aid per capita flows to Sub-Saharan Africa as a region (although the actual yearly per capita amount is declining) and, measured as a region, the aid received is a greater percentage of GNP and of GDI as well. If the way to make an economy grow is to invest in it, then Sub-Saharan Africa, even with more aid than other regions, has been unable to generate this investment. It has been unable to jumpstart the cycle in which increased investment begets more productivity which begets increased economic growth which allows for more savings which, in turn, is invested in more productive means. One of the reasons why it may be difficult for Sub-Saharan Africa to generate the savings and investment necessary for growth is that the level of inequality of income is high with small segments of society receiving a large share of the economy's income. This means that not only is per capita income (total income divided by total population) lower than other regions of the world but that the income of the "average" resident of Sub-Saharan Africa is a good deal lower.

GNP growth rate

Real growth of GDP is a useful measure of economic progress, if not necessarily of development. If there is no growth of the overall economy then there can be no growth in per capita incomes. In part, for any one country, growth in the 1990s may also reflect an unnaturally reduced economic base prevailing in the previous decade.

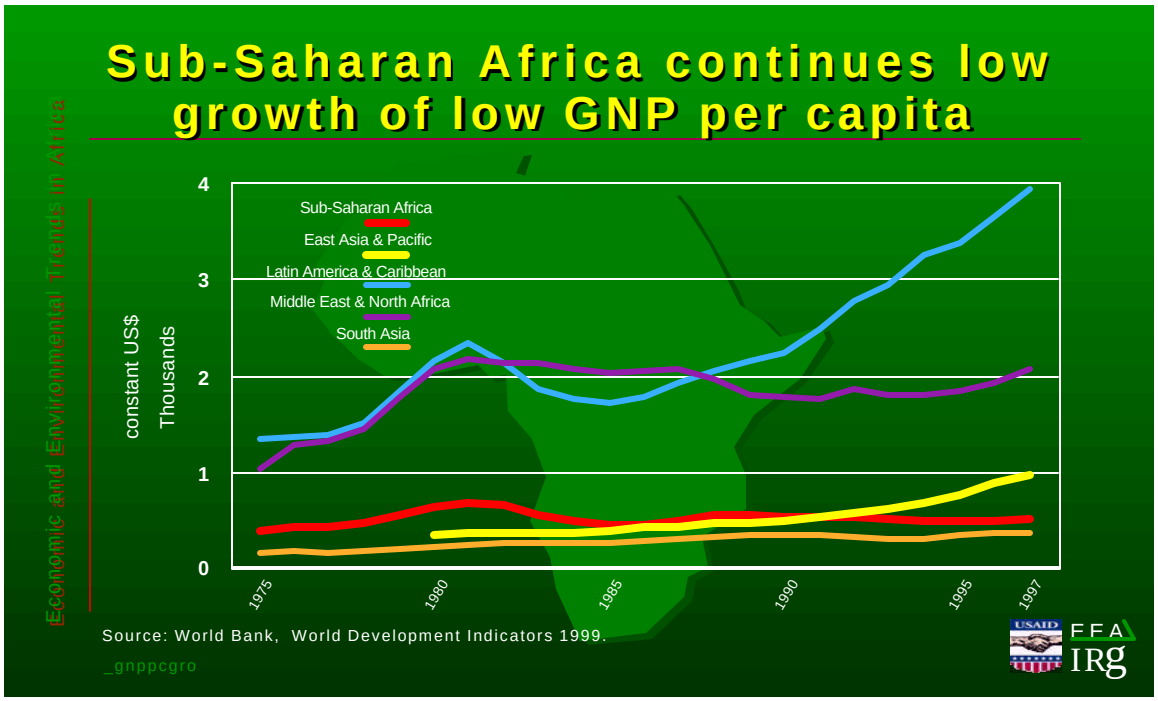
The relationship of economic growth to civil conflict is striking.

GNP per capita growth rate

As a first measure of relative well-being per capita GNP (or GDP) has real appeal and utility. An analysis of it shows that Sub-Saharan Africa, taken as a whole, has not improved economically in the last decades.

But such an aggregated measure greatly hides the heterogeneity of its constituents. As a regional measure the disparate performances of different countries are masked in the averaging. And, taken as a measure in any one country, the "per capita" figure and any changes therein hide the underlying inequalities of wealth and income and their growth.

While the figures used here are for dollars the relationship holds even when adjusted for purchasing power.



Gross domestic investment

To grow and develop a country must invest in directly productive efforts as well as in the infrastructure to support them. The level of Gross Domestic Investment (GDI) for Sub-Saharan Africa in the last twenty years is somewhat lower than for other developing regions. Investment can come from domestic sources (as a result of saving) or from foreign sources (direct investment or ODA, for example). Logic and theory suggest that GDI should be directly associated with GDP growth and they should be mutually reinforcing.

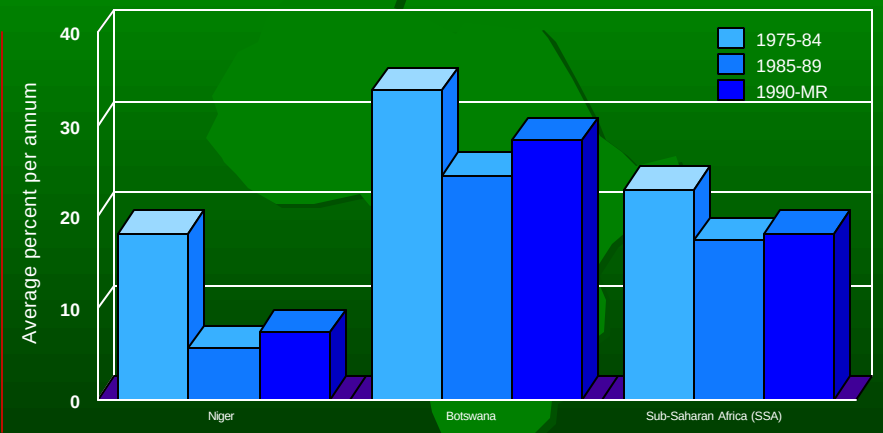
A high level of investment is not the only aspect needed for future growth as education (another type of investment) and positive economic policies are also needed. The disparate performances of Botswana ad Niger are put into context in the analysis of each country in Section E below.

Average Gross Domestic Investment vs. GDP growth rate since 1990

Source: World Bank, Africa Live database, averages are for 1990-most recent year available

_gdi2gdpgro

Comparison of Botswana, Niger, and SSA annual Gross Domestic Investment averages since 1990

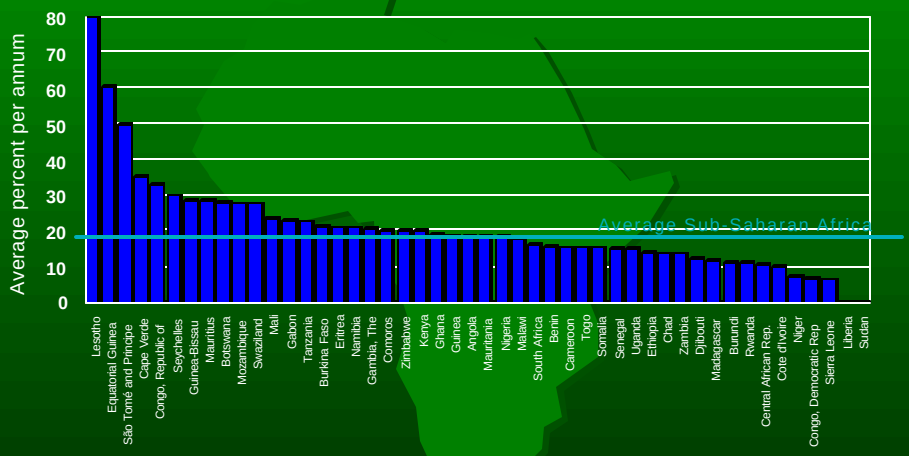


Source: World Bank, Africa Live database, averages are for 1990-most recent year available

_gdibnssa

Economic and Environmental Trends in Africa

Gross Domestic Investment per annum average since 1990



Source: World Bank, Africa Live database, averages are for 1990-most recent year available

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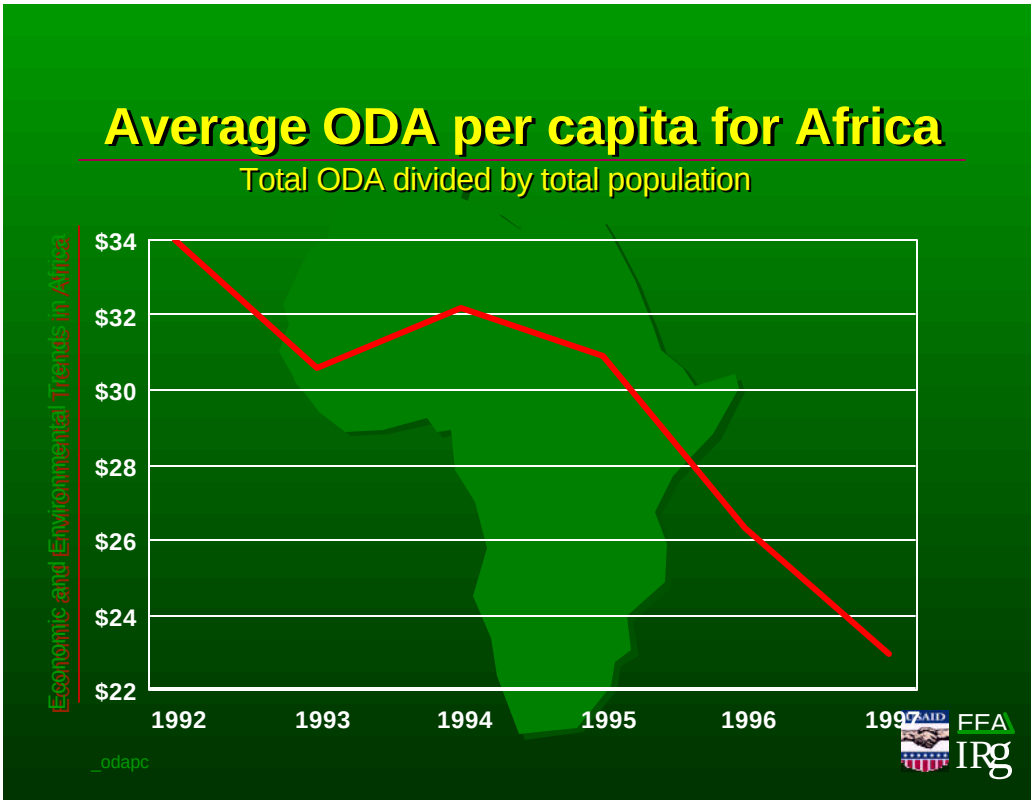
Economic and Environmental Trends in Africa

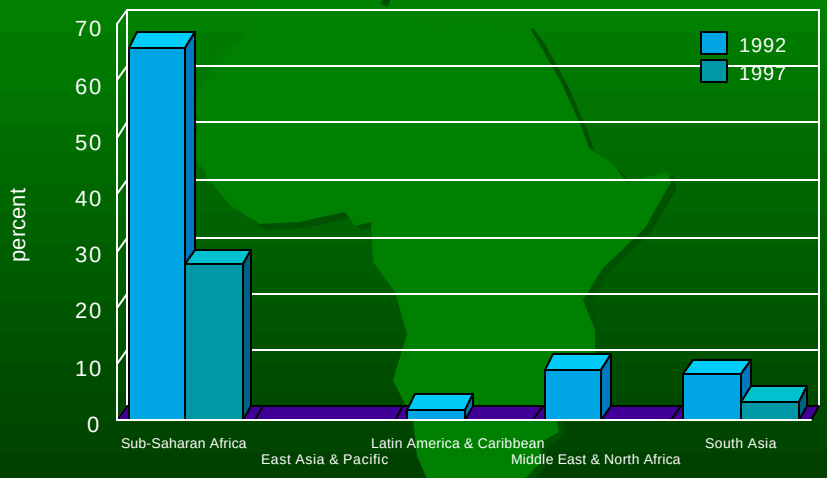
Official Development Assistance

The total ODA for Sub-Saharan Africa divided by the total population has suffered a decline this decade. ODA is essential for Sub-Saharan Africa development as, at present income levels for most of the population, domestic savings are insufficient for investing and creating the productive infrastructure. ODA is high relative both to GNP and to GDI of other developing regions.

The changing mix of countries, of donors, of areas of emphasis, or of grants and loans and terms is not shown by these aggregated figures.



As percent of GDI SSA has received much greater ODA



Economic and Environmental Trends in Africa

Source: World Bank, World Development Indicators 1999.

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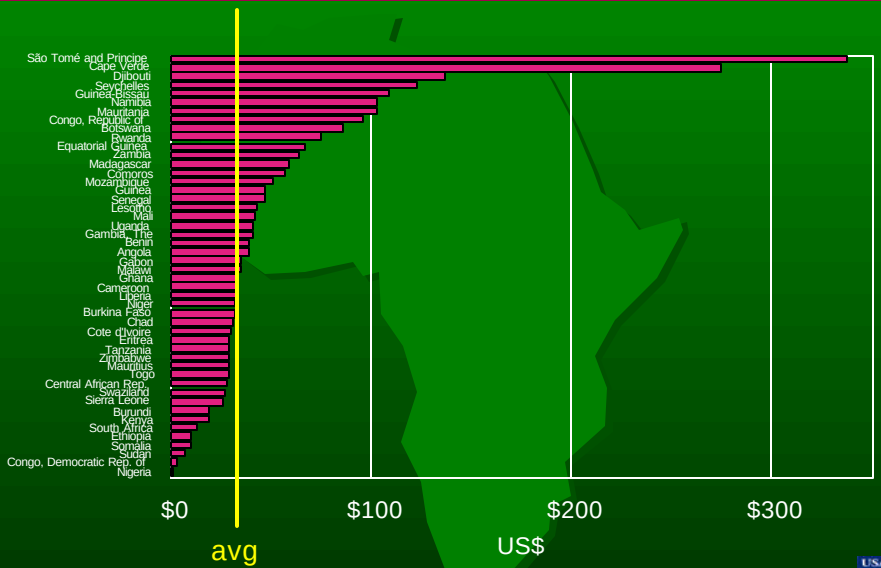
ODA per capita 1997



Economic and Environmental Trends in Africa

Source: WRI, World Resources Report 1998-99.

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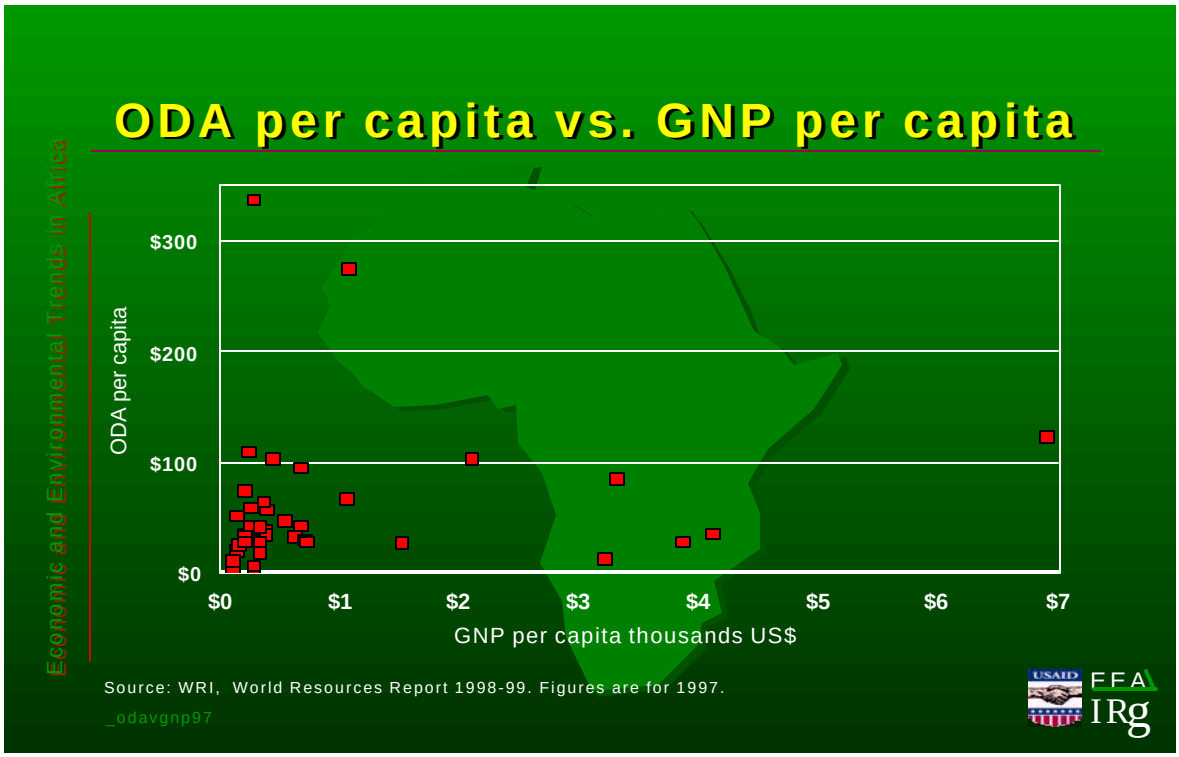
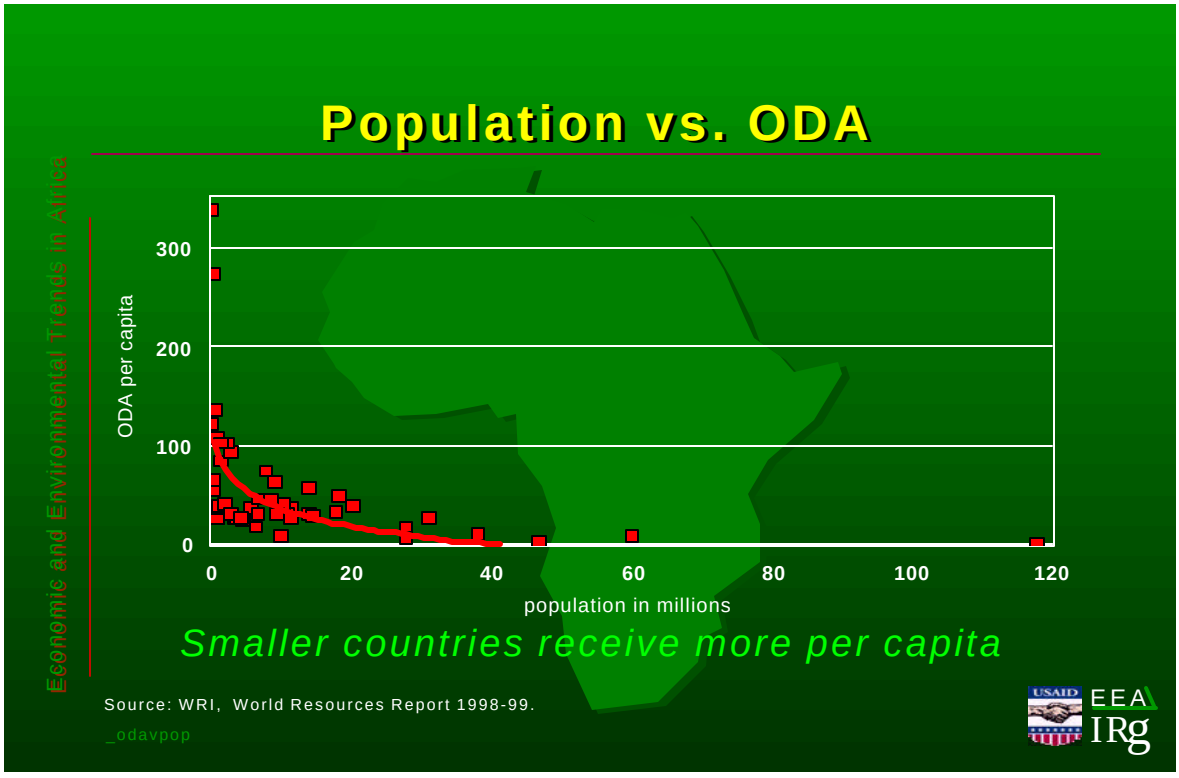
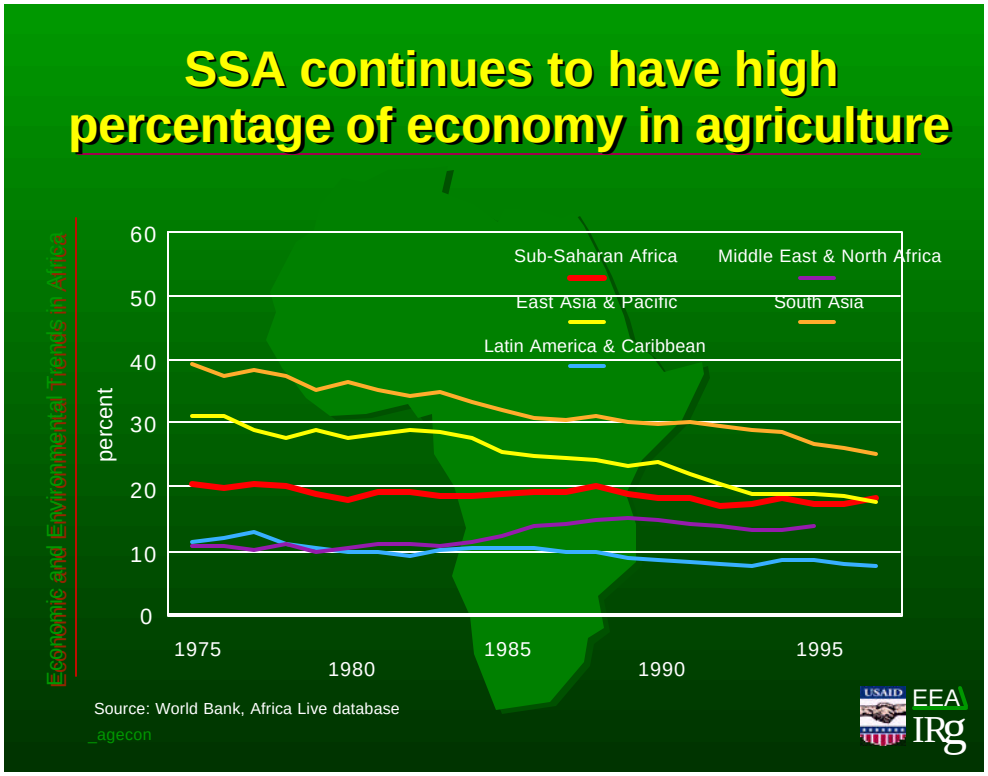


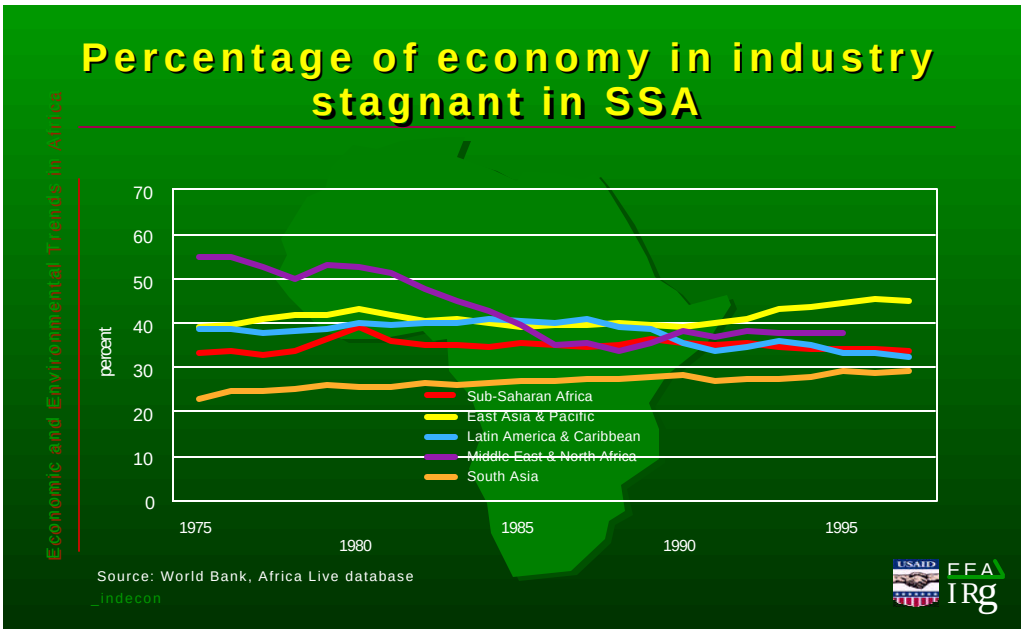


Structure of economy

An economy which is developing could be expected to have an increasing proportion in industry

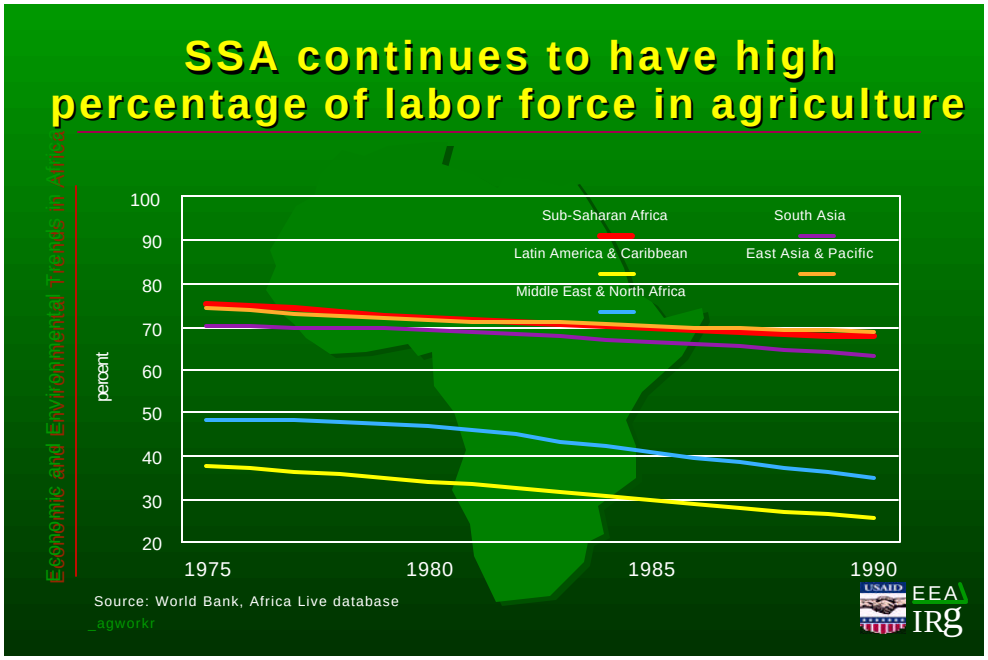
and services as it develops and meets the needs of its population. In Sub-Saharan Africa agriculture continues to be a large percentage of the economy with little relative growth of the industrial sector.

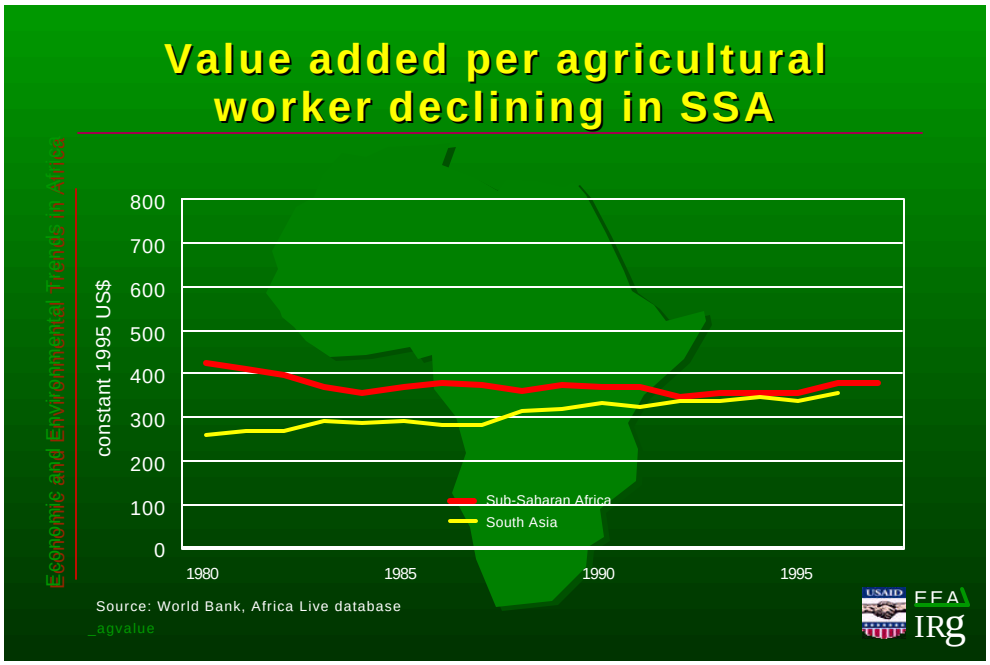




Occupation of labor force

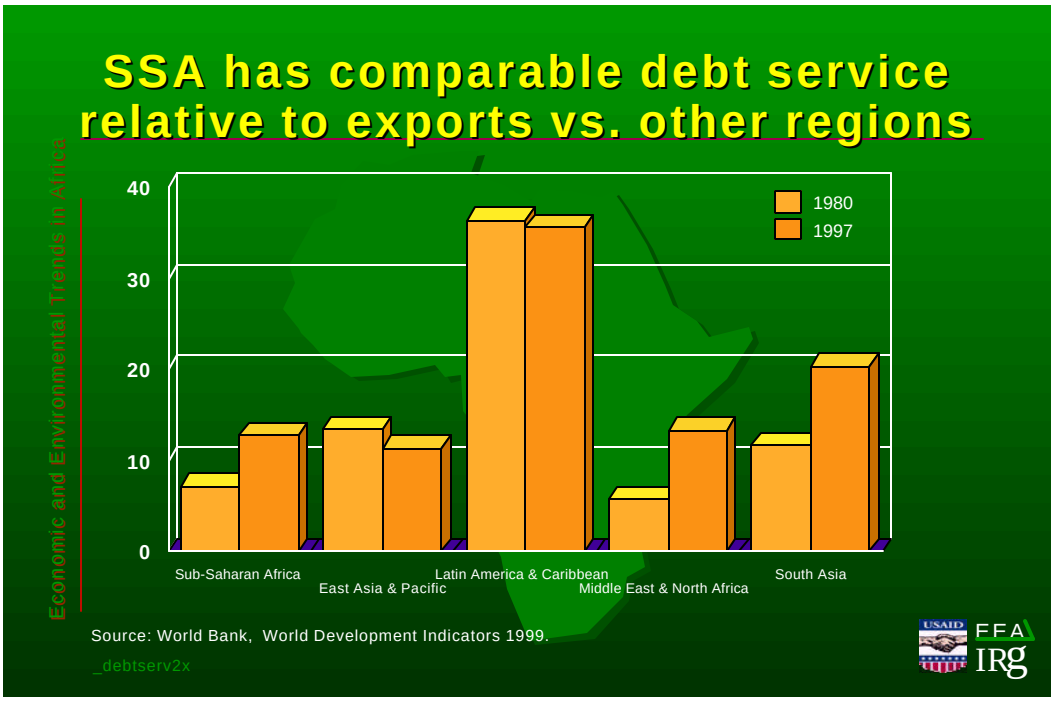
A larger proportion of the labor force continues to work in agriculture in Sub-Saharan Africa. Unfortunately, the "value added" of each of these workers continues to decline. A more dynamic industrial sector (see above) would be able to absorb more of these workers.





Debt service

The ability to repay past debt incurred is a reflection of a positive employment of this debt in the past and is crucial to obtaining new loans for present development needs. At present Sub-Saharan Africa's debt service relative to exports is comparable to that of other developing regions. Presumably the figures here reflect debt reductions and rescheduling achieved in past decades.



Inequality of income

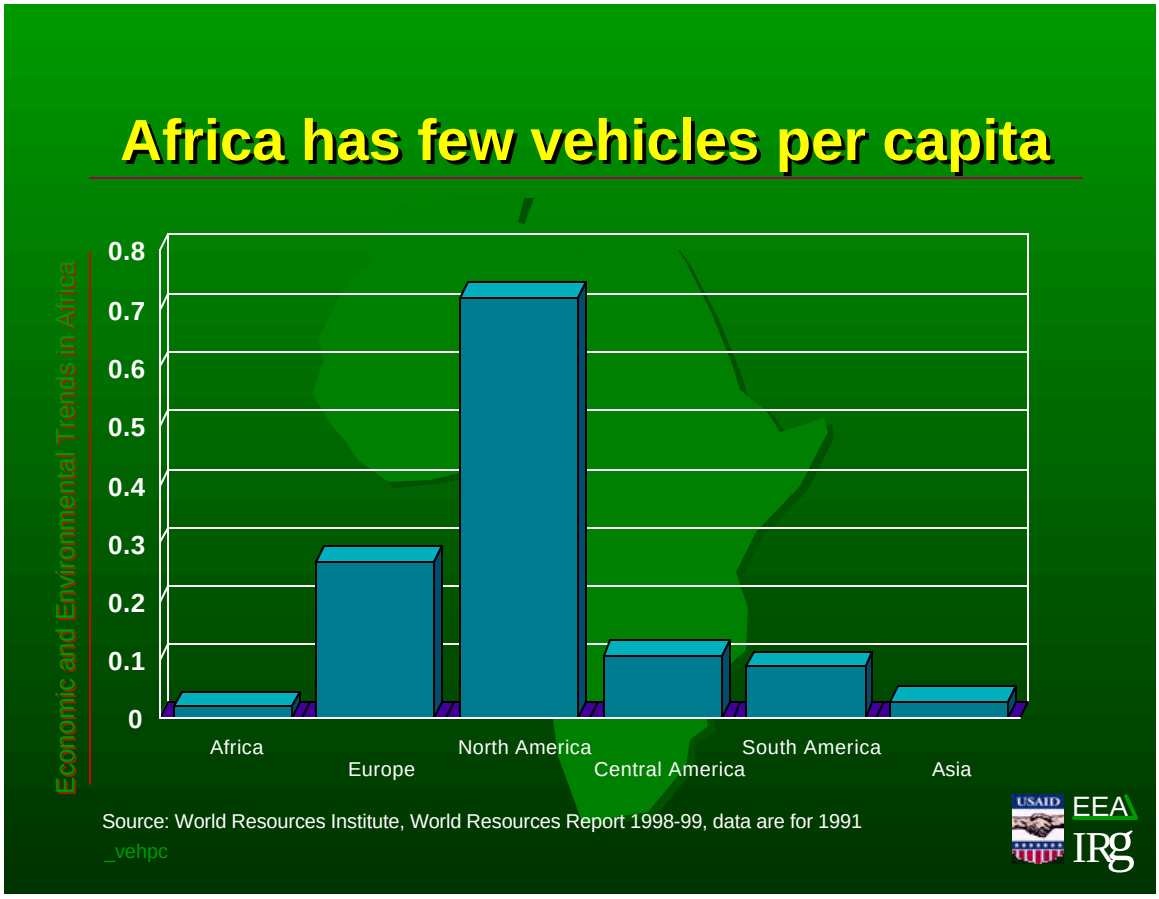
Inequality of income is marked in Sub-Saharan Africa but the poor coverage and poor data make a continental or regional figure particularly difficult to construct or to have meaning (see Botswana and Niger for individual countries), thus there is no regional graph here. The countries of Sub-Saharan Africa whose data are available show Gini coefficients ranging from 29 to 63 (this last may be the highest in the world), but the years of the surveys range from 1968 to 1993 and the data, as always, are quite suspect.

Still, the problem is of grave importance with its implications for social development and democracy as well as for the economy. Increasing production and achievement of economies of scale are dependent on larger populations with sufficient income to command these goods and services.

Vehicles and roads

More vehicles and better roads permit more efficient transport of goods to markets and permit resources to be applied more efficiently, thus improving markets in the more general sense.

While the lack of vehicles and roads may not seem apparent in places in Sub-Saharan Africa, particularly urban ones, taken as a whole, there are fewer means of transport and a poorer transport infrastructure network than would be desirable.



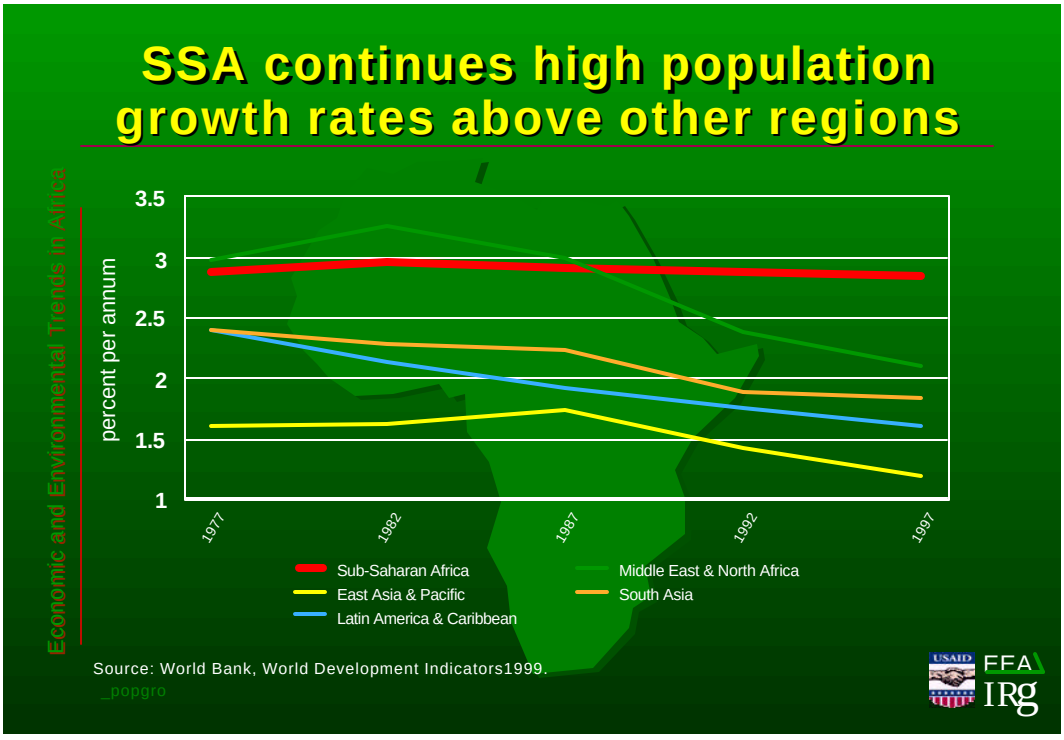
D. Trends in human social conditions illustrated with indicators

The social development conditions for the people in Sub-Saharan Africa remain at a low level of development and are improving slowly. If development means not just more food production or more income or more industry, then it should include such things as longer lives, better health in these lives, the ability to choose the number of children, a greater percentage of children reaching productive years, higher literacy, greater freedom to choose careers, and more time to spend improving society. On these counts, life expectancy, health, fertility rate, child mortality, literacy, etc. Sub-Saharan Africa continues to lag behind other less developed regions and, in most cases, the gap is widening.

Population growth rate

The overall rate of population growth, while declining, remains above that of the other regions. Like a wave, even though the fertility rate has declined significantly, the age structure of the population, being young, assures that even if each woman has fewer children, the total will continue to increase for some time to come.

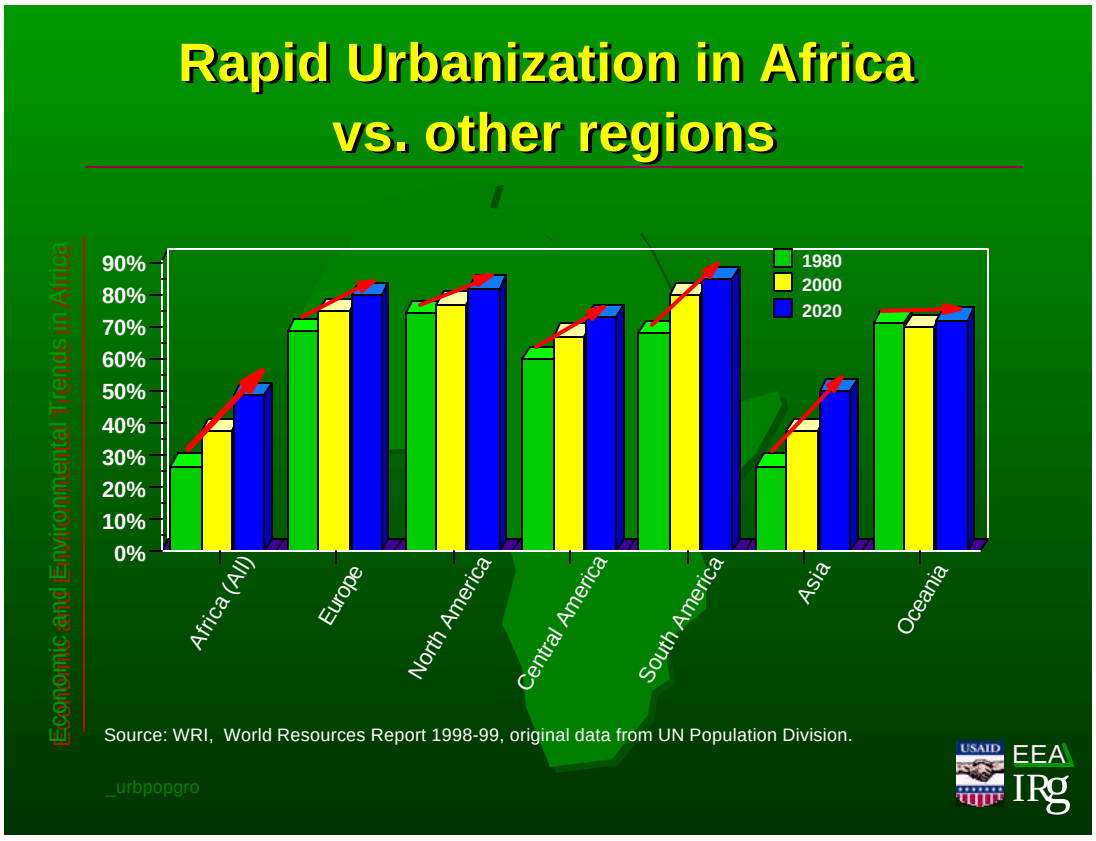
More people has implications for resource use, food supply, employment creation, infrastructure requirements, and practically every other aspect of national life, and, in some cases, international relations as well.



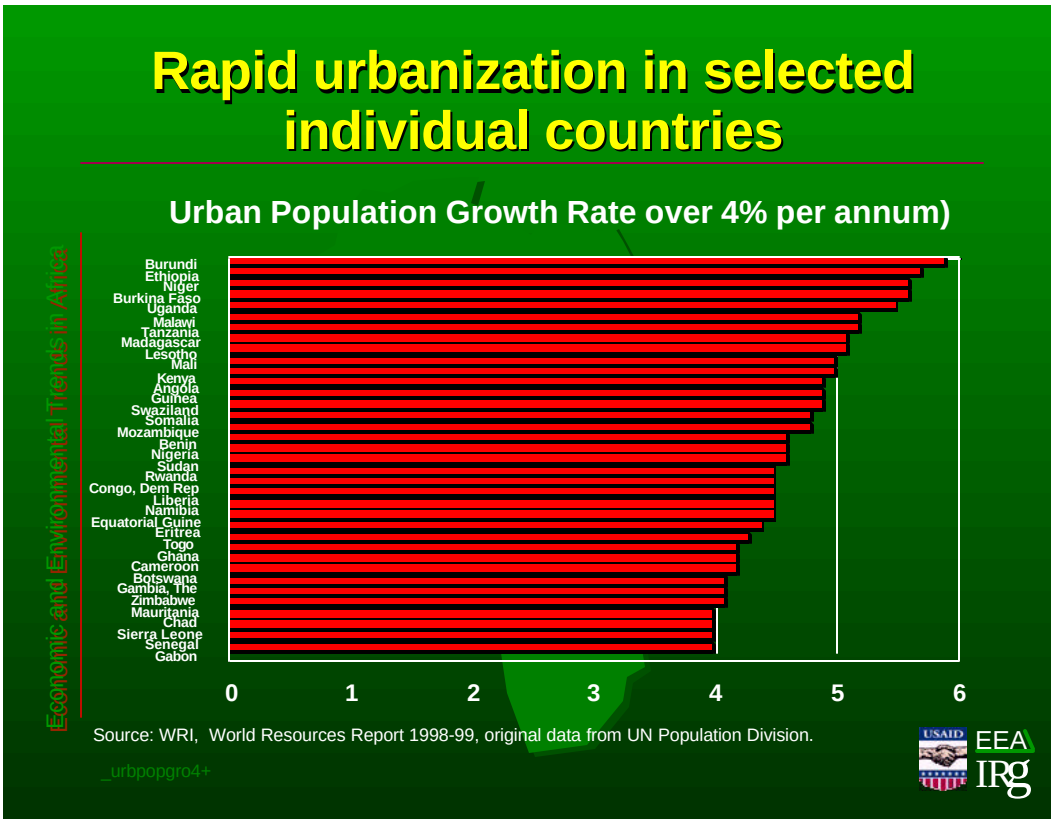
Rapid urbanization

Rapid urbanization is a problem that reflects the combination of fast population growth in general, the lack of opportunities in rural areas, and, to some extent, the attraction of urban living. It is widespread across Sub-Saharan Africa as more than 2/3 of the countries have urban growth rates of over 4% per annum.

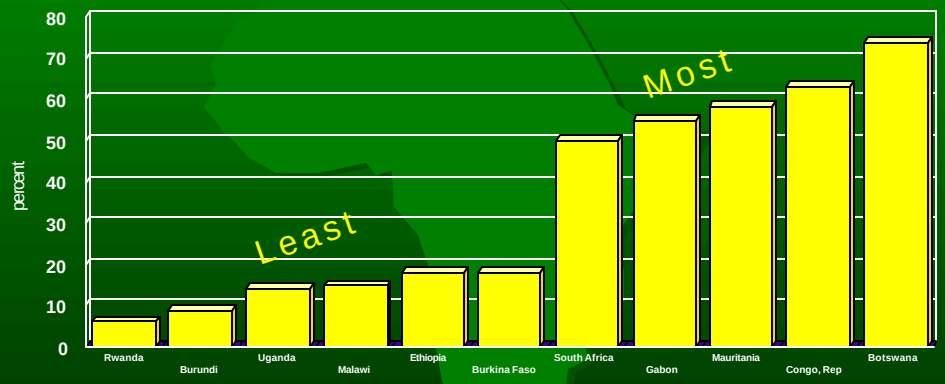
Unfortunately, urban life places high demands on infrastructure such as water supply and sanitation, power supply, and others, and growth will require a higher investment in these areas. Further exacerbating the problem, it is the poorer countries which have faster urban growth.



Rapid urbanization in selected individual countries



Most and least urbanized countries



Source: World Bank, World Development Indicators 1999.

_urbpop+-

Economic and Environmental Trends in Africa

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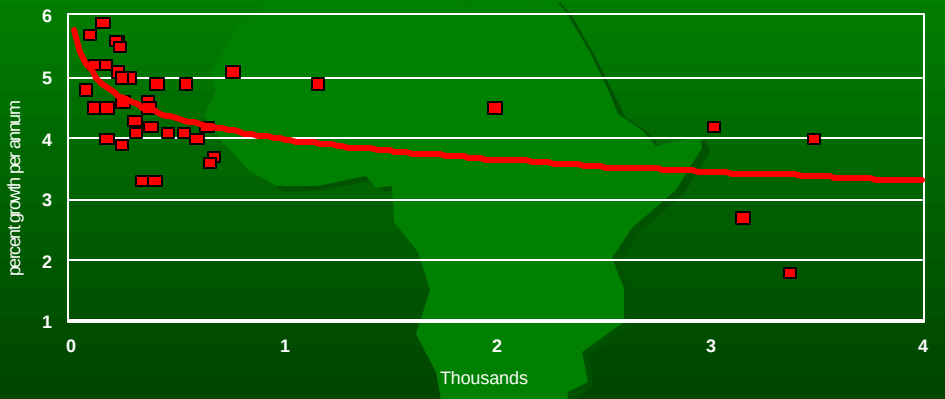
Poorer countries also have faster urban growth rate

Urban growth rate 2000-05 vs. GNP per capita 1995



Source: WRI, World Resources Report 1998-99, Table 6.1 and 9.1.
GNP, World Development Indicators 1997; growth, UN Population Division

_urbvgnp

Economic and Environmental Trends in Africa

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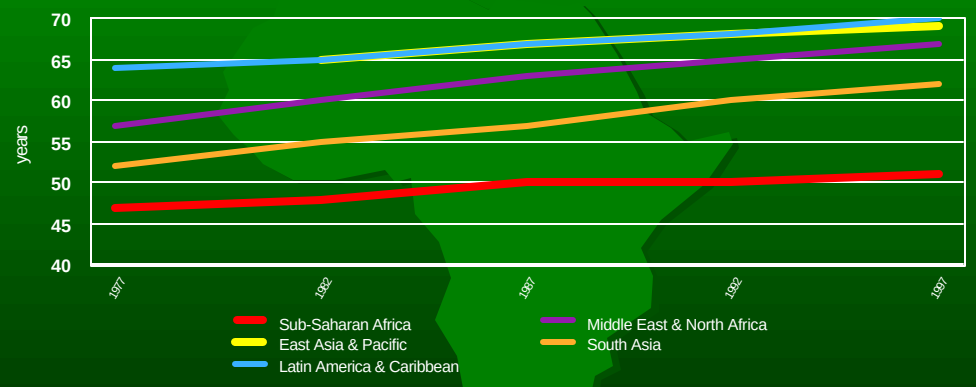
Life expectancy

Life expectancy in Sub-Saharan Africa remains very low and is increasing only slowly. Life expectancy is, in some ways, the overall indicator as it reflects not only conditions for children but also long-term effects of nutrition, sanitation, and even working conditions. The range in Sub-Saharan Africa is extraordinary, from 37 in Sierra Leone to over 70 years in the Seychelles and Mauritius.

The AIDS crisis will have a profound effect on this indicator.

SSA life expectancy increases slowly; remains below other regions

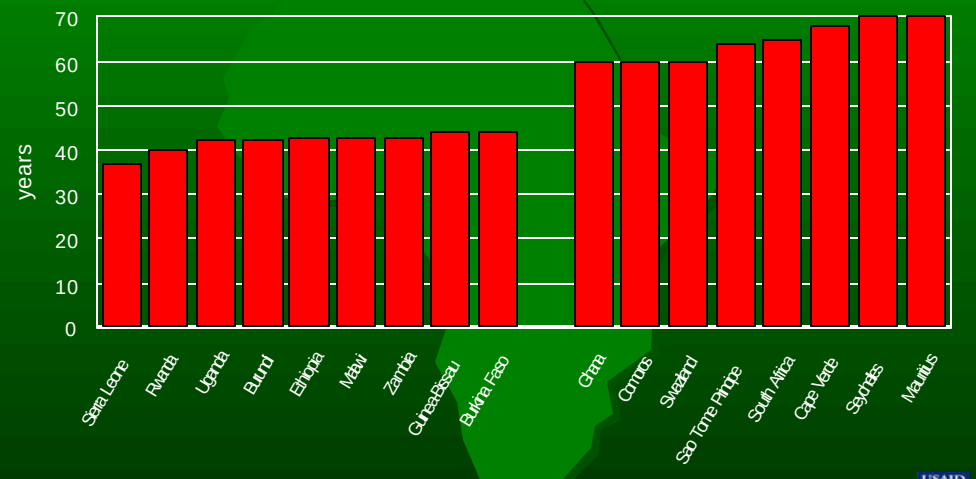


Source: World Bank, World Development Indicators1999.

_lifeexp

Economic and Environmental Trends in Africa

Lowest and highest life expectancy



Source: World Bank, World Development Indicators1999. Year is 1997.

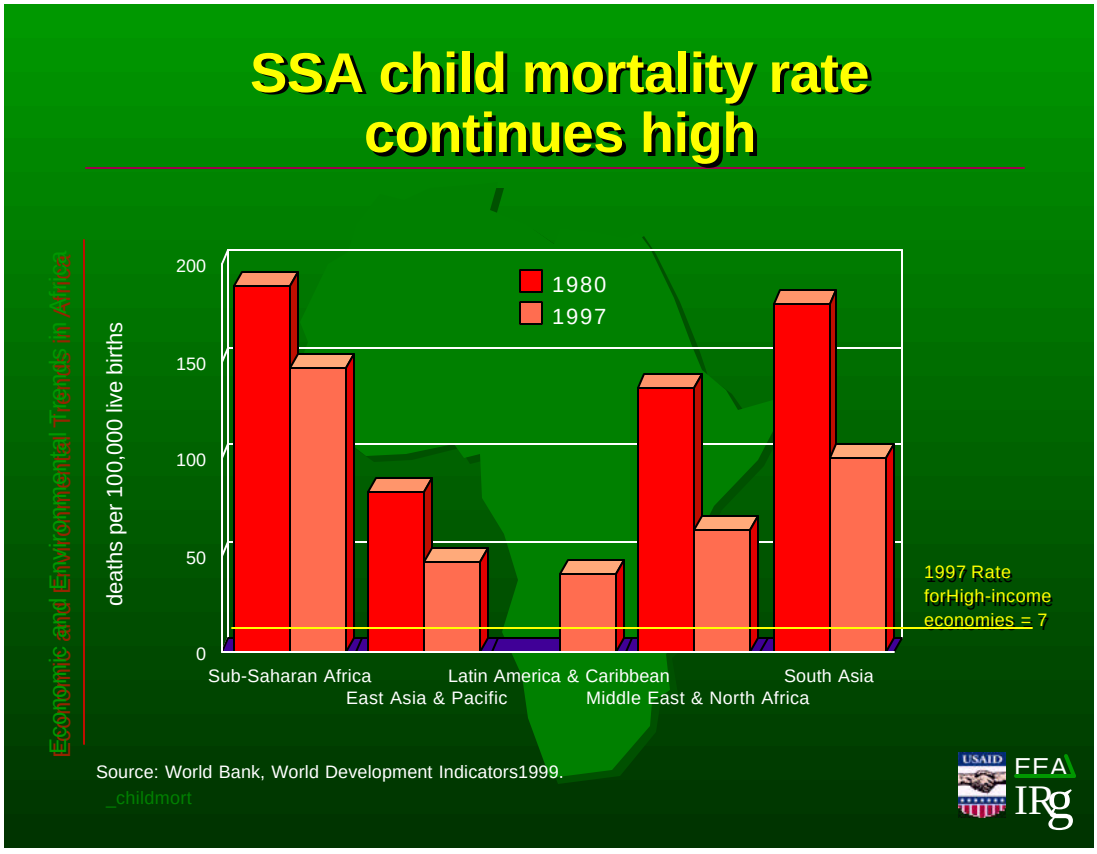
_lifeexphilo

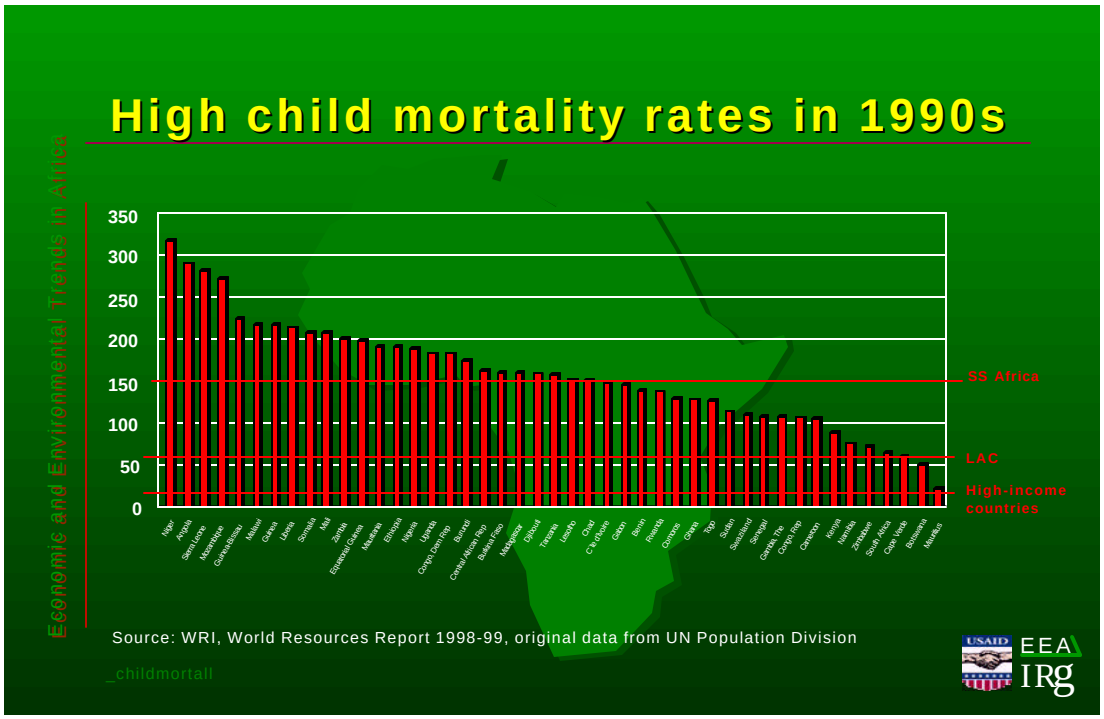
Economic and Environmental Trends in Africa

Child mortality rate

While most countries in Sub-Saharan Africa have reduced their child mortality rates, that of the region continues high relative to other developing regions and this reduction is not of the size achieved in South Asia, for instance. While some countries, such as The Gambia, have achieved significant decreases in child mortality, others, such as Angola and Zambia, have suffered a rise in this over the last two decades.

As this indicator concerns deaths under the age of 5 it reflects not only the state of prenatal care and delivery (shown directly in infant mortality but indirectly here) but also the more general health and nutrition conditions in the country to which the young are more vulnerable.




High child mortality rates in 1990s
Economic and Environmental Trends in Africa
350
300
250
200
150
100
50
0
SS Africa
LAC
High-income countries
Niger
Angola
Sierra Leone
Mozambique
Guinea-Bissau
Malawi
Congo
Liberia
Somalia
Mali
Zambia
Equatorial Guinea
Mauritania
Ethiopia
Nigeria
Uganda
Congo, Dem Rep
Central African Rep
Burundi
Burkina Faso
Madagascar
Djibouti
Tanzania
Lesotho
Chad
C'te d'Ivoire
Gabon
Benin
Rwanda
Cameroon
Comoros
Ghana
Togo
Sudan
Swaziland
Senegal
Gambia, The
Congo, Rep
Cameroon
Kenya
Namibia
Zimbabwe
South Africa
Cape Verde
Botswana
Mauritius
Source: WRI, World Resources Report 1998-99, original data from UN Population Division
_childmortall
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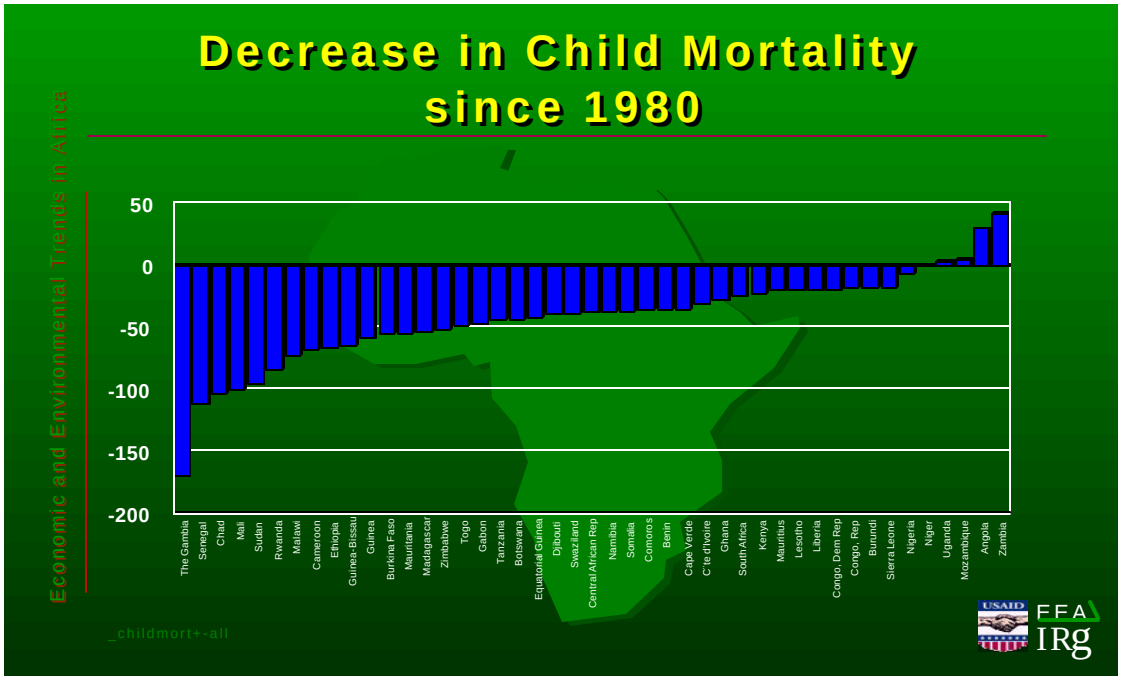
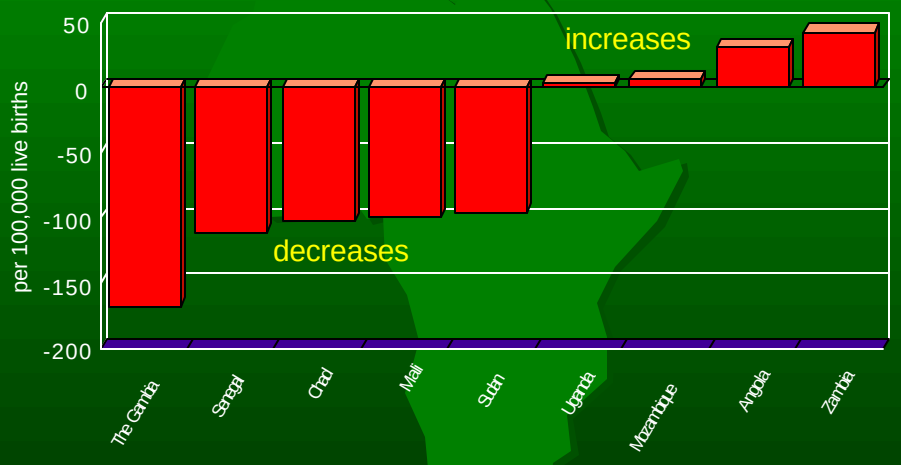
EEA
IRg


Decrease in Child Mortality since 1980
Economic and Environmental Trends in Africa
50
0
-50
-100
-150
-200
The Gambia
Senegal
Chad
Mali
Sudan
Rwanda
Malawi
Cameroon
Ethiopia
Guinea-Bissau
Guinea
Burkina Faso
Mauritania
Madagascar
Zimbabwe
Togo
Gabon
Tanzania
Botswana
Equatorial Guinea
Djibouti
Swaziland
Central African Rep
Namibia
Somalia
Comoros
Benin
Cape Verde
C'te d'Ivoire
Ghana
South Africa
Kenya
Mauritius
Lesotho
Liberia
Congo, Dem Rep
Congo, Rep
Burundi
Sierra Leone
Nigeria
Niger
Uganda
Mozambique
Angola
Zambia
_childmort+-all
USAID
EEA
IRg

Greatest decreases and increases in child mortality rates since 1980



Source: WRI, World Resources Report 1998-99, original data from UN Population Division

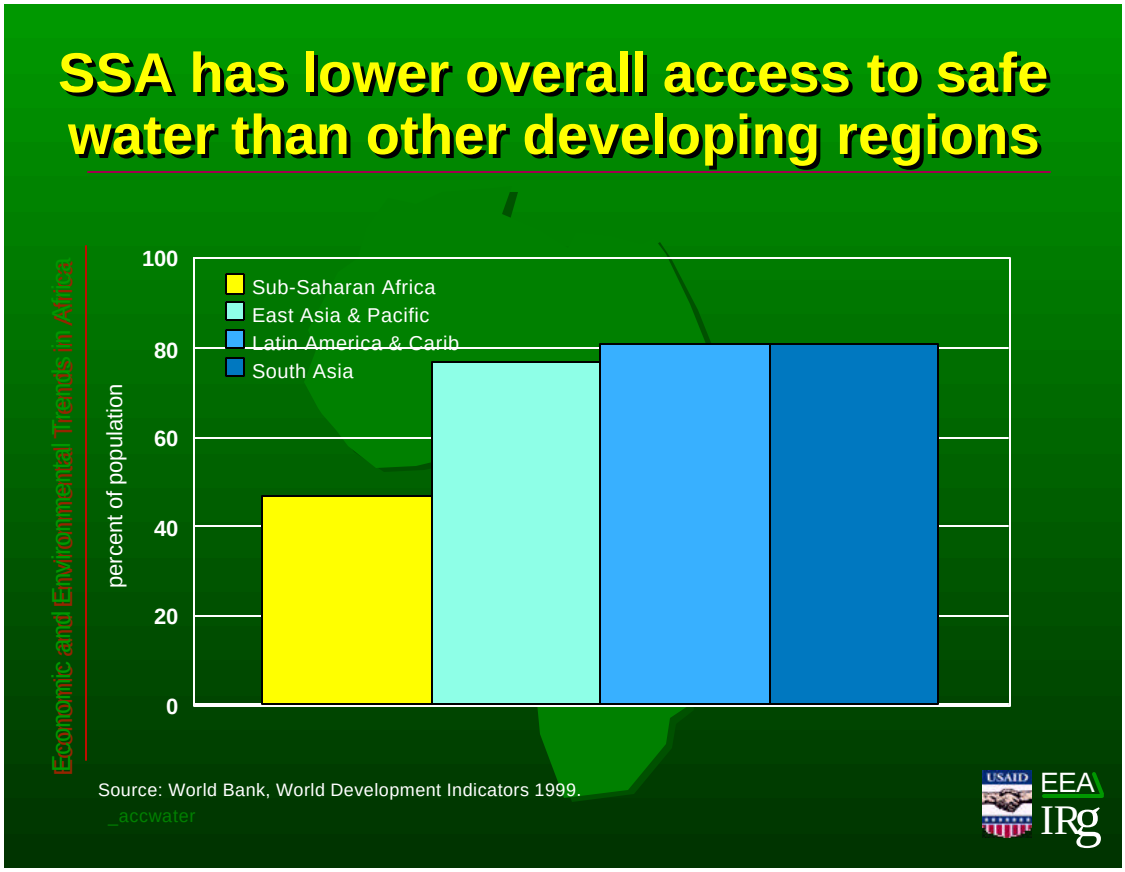
_childmort+-

Economic and Environmental Trends in Africa

Population with access to safe water

Having access to safe water for domestic consumption improves health, reduces expenditures on health services, and improves productivity.

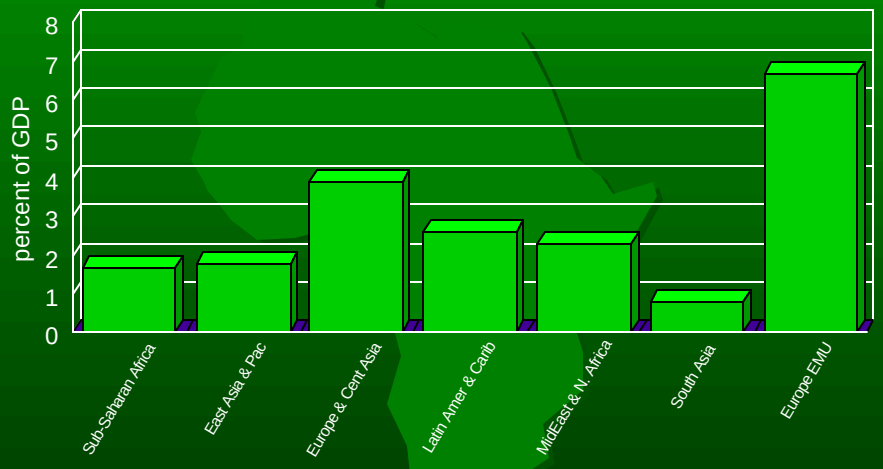
A much smaller percentage of rural households has access to safe water than urban.



Expenditures on health

Public expenditures on health in Sub-Saharan Africa, as a percent of GDP, are comparable to those in other developing regions. However, the total health expenditure is lower than all other regions with the difference being provided by private spending on health, a much smaller factor in Sub-Saharan Africa. Of course, as with other indicators, the same percent of a smaller GDP translates to actual expenditures which are lower. The situation will only worsen as the AIDS crisis deepens and broadens.

SSA public health expenditure ratio comparable to rate for other low and middle income regions

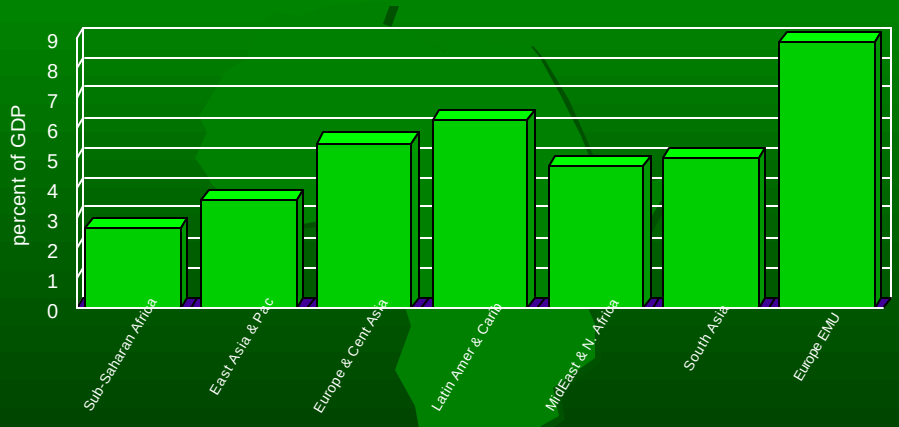


Source: World Bank, World Development Indicators 1999, Table 2.13.
Regions except "Europe EMU" are "Low and middle income".

_pubhlthrt

Economic and Environmental Trends in Africa

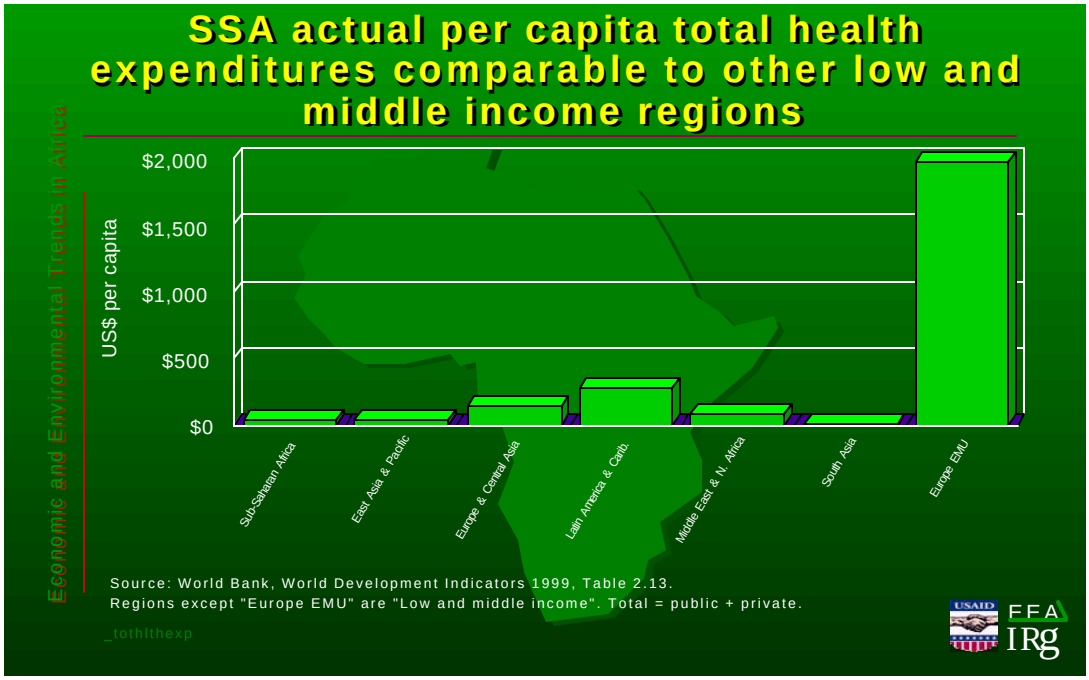
SSA total health expenditure ratio lower than other low and middle income regions



Source: World Bank, World Development Indicators 1999, Table 2.13.
Regions except "Europe EMU" are "Low and middle income". Total = public + private.

_tothlthrt

Economic and Environmental Trends in Africa

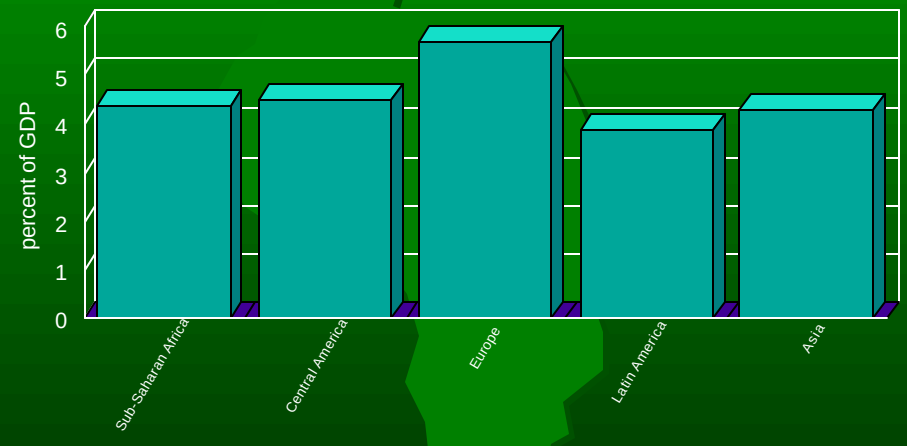


Expenditures on education

Primary education is fundamental to increasing productivity of all members of society and secondary education, and more, is crucial to sectors hoping to compete at the international level. Education is also key to changing the secondary situation of women, of whom, as adults, a larger proportion are illiterate.

Public expenditures on education in Sub-Saharan Africa, are in general, on a percentage basis, comparable to those in other developing regions and to more developed regions as well. They also represent between 10 and more than 30% of government expenditures, a figure also comparable to other regions. The difference is that this is a comparable percentage of a much smaller number, the GDP or government spending. There should be a relationship between education and GDP growth but statistics over a short time period may not reflect this.

SSA public education expenditure ratio comparable to rate for other regions

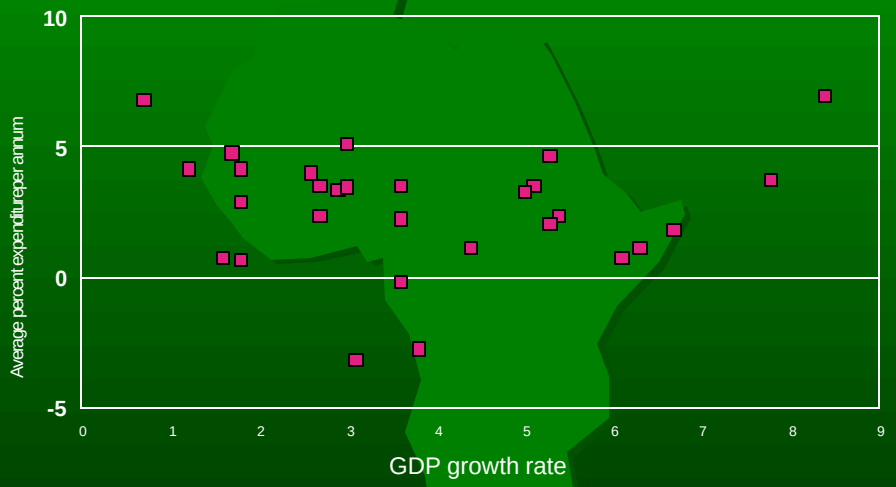


Source: WRI, World Resources Report 1998-99, original data from UNESCO.
Figures are for all reporting countries and reflect 1995 or most recent year reported.

_pubeduexp

USAID EEA IRg

Average public expenditure on education vs. average GDP growth rate since 1990



Source: World Bank, Africa Live database, averages are for 1990-most recent year available

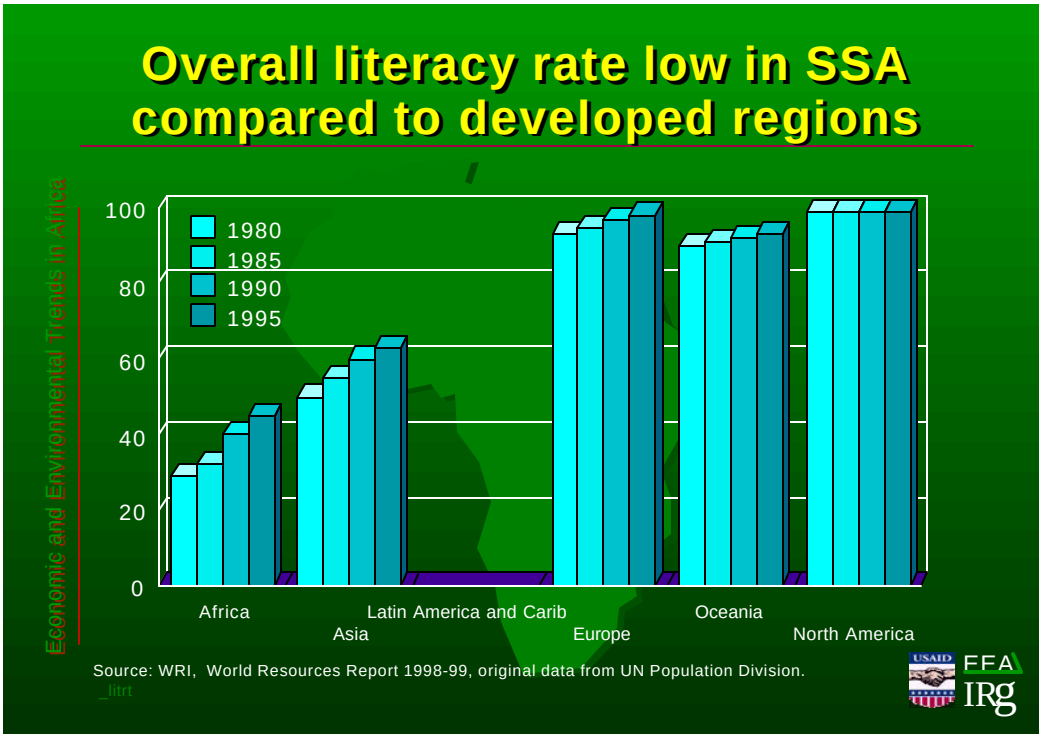
_expedu2gdpgro

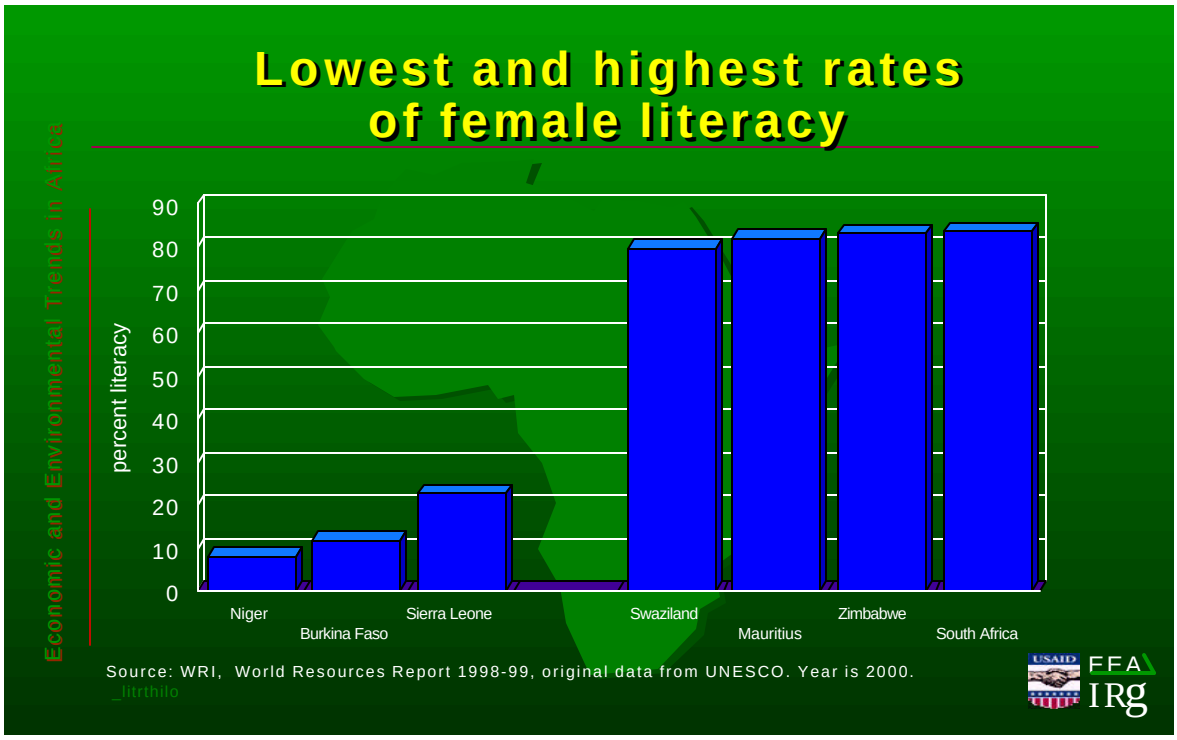
USAID EEA IRg

Literacy rates

Literacy rates in Africa remain below those of other developing regions though they are increasing faster.

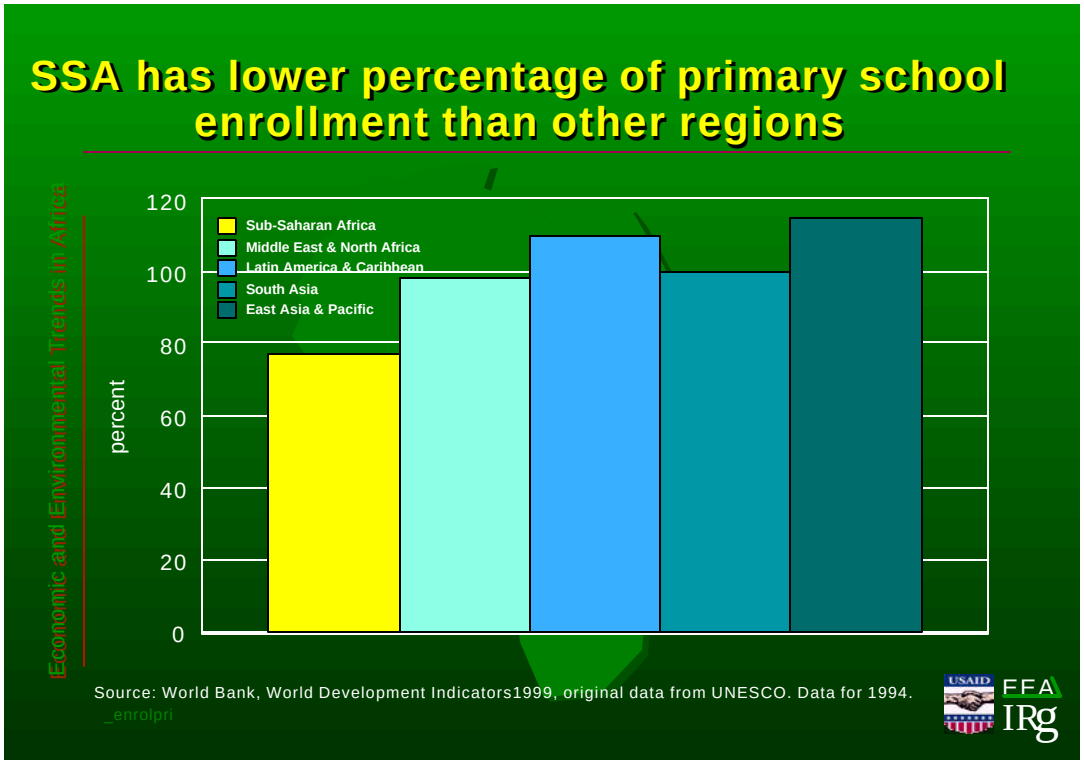
Unfortunately, the rate of literacy among adult women remains very low, as little as 8% in Niger, though in certain countries such as Botswana, some 65% are literate. The World Resources Report for 1999 suggests that: "this situation has serious implication for child health and food security, given that women in rural areas of the region are almost solely responsible for child nutrition and produce up to 80% of basic foodstuffs."




Lowest and highest rates of female literacy
Economic and Environmental Trends in Africa
percent literacy
90
80
70
60
50
40
30
20
10
0
Niger
Burkina Faso
Sierra Leone
Swaziland
Mauritius
Zimbabwe
South Africa
Source: WRI, World Resources Report 1998-99, original data from UNESCO. Year is 2000.
_litrthilo
USAID
FEA
IRg

Primary and secondary school enrollment

Sub-Saharan Africa has increased its primary and secondary school enrollments over the last decades but they remain below those of other regions particularly for the secondary level where only about one fourth of the eligible are enrolled. A secondary school education will be necessary if economies are to develop and workers are to move out of agriculture and into urban employment.



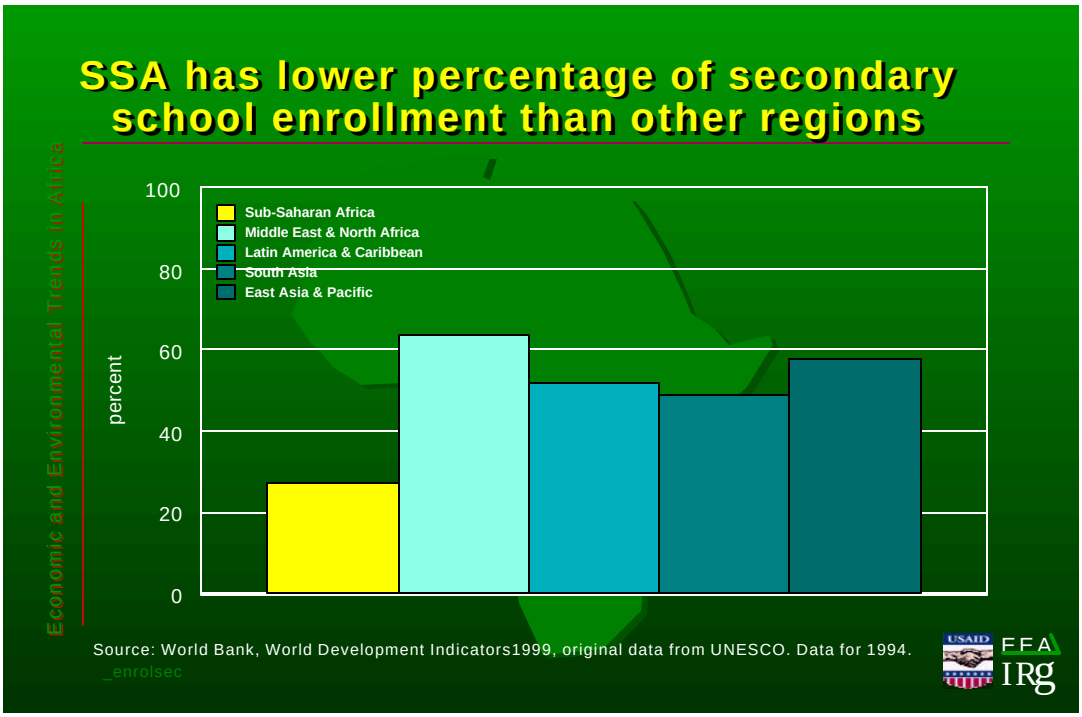
E. Trends in bio-physical, economic, and social indicators in Botswana and Niger

Two countries, Botswana and Niger, which could represent the two sides of the development coin -- one where development is working and the other where there is, on the whole, a stagnation in development -- were examined with respect to the indicators developed in the previous sections.

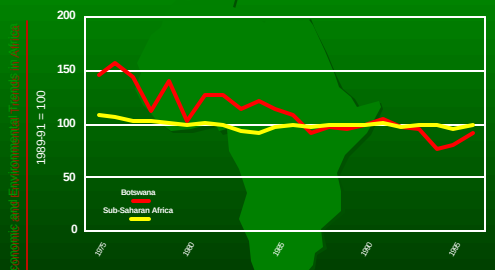
In the majority of cases, or indicators, Botswana had higher values for the indicator than did Sub-Saharan Africa or Niger, and the trend of the indicator was more positive.

Trends in bio-physical indicators in Botswana and Niger

Not all of Botswana's indicators are more positive than those of Niger. Botswana is losing cropland per capita and still suffers from a high rate of deforestation. Niger has gained cropland, increased fertilizer use, and gained forest, all important developments in the bio-physical area.



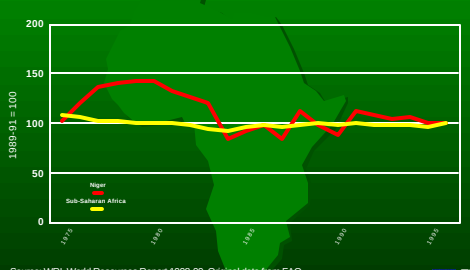
Botswana per capita food production has declined to SSA average



Source: WRI, World Resources Report 1998-99. Original data from FAO.

_foodpc

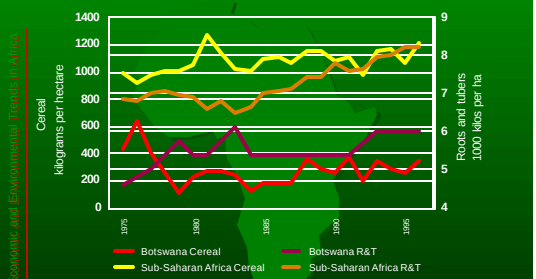
Niger food per capita production average for SSA



Source: WRI, World Resources Report 1998-99. Original data from FAO.

_foodpc

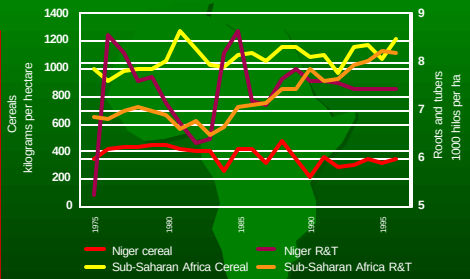
Botswana yields stagnant and lower than Africa



Source: WRI, World Resources Report 1998-99, original data from FAO.

_agyield

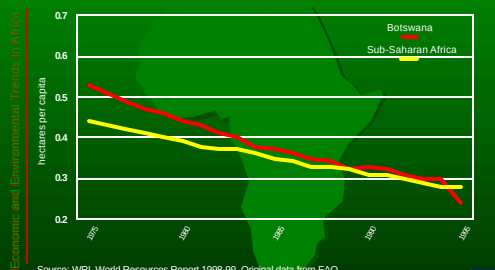
Niger yields stagnant and lower than Africa



Source: WRI, World Resources Report 1998-99, original data from FAO.

_agyield

Botswana has lost cropland per capita faster than SSA



Source: WRI, World Resources Report 1998-99. Original data from FAO .

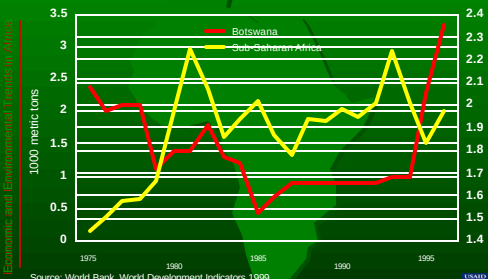
_croppc

Niger has gained cropland per capita

Source: WRI, World Resources Report 1998-99. Original data from FAO .

_croppc

Botswana fertilizer consumption declined but has recently rebounded

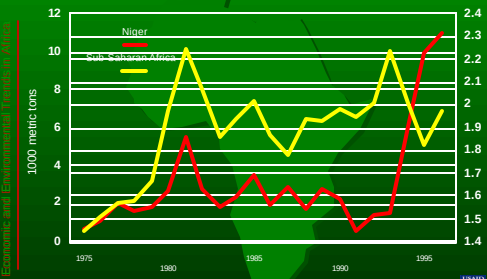


Source: World Bank, World Development Indicators 1999.

_fert

Economic and Environmental Trends in Africa

Niger fertilizer consumption has recently grown

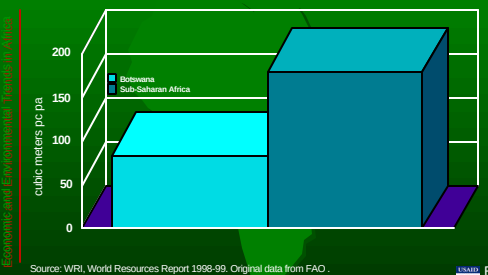


Source: World Bank, World Development Indicators 1999.

_fert

Economic and Environmental Trends in Africa

Botswana uses low amount of water compared to SSA

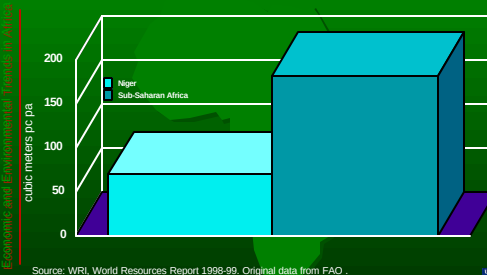


Source: WRI, World Resources Report 1998-99. Original data from FAO .

_wateruse

Economic and Environmental Trends in Africa

Niger uses low amount of water compared to SSA

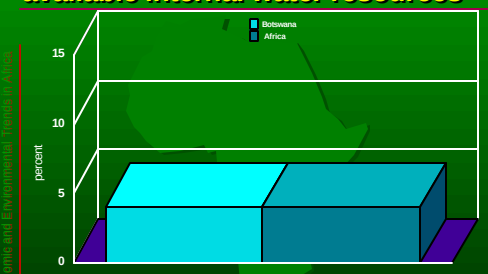


Source: WRI, World Resources Report 1998-99. Original data from FAO .

_wateruse

Economic and Environmental Trends in Africa

Botswana uses low percentage of available internal water resources

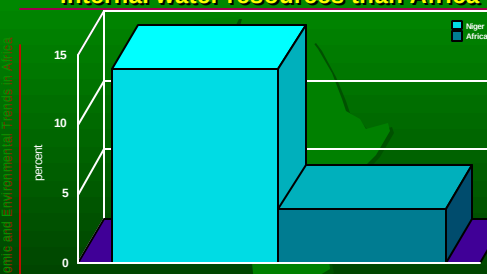


Source: WRI, World Resources Report 1998-99. Original data from FAO Botswana figure is for 1992.

_wateruse%

Economic and Environmental Trends in Africa

Niger uses higher percentage of available internal water resources than Africa

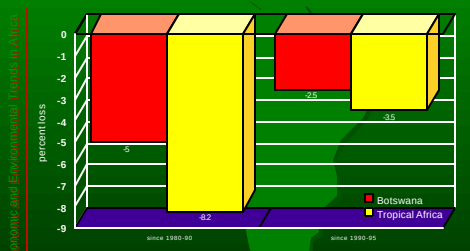


Source: WRI, World Resources Report 1998-99. Original data from FAO Niger figure is for 1988.

_wateruse%

Economic and Environmental Trends in Africa

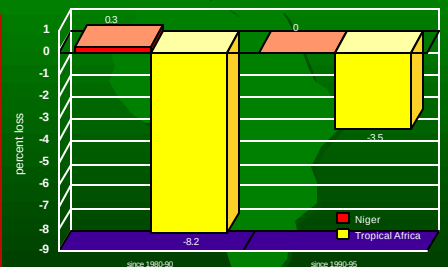
Botswana deforestation less than Tropical Africa



Source: WRI, World Resources Report 1998-99. Original data from FAO .

_defor

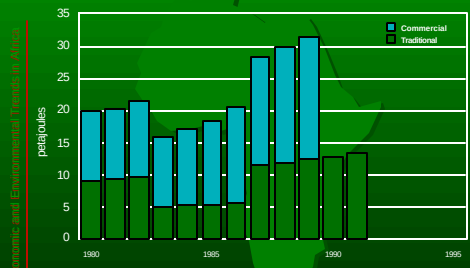
Niger gained and retained forest; Tropical Africa lost forest



Source: WRI, World Resources Report 1998-99. Original data from FAO .

_defor

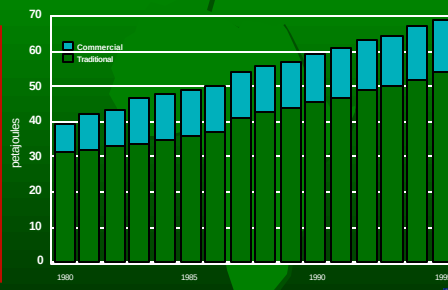
Botswana commercial/traditional energy balance



Source: WRI, World Resources Report 1998-99, original data from UN Energy Stats Yearbooks.

_fuel

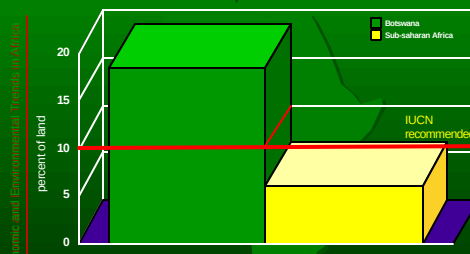
Niger commercial/traditional energy balance



Source: WRI, World Resources Report 1998-99. Original data from UN Energy Statistics.

_fuel

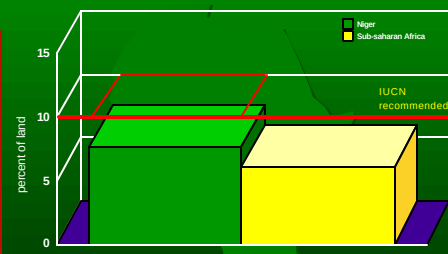
Botswana protected area above SSA average; above IUCN



Source: WRI, World Resources Report 1998-99. Original data from WCMC.

_pa

Niger protected area above SSA average; below IUCN

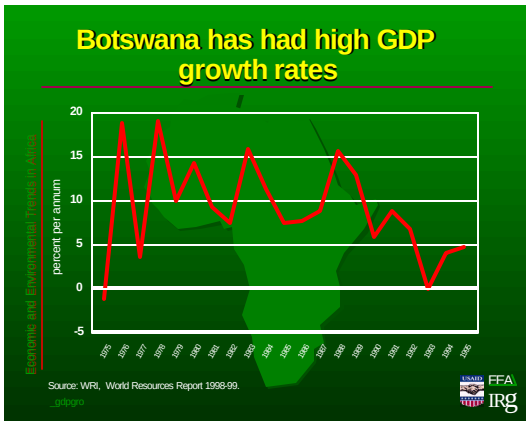


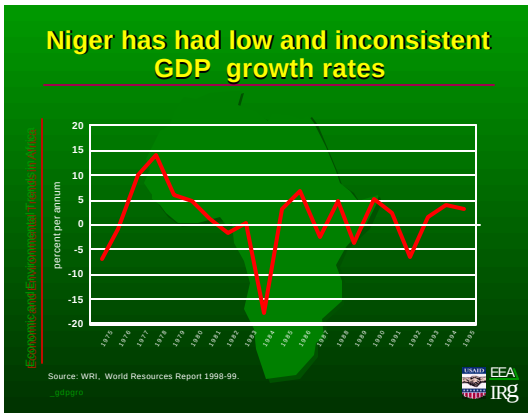
Source: WRI, World Resources Report 1998-99. Original data from WCMC.

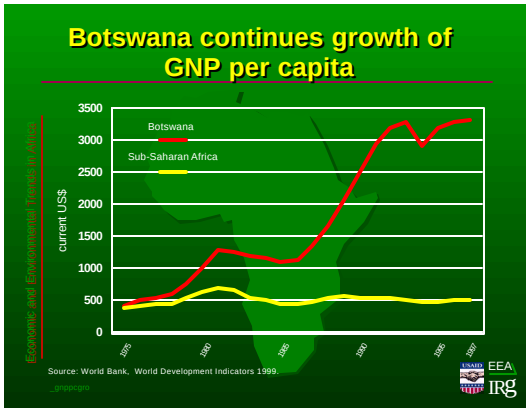
_pa

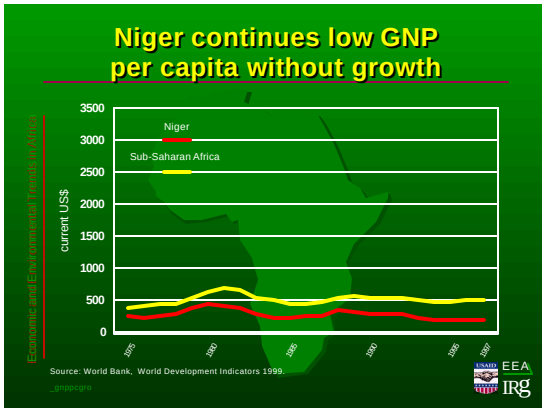
Trends in economic indicators in Botswana and Niger

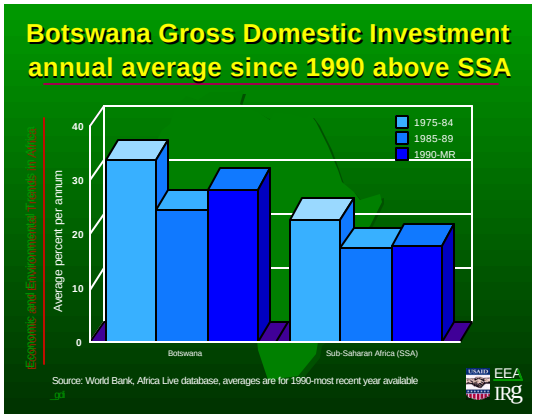
Botswana has historically received more ODA per capita and has had a better economic performance than Niger as measured in investment, GDP per capita, and growth of industry. On the other hand, its inequality of income is significantly higher.

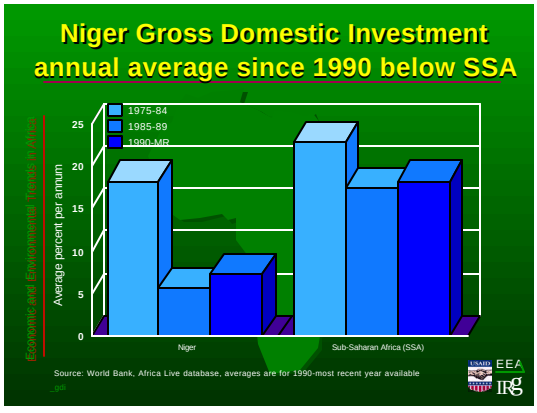




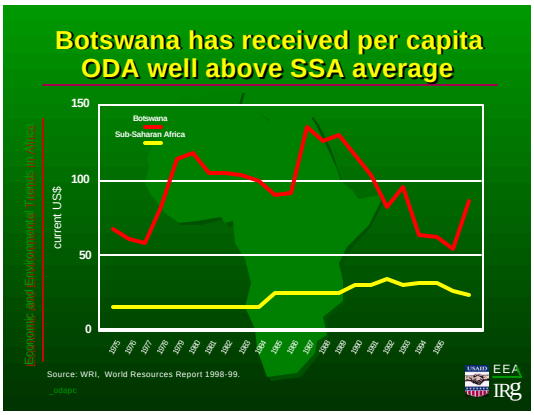




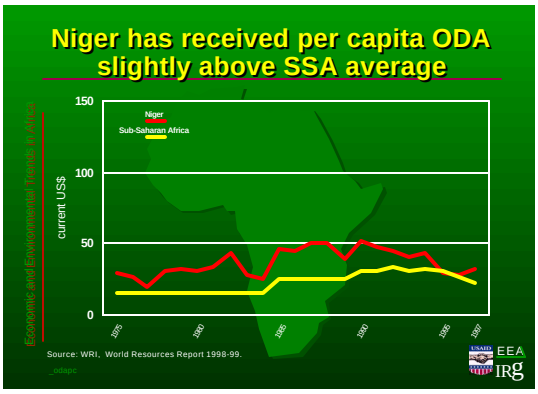




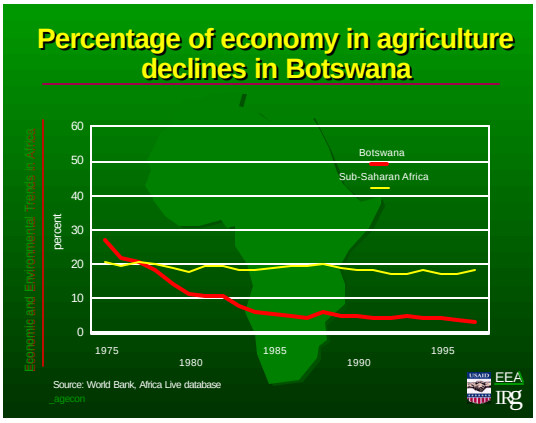
Botswana has received per capita ODA well above SSA average



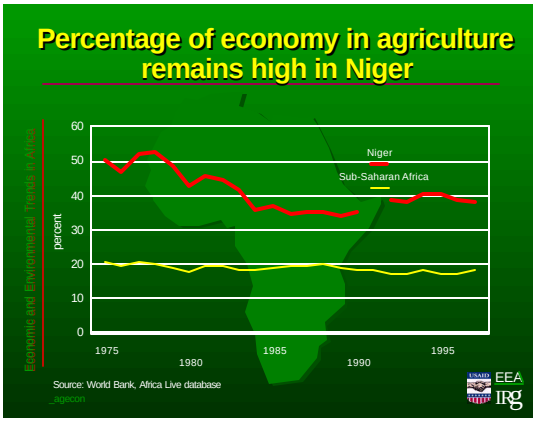
Niger has received per capita ODA slightly above SSA average



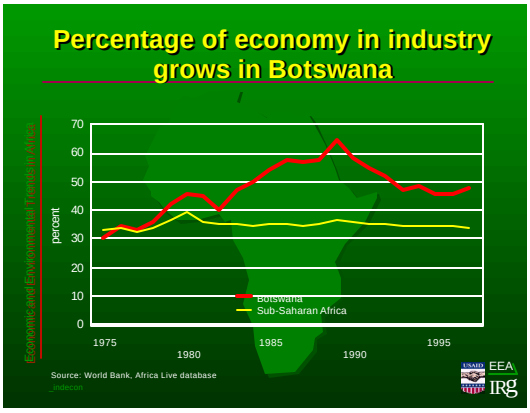
Percentage of economy in agriculture declines in Botswana



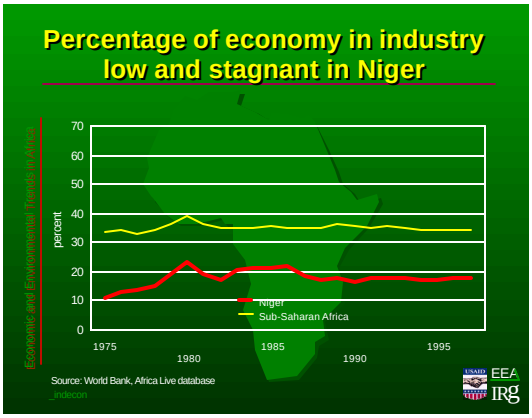
Percentage of economy in agriculture remains high in Niger

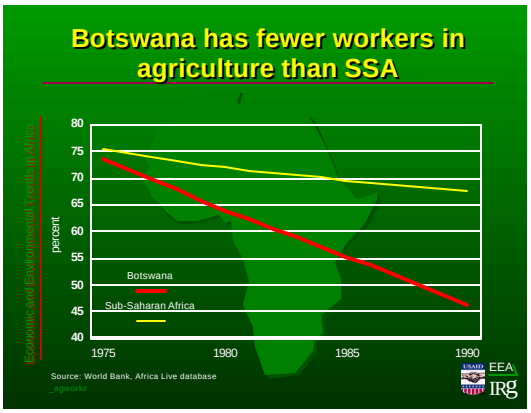


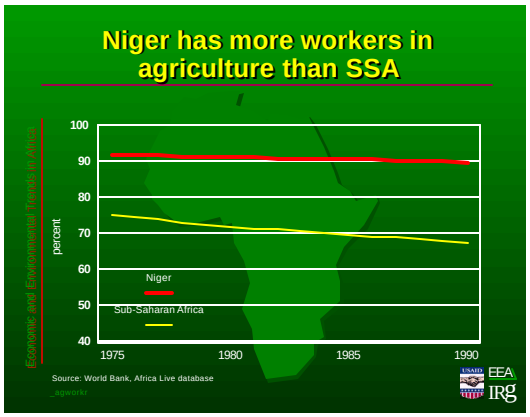
Percentage of economy in industry grows in Botswana

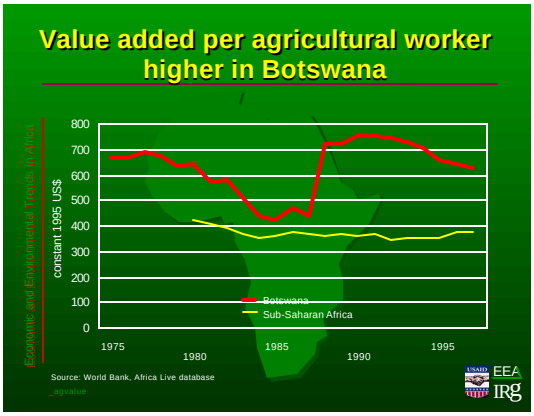


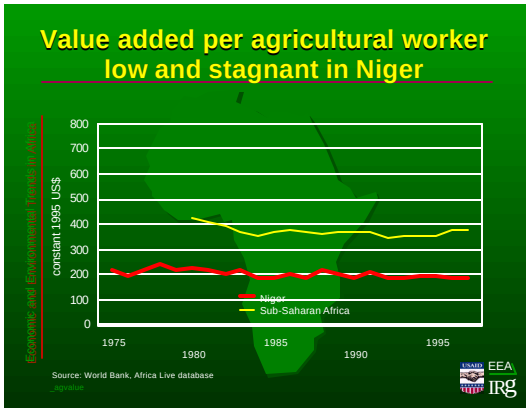
Percentage of economy in industry low and stagnant in Niger

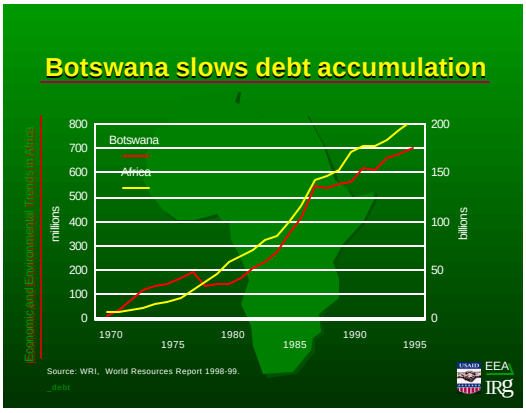


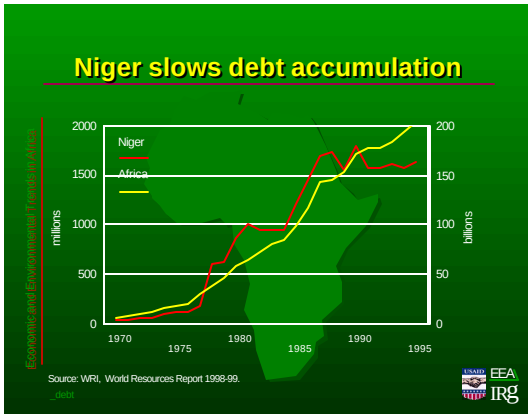

Botswana has fewer workers in agriculture than SSA
Economic and Environmental Trends in Africa
percent
80
75
70
65
60
55
50
45
40
1975
1980
1985
1990
Botswana
Sub-Saharan Africa
Source: World Bank, Africa Live database
_agworkr
EEA
IRG

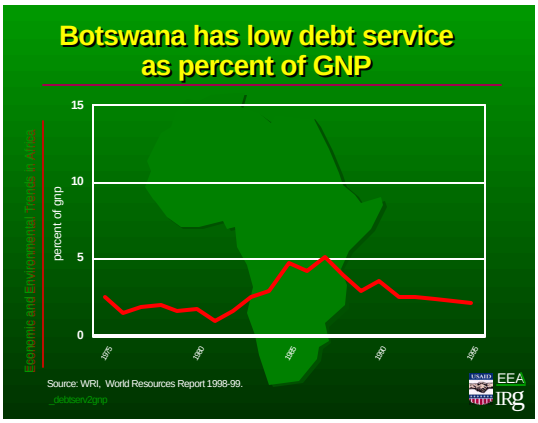

Niger has more workers in agriculture than SSA
Economic and Environmental Trends in Africa
percent
100
90
80
70
60
50
40
1975
1980
1985
1990
Niger
Sub-Saharan Africa
Source: World Bank, Africa Live database
_agworkr
EEA
IRG

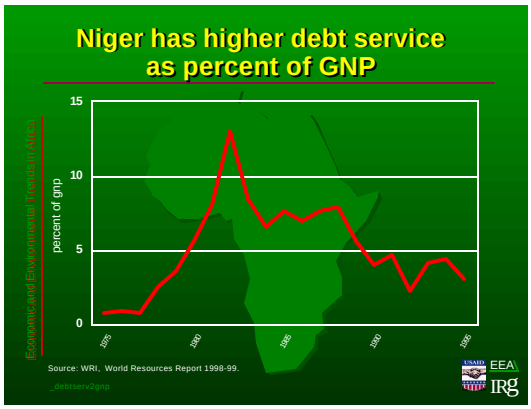

Value added per agricultural worker higher in Botswana
Economic and Environmental Trends in Africa
constant 1995 US$
800
700
600
500
400
300
200
100
0
1975
1980
1985
1990
1995
Botswana
Sub-Saharan Africa
Source: World Bank, Africa Live database
_agvalue
EEA
IRG

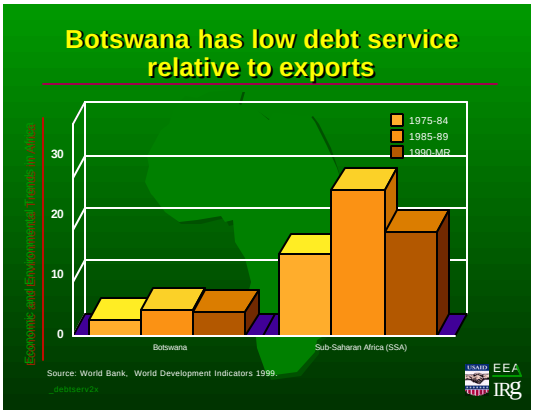

Value added per agricultural worker low and stagnant in Niger
Economic and Environmental Trends in Africa
constant 1995 US$
800
700
600
500
400
300
200
100
0
1975
1980
1985
1990
1995
Niger
Sub-Saharan Africa
Source: World Bank, Africa Live database
_agvalue
EEA
IRG

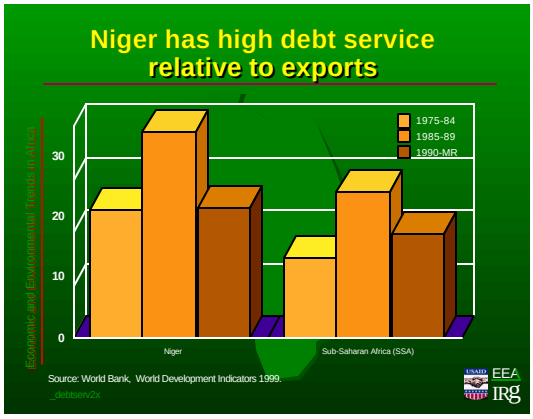

Botswana slows debt accumulation
Economic and Environmental Trends in Africa
millions
billions
800
700
600
500
400
300
200
100
0
200
150
100
50
0
1970
1975
1980
1985
1990
1995
Botswana
Africa
Source: WRI, World Resources Report 1998-99.
_debt
EEA
IRG

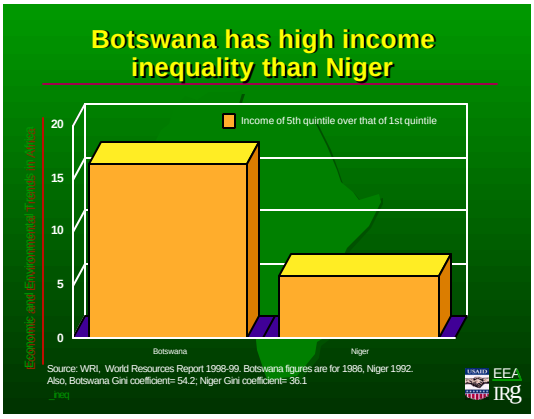

Niger slows debt accumulation
Economic and Environmental Trends in Africa
millions
billions
2000
1500
1000
500
0
200
150
100
50
0
1970
1975
1980
1985
1990
1995
Niger
Africa
Source: WRI, World Resources Report 1998-99.
_debt
EEA
IRG

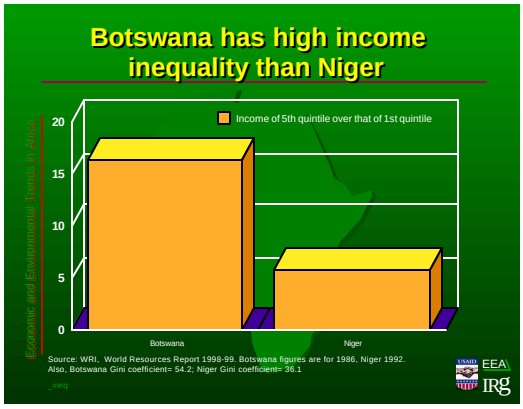

Botswana has low debt service as percent of GNP
Economic and Environmental Trends in Africa
percent of gnp
15
10
5
0
1975
1980
1985
1990
1995
Source: WRI, World Resources Report 1998-99.
_debtserv2gnp
EEA
IRG

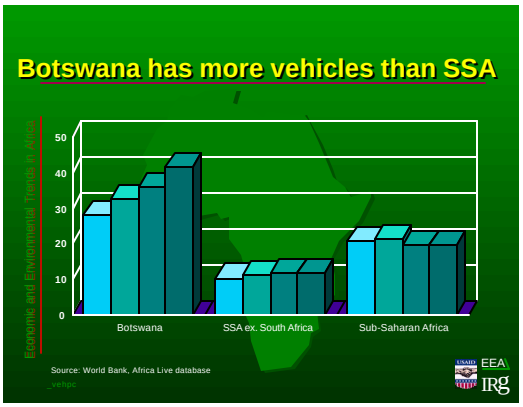

Niger has higher debt service as percent of GNP
Economic and Environmental Trends in Africa
percent of gnp
15
10
5
0
1975
1980
1985
1990
1995
Source: WRI, World Resources Report 1998-99.
_debtserv2gnp
EEA
IRG

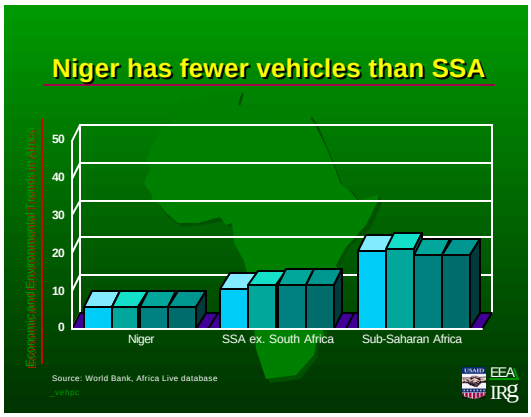

Botswana has low debt service relative to exports
Economic and Environmental Trends in Africa
1975-84
1985-89
1990-MR
30
20
10
0
Botswana
Sub-Saharan Africa (SSA)
Source: World Bank, World Development Indicators 1999.
_debtserv2x
EEA
IRG

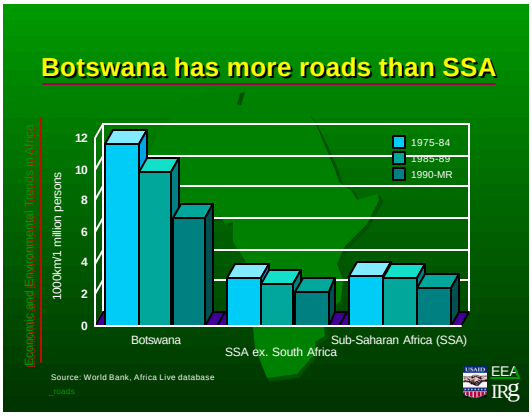

Niger has high debt service relative to exports
Economic and Environmental Trends in Africa
1975-84
1985-89
1990-MR
30
20
10
0
Niger
Sub-Saharan Africa (SSA)
Source: World Bank, World Development Indicators 1999.
_debtserv2x
EEA
IRG

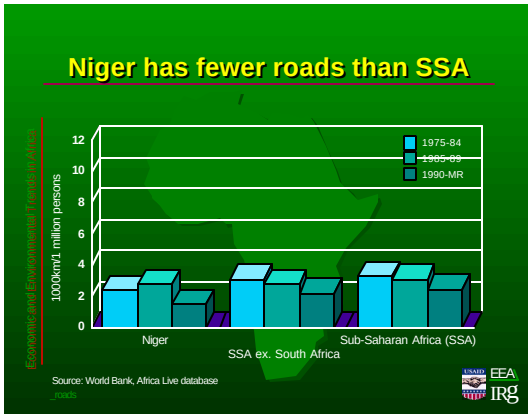

Botswana has high income inequality than Niger
Economic and Environmental Trends in Africa
Income of 5th quintile over that of 1st quintile
20
15
10
5
0
Botswana
Niger
Source: WRI, World Resources Report 1998-99. Botswana figures are for 1986, Niger 1992.
Also, Botswana Gini coefficient= 54.2; Niger Gini coefficient= 36.1
_ineq
EEA
IRG


Botswana has high income inequality than Niger
Economic and Environmental Trends in Africa
Income of 5th quintile over that of 1st quintile
20
15
10
5
0
Botswana
Niger
Source: WRI, World Resources Report 1998-99. Botswana figures are for 1986, Niger 1992.
Also, Botswana Gini coefficient= 54.2; Niger Gini coefficient= 36.1
_ineq
EEA
IRG


Botswana has more vehicles than SSA
Economic and Environmental Trends in Africa
50
40
30
20
10
0
Botswana
SSA ex. South Africa
Sub-Saharan Africa
Source: World Bank, Africa Live database
_vehpc
EEA
IRG

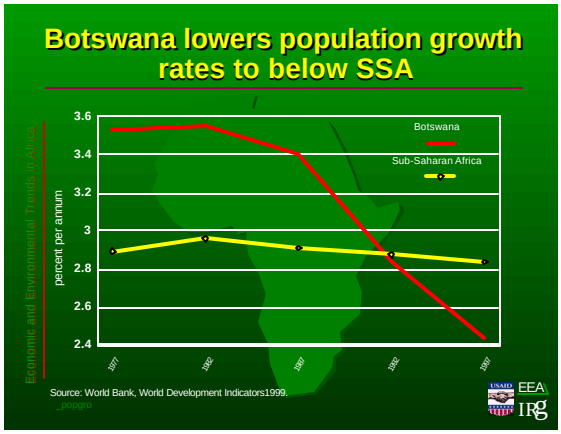

Niger has fewer vehicles than SSA
Economic and Environmental Trends in Africa
50
40
30
20
10
0
Niger
SSA ex. South Africa
Sub-Saharan Africa
Source: World Bank, Africa Live database
_vehpc
EEA
IRG

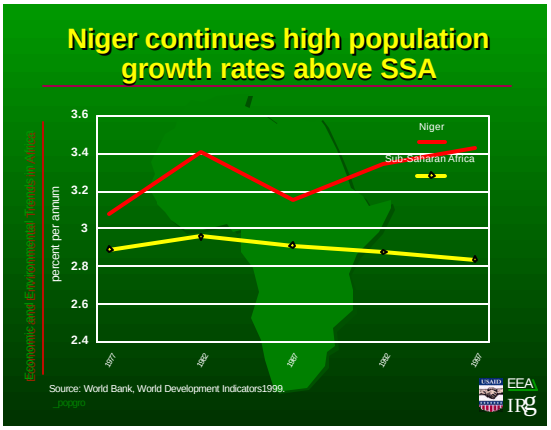

Botswana has more roads than SSA
Economic and Environmental Trends in Africa
1000km/1 million persons
12
10
8
6
4
2
0
1975-84
1985-89
1990-MR
Botswana
SSA ex. South Africa
Sub-Saharan Africa (SSA)
Source: World Bank, Africa Live database
_roads
EEA
IRG

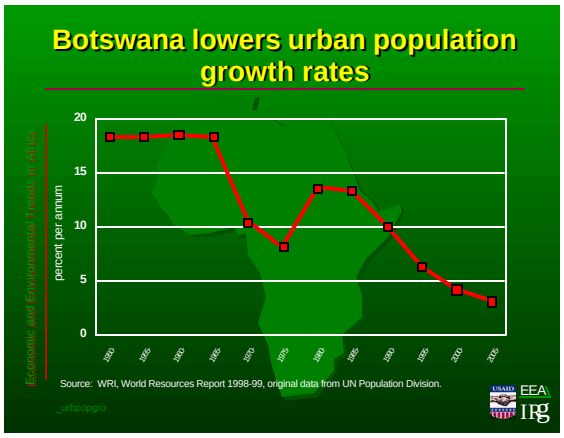

Niger has fewer roads than SSA
Economic and Environmental Trends in Africa
1000km/1 million persons
12
10
8
6
4
2
0
1975-84
1985-89
1990-MR
Niger
SSA ex. South Africa
Sub-Saharan Africa (SSA)
Source: World Bank, Africa Live database
_roads
EEA
IRG

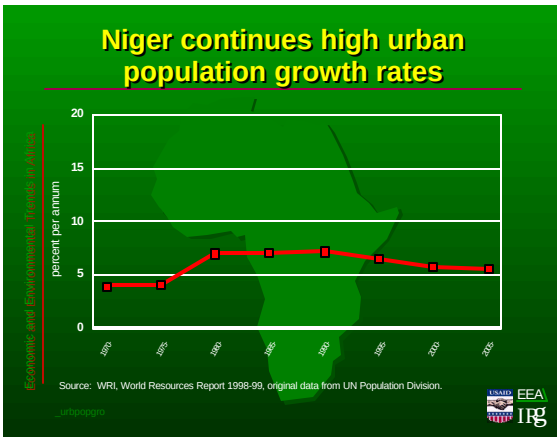
Trends in social indicators in Botswana and Niger

Botswana has improved its social indicators, particularly the percentage of women achieving literacy, but also population growth, child mortality, access to water, and education. However, its life expectancy has recently been declining (to the level of Niger).

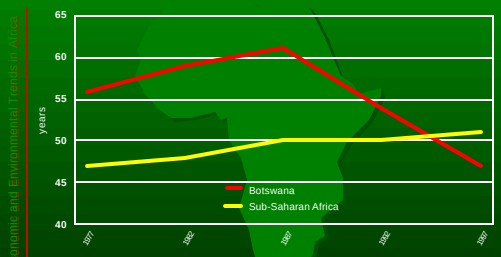








Botswana has seen decline in life expectancy to below SSA



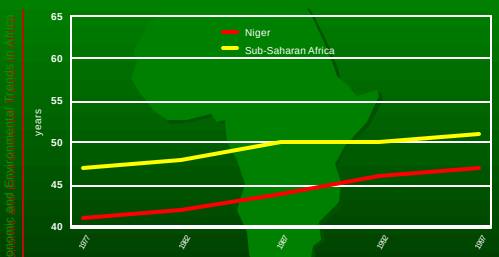
Source: World Bank, World Development Indicators1999.

_lifeexp

Economic and Environmental Trends in Africa

EEA IRG

Niger has seen increase in life expectancy; remains below SSA



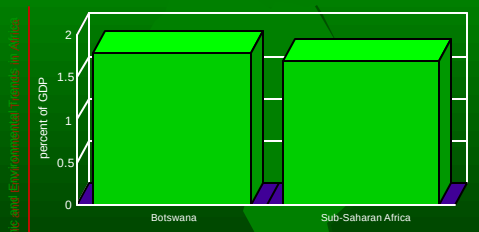
Source: World Bank, World Development Indicators1999.

_lifeexp

Economic and Environmental Trends in Africa

EEA IRG

Botswana public health expenditures higher than overall rate for SSA



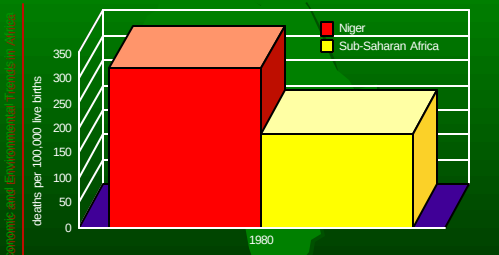
Source: World Bank, World Development Indicators 1999, Table 2.13.

_exphlth

Economic and Environmental Trends in Africa

EEA IRG

Niger has high child mortality rate



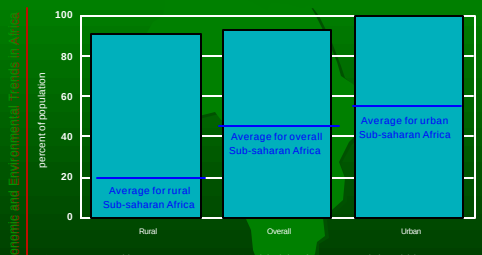
Source: WRI, World Resources Report 1998-99, original: UNICEF.

_chldmort

Economic and Environmental Trends in Africa

EEA IRG

Botswana provides better access to safe water than SSA



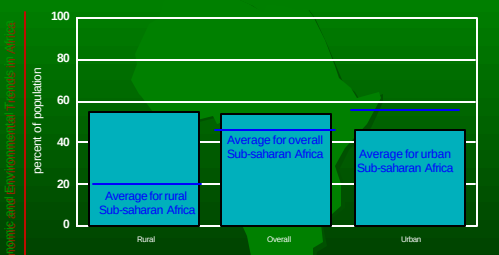
Source: WRI, World Resources Report 1998-99, original data from UN Population Division.

_accwater

Economic and Environmental Trends in Africa

EEA IRG

Niger provides better rural access to safe water, poorer urban access



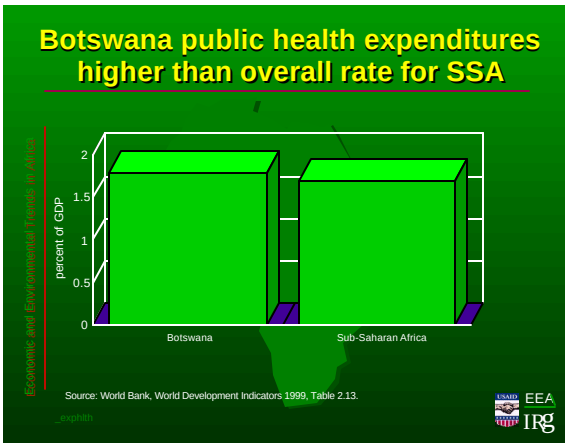
Source: WRI, World Resources Report 1998-99, original data from UN Population Division.

_accwater

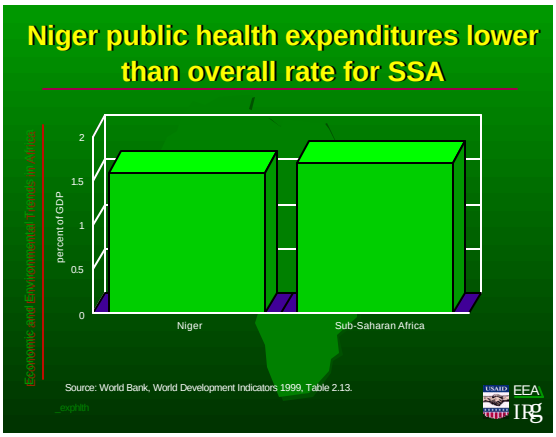
Economic and Environmental Trends in Africa

EEA IRG

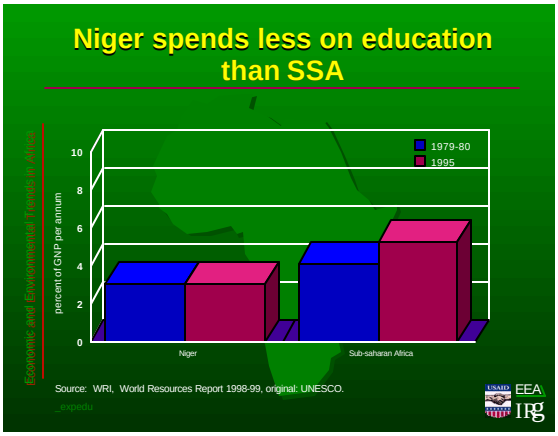
Botswana public health expenditures higher than overall rate for SSA



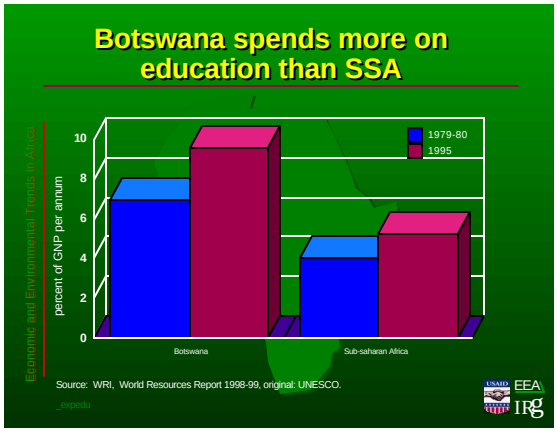
Niger public health expenditures lower than overall rate for SSA



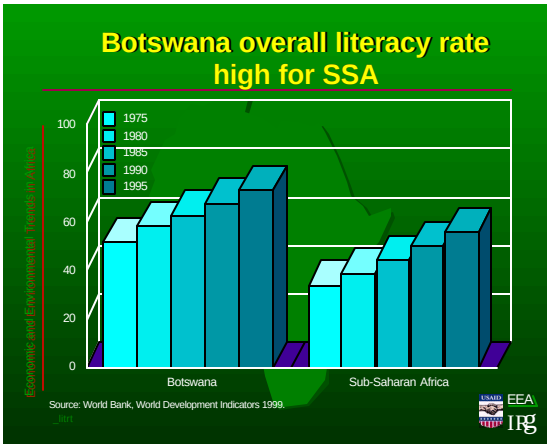
Niger spends less on education than SSA



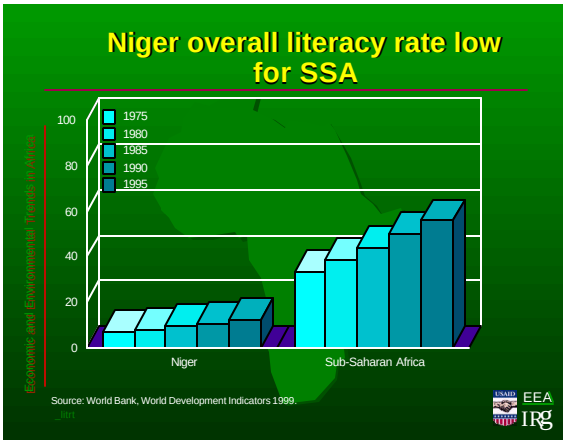
Botswana spends more on education than SSA



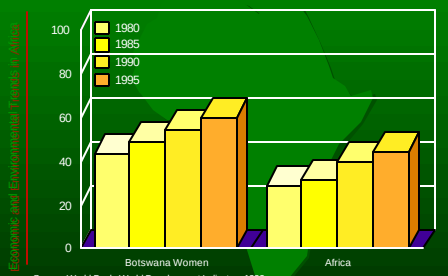
Botswana overall literacy rate high for SSA



Niger overall literacy rate low for SSA



Botswana female literacy rates higher than overall rate for Africa



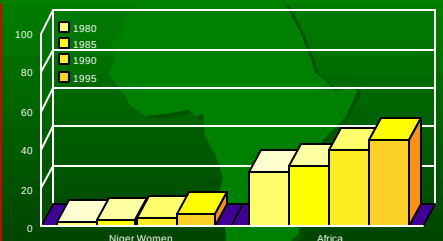
Source: World Bank, World Development Indicators 1999.

_femlit

Economic and Environmental Trends in Africa

EEA IRG

Niger female literacy rates lower than overall rate for Africa



Source: World Bank, World Development Indicators 1999.

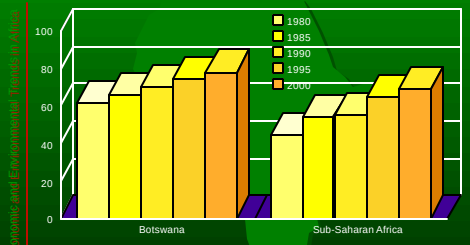
_femlit

Economic and Environmental Trends in Africa

EEA IRG

Botswana female literacy compared with male literacy higher than SSA

(less of a gap)



Source: World Bank, World Development Indicators 1999.

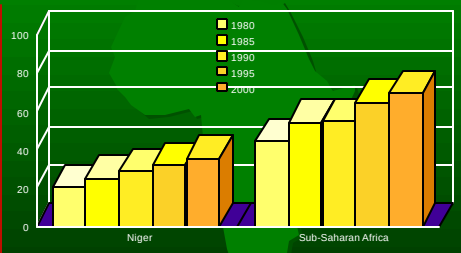
_femmalit

Economic and Environmental Trends in Africa

EEA IRG

Niger female literacy compared with male literacy higher than SSA

(more of a gap)



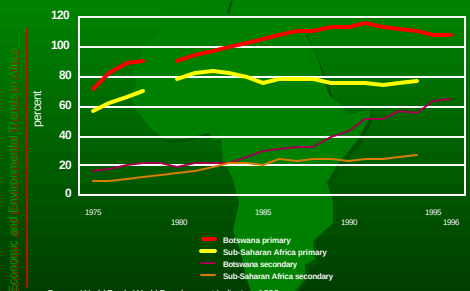
Source: World Bank, World Development Indicators 1999.

_femmalit

Economic and Environmental Trends in Africa

EEA IRG

Botswana has higher percentage of both primary and secondary school enrollment than SSA



Source: World Bank, World Development Indicators 1999

_enrol

Economic and Environmental Trends in Africa

EEA IRG

Niger has lower percentage of both primary and secondary school enrollment than SSA

Source: World Bank, World Development Indicators 1999

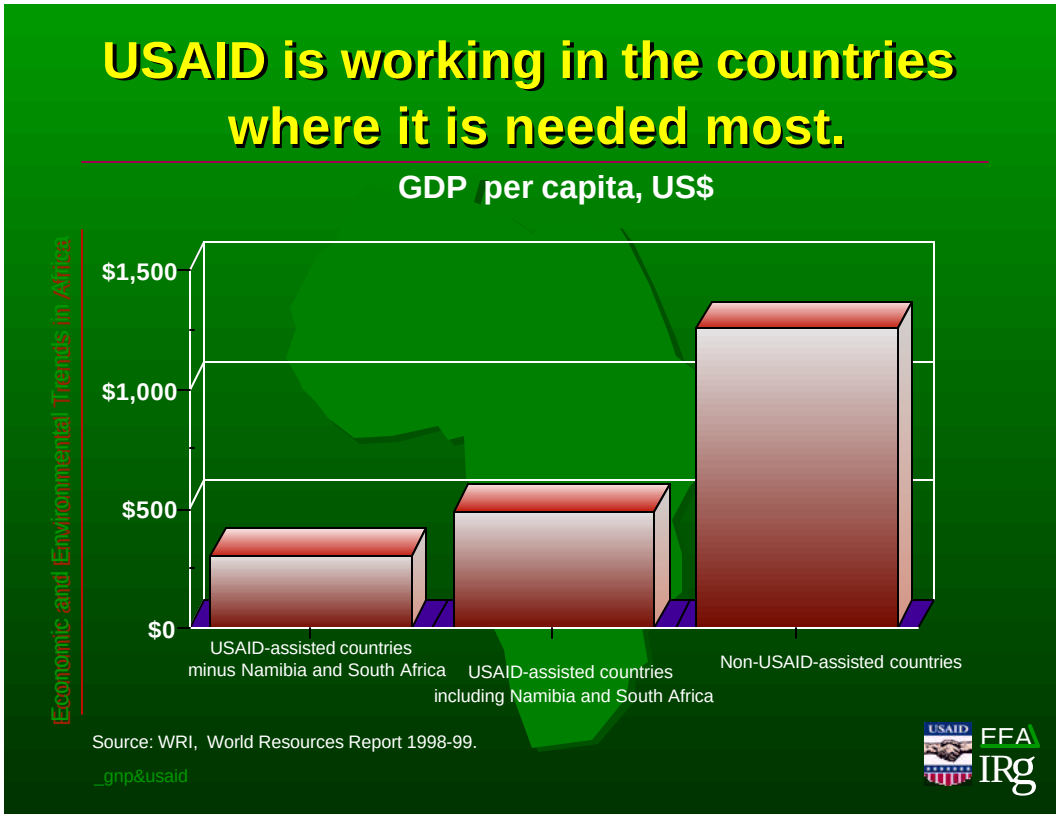
_enrol

Economic and Environmental Trends in Africa

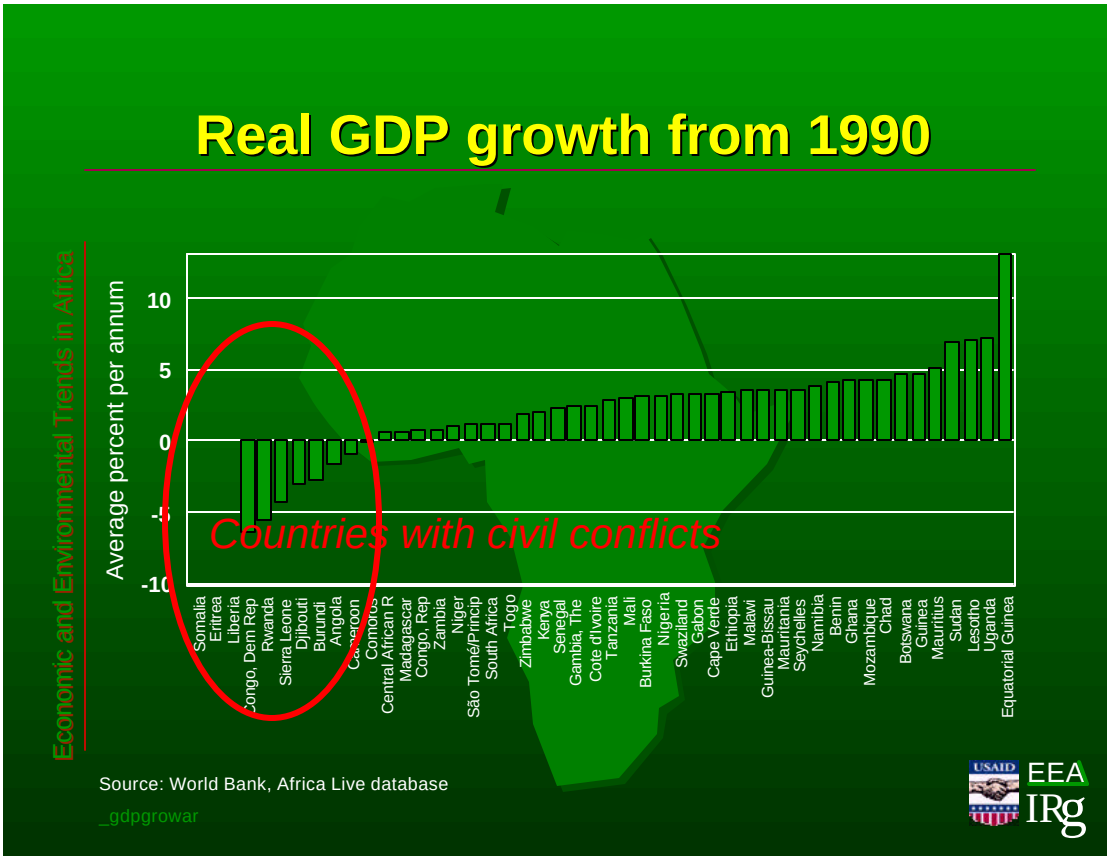
EEA IRG

F. Some regional trends

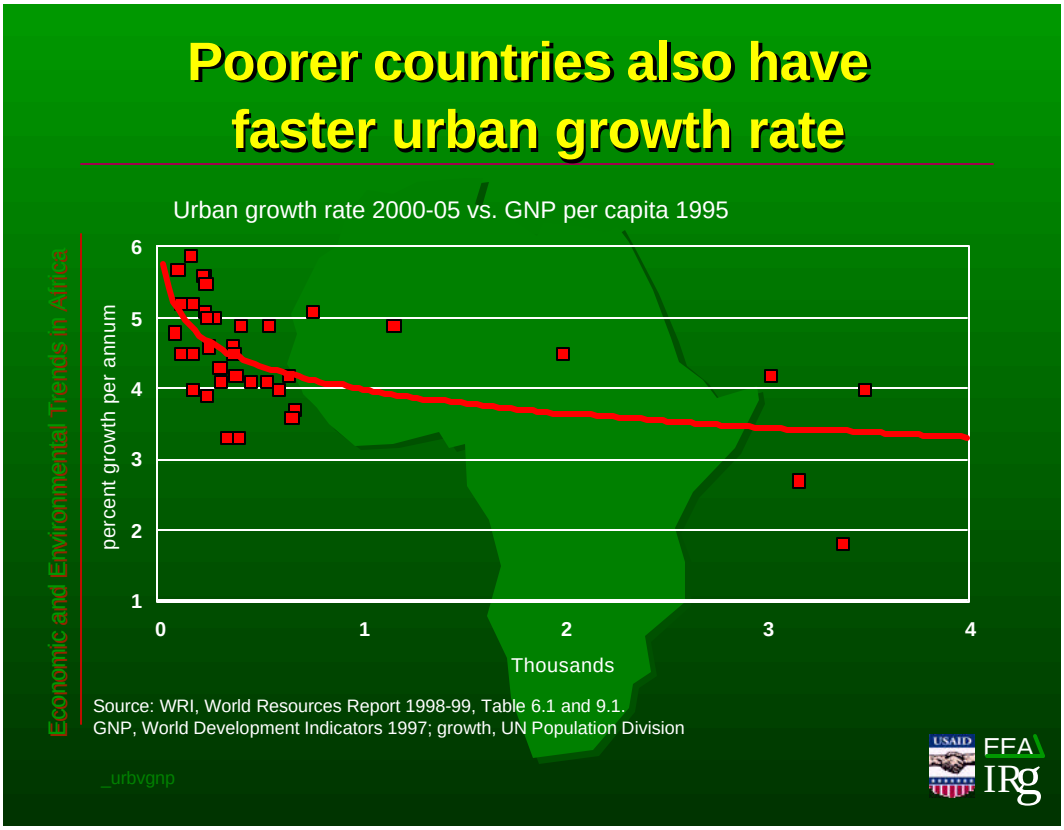
Overall, the countries in which USAID is working are the countries where the development is most needed.



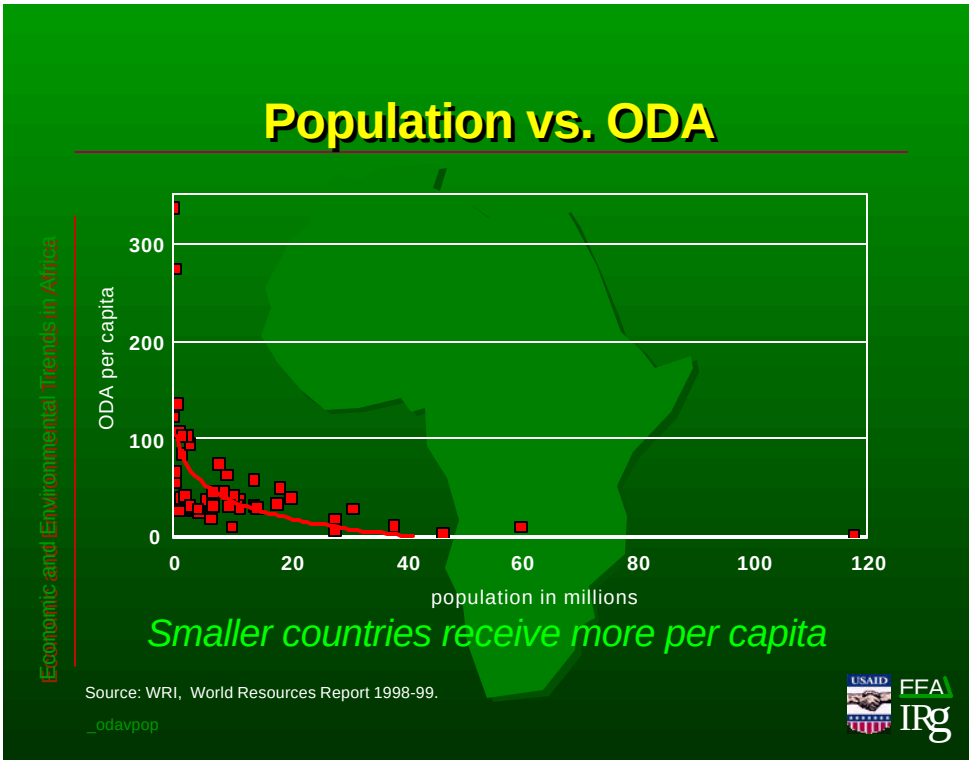
The correlation between civil conflict and economic growth is unmistakable however, the direction is uncertain. Do countries engage in civil war when they enjoy low economic growth or do they not grow as a result of the war? Are wars the result of conflict over access to resources?



The correlation between urban population growth and low income is most unfortunate as building urban life requires much more resources than rural life.



Official Development Assistance (ODA) has been declining on a per capita basis in this decade (see above). Smaller countries receive more aid per capita but there is no easily-perceived relationship between the ODA received and the per capita GNP of countries.



Part 3. Recommendations for further work

A . Cooperate with other organizations

USAID should cooperate with World Bank and the African Development Bank as well as with research organizations such as the World Resources Institute on developing more appropriate and useful indicators and groupings as in the Africa Live Database. The effort would begin exploring indicators and relationships between these as in the analyses contained here of Urban Growth and GNP, Gross Domestic Investment and GNP, and Public Expenditures on Education and GNP.

B. Carry out analyses of specific regions and countries

Using the indicators and structure presented here as a base, carry out analyses of specific regions such as West Africa versus East Africa or of countries à la Botswana and Niger, within their regional environmental context, for example, Mali within the Sahelian countries. The extreme heterogeneity of Africa makes problematic and less than fully explanatory any short study seeking to create an analytical tool and structure which carries out the analysis at a Sub-Saharan Africa regional level.

C. Examine the effects of aid in specific sectors

Examine the effects of aid across the continent or region in a specific sector such as population, using figures for aid in the specific sub-sector and the appropriate indicators for that sector. Does more aid really mean better results? Often, evaluations are conducted of only one program in only one country.

D. Create a model of the sector

These observations about social, economic, and bio-physical aspects and their statistical information will provide much input to the modeling work beginning at the University of Maryland under this same project.

Part 4. Annexes

A. Overview

One of the principal purposes of this study was to gather information on data sources and on indicator programs and to evaluate these before using them to characterize and analyze the social, economic, and environmental conditions.

The procedure of the work was to gather new sources of information on the Internet, on CD-ROM, or in printed form, extract the most relevant information for trends, build relevant spreadsheets, graphs and text, and present the whole in a useful format. This section reflects this order with the lists and printouts from original sources first, the lists of created spreadsheets and graphics next, and the presentation and analyses in HTML or other format last.

B. Lists of files used (WRI, WB ADI, ALDB ...)

Directory of C:\Africa_trends\Aldb files\

The Excel files (XLS) were obtained from the Africa Live Database of the World Bank and were used in indicator production especially for the Sub-Saharan Africa grouping. The additional descriptions here (e.g., `avg ann defor rt '90s`) were added by the author to decipher the original names for later users (pc = per capita, etc.). They give the description of the indicator as well as the latest year of the data where possible.

```
Africa+Briefing.html                              2 KB        5/14/99
agrsct1 ag gdp grow rts '96.xls                   265 KB      5/14/99
agrsct2 food prod index '96.xls                   265 KB      5/23/99
agrsct3 cereal crop yld '96.xls                   265 KB      5/14/99
agrsct4 fert cons '95.xls                         264 KB      5/14/99
agrsct7 ag pct gdp some '98.xls                   265 KB      5/14/99
edusct4 pub exp on ed as % gdp '96.xls            351 KB      5/14/99
envsct1 avg ann defor rt '90s.xls                 351 KB      5/20/99
envsct10 status of NEAP '96.xls                   350 KB      5/14/99
envsct2 pct pop access water '90s some '94        350 KB      5/20/99
envsct3 % urb pop acc safe water '94.xls          263 KB      5/14/99
envsct9 % land in prot area (empty).xls           350 KB      5/14/99
finsct7 grs dom savgs % gdp '98.xls               266 KB      5/14/99
food prod index mapped.xls                        111 KB      5/19/99
gdi to gdp mapped.xls                             112 KB      5/19/99
gndrsct2 maternal mort rt '95.xls                 350 KB      5/19/99
hlthsct1 infant mort rate '97.xls                 351 KB      5/14/99
indagrgr ag growth rt '98.xls                     268 KB      5/19/99
indagrgr ag growth.xls                            268 KB      4/6/99
indcabml curr acct bal.xls                        265 KB      5/6/99
indcagdp curr acct bal.xls                        269 KB      4/6/99
inddodex debt as % exports.xls                    268 KB      4/6/99
inddsant debt serv ante empty.xls                 266 KB      4/6/99
inddspst debt serv post.xls                       268 KB      4/6/99
indgdpgr gdp growth.xls                           268 KB      4/6/99
indgnpcp gnp pc $ '97.xls                         264 KB      4/6/99
indgnpml gnp mill$.xls                            268 KB      4/6/99
indindgr industry growth.xls                      268 KB      4/6/99
indivgdp ratio invstmt to gdp '98.xls             268 KB      5/14/99
indodaml net oda in $.xls                         266 KB      4/6/99
indodgdp net oda % gdp '97.xls                    268 KB      5/19/99
indpopml population.xls                           268 KB      4/6/99
indsrvgr service growth.xls                       268 KB      4/6/99
Infrsct1 roads pc some '93.xls                    264 KB      5/14/99
Infrsct6 vehicles pc '96.xls                      265 KB      5/14/99
keymr key indics most rec.wk4                     150 KB      3/25/99
keymr key indics most rec.xls                     324 KB      3/25/99
macroecon.htm                                     3 KB        5/19/99
pop mapped.xls                                    139 KB      3/25/99
popsct1 total fert rt '97.xls                     351 KB      5/19/99
psdsct2 gross domest invest as % gdp '98.xls      352 KB      5/14/99
psdsct3 gross pvt invest as % gdp '98.xls         352 KB      5/14/99
psdsct5 FDI as % gdp '97 some '98.xls             352 KB      5/19/99
pvrsct2 gini coeff income various yrs.xls         263 KB      5/14/99
```

```
pvrsct3 natl povty count as % pop 'MR.xls       350 KB      5/14/99
pwrsct1 access to elec (empty).xls              351 KB      5/14/99
pwrsct4 trad engy use & cons '95.xls            265 KB      5/23/99
```

Directory of C:\Africa_trends\WDIndics\

The World Development Indicators are the principal collection of indicators produced by the World Bank. “List of indics.wpd” is a list of all of the WDI indicators in an easier format to use. Several tables from the report are included here as available on the World Bank website. Unfortunately, PDF files are a special type of image file from which extracting the data contained therein is difficult. These tables cover all larger countries and this some of the smaller Sub-Saharan African countries may not be included. They are included in the original data files from the WDI CD-ROM which was also consulted.

```
list of indics.wpd                              25 KB       4/29/99

tab1_6.pdf                                      123 KB      4/28/99
tab2_1 pop.pdf                                  52 KB       3/25/99
tab2_14 access to health.pdf                    33 KB       3/8/99
tab3_1 land use & defor.pdf                     46 KB       3/25/99
tab3_13 govt commit to env.pdf                  20 KB       3/8/99
tab3_4 biodiv and PAs.pdf                       24 KB       3/8/99
tab3_5 freshwater.pdf                           30 KB       3/8/99
tab3_8 energy eff & emiss.pdf                   25 KB       3/8/99
tab4_1 growth of output.pdf                     45 KB       3/25/99
tab6_1 integ w glob econ.pdf                    46 KB       3/25/99
table 2_13.123                                  33 KB       5/21/99
wdi01 size of econ.pdf                          80 KB       3/8/99
wdi02 qual of life.pdf                          79 KB       3/8/99
wdi03 pop & lab force.pdf                       77 KB       3/8/99
wdi04 poverty.pdf                               70 KB       3/8/99
wdi05 income dist.pdf                           72 KB       3/8/99
wdi06 educ.pdf                                  79 KB       3/8/99
wdi07 health.pdf                                80 KB       3/8/99
wdi08 land use & ag prod.pdf                    79 KB       3/8/99
```

C. Printouts of materials from websites

Included here are printouts of the two referenced indicator workshops, many of the indicator programs referenced in Part 1.B above and of many of the data sources in Part 1.C. above. These are also included in the Bookmarks section above. The printouts give an idea of the structure and contents of the page and include the URL. The files for these are included on the EETA Zip disk in the \Organizations directory.

Directory of C:\Africa_trends\Organizations\

```
Africa DB                                       <DIR>
Afr-SD                                          <DIR>
CBD                                             <DIR>
CIAT                                            <DIR>
CSD indics                                      <DIR>
FAO Stat                                        <DIR>
Frame                                           <DIR>
IDRC                                            <DIR>
IISD                                            <DIR>
INDEX 99                                        <DIR>
Indicators                                      <DIR>
OECD DAC                                        <DIR>
UN SD                                           <DIR>
Un Stat Office                                  <DIR>
UNCCD                                           <DIR>
Undp                                            <DIR>
UNEP                                            <DIR>
Unesco                                          <DIR>
Unfpa                                           <DIR>
USAID                                           <DIR>
WBANK                                           <DIR>
WHO                                             <DIR>
WRI                                             <DIR>
```

D. Printouts of bookmarks

This bookmark file has three sections. The first is sites used directly in this EETA study. The second section contains sites on Biodiversity and the Environment in general, some of which are directly relevant to this study and others of which may be of interest to readers. The third section has sites within the UN system which are not included in the first two sections. This file is provided on the EETA Zip disk as bookmark ssa.htm Of course, with the fast pace of changes on the Net, not all of the sites will be found where they are presently identified here.

Bookmarks for SS Africa Econ and Env Trends

Africa

Africa Data Dissemination Service
Africa Briefings - External (To use Africa Live Database)
Africa Library Introduction
Africa Live Database
African Development Bank Group Home Page
ADB Environment and Sustainable Development Unit Home Page
African Environmental Issues - Environment - Net Links MiningCo Search engine
Afr-SD
Angola: Welcome to the Official Web Site of the Republic of Angola
AREIN Links
CARPE-index
Center for International Health Information (CIHI)
CIAT English
DisplayText cannot span more than one line!
Democratic Republic of Congo
Eldis Environmental Datasets' Directories Guide
Embassy of Mauritania
Embassy of Rwanda, Washington, D.C.
Environment Information Systems Program in Sub-Saharan Africa
Eritrean Govenment Home Page
Ethiopia
Focus International index
FRAME Homepage
Gabon
GCIS home page South Africa
Ghana Embassy: Business, tourism and investment opportunities in West Africa
Gouvernement du sénégal
Government Of Mauritius
ICIPE
IDRC: Research Program for West and Central Africa
Internet World Wide Namibia Index Page
IDRC Focus Collection: Grassroots Indicators for Desertification
IISD Compendium of SD Indicator Initiatives
ISRIC Home Page
IUCN Monitoring and Evaluation Initiative

La cellule de Coordination Biodiversité du Gabon
Land Quality Indicators Home Page
Madagascar: Table of Contents
Mozambique Home Page
Namibia Ministry of Environment and Tourism Home Page - Travel
National Archives of Namibia
National Information Networks - Africa
Nigeria
OECD Indicators of Development Progress
Reengineering and Results Framework RFNET ARCHIVES
Republique Democratique du Congo
SEPA - Secretariado Executivo para o Ambiente Cabo Verde
Spatial Modeling Environment U MD
The Republic of The Gambia's Web Page
Trade and Environment Database
Trade and Environment Database
UNDP Human Development Report Office
UN Habitat Urban Indics Prog
UNICEF The Progress of Nations
UNSD/Social and Housing Statistics Section
U.S. Geological Survey
USAID in Africa - USAID Bureau for Africa
USAID Regions & Countries
USAID: Africa Bureau Information Center
Welcome National databank of Nigeria
WHO Basic Health Indicators
World Bank Group--Country data: African Development Indicators
World-Wide Web Virtual Library / Forestry / Soils and Substrates
Zimbabwe

Biodiversity and Environment

About JNCC
Australia local govt monit strategy
Australian Local Government Association
Australian National Botanic Gardens Biodiversity Server
Australian National University
BC Canada Biodiv Library
BEAR
Bellagio - Principles
BIN21 Virtual Library
GOTOBUTTON BM_|_ Biodiversity and WORLDMAP
GOTOBUTTON toc BIODIVERSITY IN CANADA - A SCIENCE ASSESSMENT
GOTOBUTTON BM__ Biodiversity Insight System (BIS)
BioDiversity Pro Home Page
Biology sites

BIONET Web Page
Biota: The Biodiversity Database Manager
Canada's National Environmental Indicators Series
Canadian Botanical Conservation Network - English Index Page
„_ CBIN Home Page
CCE - CCA - CEC NAFTA Env Org
cdiac.esd.ornl.gov
CEDAR, Central European Environmental Data Request Facility
CI SIG
CIESIN Home Page
Community Sustainability Auditing Project
Compendium of SD Indicator Initiatives
Conferència electrònica sobre Biodiversitat. | Electronic conference on Biodiversity
Conservation Biology
Conservation Biology Institute, Pacific Northwest Ecoregion Survey
Convention on Biological Diversity
CSIRO Australia - Home Page
“_ CSIRO Contacts Directory - Division of Wildlife and Ecology
”_ Directory of /pub/iucn/icons
DisplayText cannot span more than one line!
Doing Your Own Survey
Eco Workshop Contacts
Eco-indicator 95
Ecological Monitoring and Assessment Network (Environment Canada)
Ecological Stewardship Workshop
Ecotrip®
EDF -- Environmental Defense Fund WorldWide
Eldis Home Page Env and Dev Info
ENV 316: Case Studies in Forest and Environmental Management
Environment Australia On-Line
_ Environment '97
Environmental Indicators Website US EPA
Environmental Treaties and Resource Indicators Project
ETI Homepage
EURO-ENVIRONMENT 1998
European Working Group on Research and Biodiversity (EWGRB)
event: financial innovations for biodiversity
FCN Foundation for the Conservation of Nature, International
FIBRE - Finnish Biodiversity Research Home Page
Field Biology Software Checklist
Fish and Wildlife Information Exchange--VA Tech
«_ GELOS Home Page (Gelos/CEO)
George Wright Society
GEOWAREHOUSE - DATA WAREHOUSE
Global Environment Facility
Global Forest Information Service-Home Page

Hart Environmental Data
Homepage of the Biotechnology and Development Monitor
How to Search BIOSIS
USGS Inter-American Geospatial Data Network
Global Environmental Information Locator Service (GELOS)
IABIN - Inter-American Biodiversity Information network
ICONS Download Area
ICONS Home Page
ID21 Development Research reporting service.
IGC: EcoNet
IIED Environmental Planning Group: Publications
»_ INBio-ECOMAPAS
IISDnet
IISDnet (IISD's Web Site)
Information Systems in Developing Countries
International Forest Policy
IUCN - The World Conservation Union
Landcare Research Home Page
Latin American Alliance Network
Linkages - A Multimedia Resource for Environment & Development Policy Makers
MAB Net Americas
Mailing Lists at IGC
Map Maker - GIS for Windows
National Audubon Society
National Biological Information Infrastructure
National Resource Information Centre
New Zealand Ministry for the Environment Home Page
NGDC/WDCA MGG-Announcements: Surface of the Earth Poster
NMA home page - NMA first page
NSW State of the Environment 1997 - NSW SoE 97
ODI Natural Resource Perspectives Number 10
ODI Natural Resource Perspectives Number 9
OECD Statistics - Economic Indicators - Statistical Data and Graphs
Overseas Development Institute
Overview - Socio-economic Research Network
Pacific Biodiversity Inst
PIENet - DPIE Home Page
Quercus mag España
Recorder 3.3 Information
Relevant measure of biodiv from EWGRB
SD Gateway - Home
SD Gateway - Home
Sectoral Note-Environment WB
Social Indicators of Development Database Search
Society for Conservation Biology (SCB)
State Biodiversity Database Survey

State Environmental Goals and Indicators Project Home Page
State of Canada's Environment Infobase - Home Page
State of Environment, British Columbia
State of the Environment Norway - Other countries
State of the Environment Norway 1995
State of the Environment Norway 1997
State of the Environment Reporting - New Zealand
Team Technologies, Inc.
Teaming with Life: Cover Page
Thailand Environment Institute
Two Way Track: Biodiversity Conservation and Ecotourism - Table of Contents
UNDP Bio paper
UNEP - Home
UNEP's Global Environment Outlook-1 - 1997
USFS Inventory and Monitoring Institute
WB Data on Poverty
WB DEVFORUM: Current Dialogues: Knowledge and Information for Development
Welcome to CABI
WELCOME TO SHAMAN PHARMACEUTICALS INC
Who's Who in Biodiversity at the Bank
World Bank Group
World Bank Monitoring Environmental Progress - Table of Contents
WB Performance Monitoring Indicators: handbook
Worldwatch Institute Home Page
WPTI Partner: IPE
WRI: "Country Environmental Studies" Biodiversity Abstracts

UN System sites

Agenda 21 - National Information
FAOSTAT Database Gateway
gopher://gopher.un.org/...-97/update/INTRODUC.IND
gopher://gopher.un.org:...nced/English/a21_01.txt
gopher://gopher.un.org:70/11/esc/cn17/unced
UN CyberSchoolBus: Resource Source
UN Statistics Division/DESIPA
UN Statistics Division/DESIPA
UNESCO Stat
United Nations - Indicators of Sustainable Development
United Nations - Sustainable Development Web Site
United Nations Earth Summit+5 Reports
United Nations Population Information Network (POPIN)
United Nations System
Welcome to UNESCO's Statistical Yearbook 1995

E. Printouts of materials in Africa_trends\countries section

Include here are printouts from the home pages of the various countries identified as having home pages in Part 1.C.

Additionally, the first page of Country Environmental Profiles from Africa Development Bank are included here for the following countries: Botswana, Cameroon, Cote d'Ivoire, Egypt, Eritrea, Ethiopia, Ghana, Guinea, Lesotho, Malawi, Mali, Mozambique, Namibia, Senegal, Sierra Leone, Sudan, Tanzania, The Gambia, Uganda, Zimbabwe. The complete texts for these reports are included on the EETA Zip disk.

F. Lists of spreadsheet and image files created

Directory of C:\Africa_trends\Afr Data files\

The majority of these files were created based on the relevant files in the World Resources Report 1998-99 database. While, in most cases, the original data came from such sources as the World Bank, FAO, or WCMC, for example, WRI has checked these and put them in to a consistent format greatly enhancing their usability. The virtue of these files is their complete historical coverage; however, they are, in general, not as up-to-date as those in the Africa Live database or the new WDI CD. For this study, the data for African countries were extracted and then the countries of Northern Africa were separated from those of Sub-Saharan Africa. When relevant macroregional data were available (Asia, Africa, Latin America, etc.) these were retained in the file but when the macroregional data were not included the rows for these were also removed. These files should be considered as working files for performing calculations and not as finished products.

afr acc safe water.123	21 KB	5/23/99
afr access health.WK1	5 KB	5/21/99
afr access water all.WK1	5 KB	5/23/99
afr access water rural.WK1	6 KB	5/3/99
afr access water urban.WK1	6 KB	5/3/99
afr ag % gdp.123	22 KB	5/23/99
afr ag in brief.WK1	104 KB	5/20/99
afr ag labor %.WK1	10 KB	5/23/99
afr arable pc reg.123	8 KB	5/23/99
afr arab-perm crop 1975+.WK1	24 KB	5/23/99
afr cereal yield 1975+.WK1	141 KB	5/20/99
afr child mort.123	22 KB	5/24/99
afr child mort.WK1	12 KB	5/14/99
afr child mort2.123	22 KB	5/24/99
afr comm eng cons.WK1	31 KB	5/10/99
afr comm pc calcs.123	102 KB	5/11/99
afr crop pc.123	11 KB	5/12/99
afr crop.WK1	31 KB	5/20/99
afr daily calorie % 'MR.WK1	4 KB	5/21/99
afr daily calorie pc '94.WK1	38 KB	5/21/99
afr debt pvt %.WK1	21 KB	4/21/99
afr debt serv %.WK1	26 KB	5/10/99
afr debt serv ratio.123	15 KB	5/23/99
afr debt tot.WK1	37 KB	5/24/99
afr deforest.WK1	15 KB	5/17/99
afr econ activ pop.WK1	10 KB	5/20/99
afr educ.WK1	15 KB	5/5/99
afr eng trad cons.WK1	21 KB	5/10/99
afr engy comm cons pc.WK1	32 KB	5/11/99
afr engy comm cons.WK1	32 KB	5/17/99
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afr engy trad cons.WK1	21 KB	5/11/99
afr fem pop.WK1	20 KB	5/3/99
afr fert cons mt.123	29 KB	5/23/99

afr fert cons p ha.123	24 KB	5/23/99
afr fert cons.WK1	27 KB	5/20/99
afr fert import.WK1	26 KB	5/13/99
afr fert prod.WK1	24 KB	5/13/99
afr food pc prod.WK1	41 KB	5/23/99
afr food prod index reg.123	7 KB	5/23/99
afr gdi as % gdp.123	15 KB	5/17/99
afr gdp grow rt.WK1	28 KB	4/20/99
afr gdp growrt.123	12 KB	5/17/99
afr gdp in ag.WK1	30 KB	5/23/99
afr gdp.123	11 KB	4/20/99
afr gdp2.123	13 KB	4/28/99
afr gnp pc.123	26 KB	5/23/99
afr gnp pc.WK1	22 KB	5/10/99
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afr illit adult fem.123	21 KB	5/24/99
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G. Lists of figures (graphs)

Figures in this study

Sub-Saharan Africa Bio-physical Indicators

Arable land per capita in poorest areas has declined faster than has that in less poor areas
Sub-Saharan African yields growing slowly
Cereal yield in Africa
Greatest gains and losses in yields of cereals in SSA
Roots and Tubers yield in Africa
Greatest gains and losses in yields of roots and tubers in SSA
SSA food production index has grown less than other regions'
SSA fertilizer consumption has levelled off in last two decades
Sub-Saharan Africa has very low fertilizer consumption per hectare
Sub-Saharan Africa imports about half of fertilizer consumed
Sizes of degraded and undegraded lands
Percent of combined degraded and non-vegetated land
Causes of human-induced soil degradation in Africa
Among Tropics, Tropical Africa deforestation rate not worst
Among tropical areas, Tropical Africa forest loss second largest
Sub-Saharan Africa uses small amount of water per capita per year
Africa uses majority of water for agriculture
SSA protected area comparable to other developing regions
Traditional energy use as percent of commercial energy use
Traditional energy use as percent of commercial energy use

Sub-Saharan Africa Economic Indicators

Real GDP growth from 1990
Sub-Saharan Africa continues low growth of low GNP per capita
SSA has comparable debt service relative to exports vs. other regions
Gross Domestic Investment per annum average since 1990
Comparison of Botswana, Niger, and SSA annual Gross Domestic Investment average
Average Gross Domestic Investment vs. GDP growth rate since 1990
Average ODA per capita for Africa
ODA per capita 1997
As percent of GNP SSA has received much greater ODA
As percent of GDI SSA has received much greater ODA
ODA per capita vs. GNP per capita

Population vs. ODA
SSA continues to have high percentage of economy in agriculture
Value added per agricultural worker declining in SSA
SSA continues to have high percentage of labor force in agriculture
Percentage of economy in industry stagnant in SSA
Africa has few vehicles per capita

Sub-Saharan Africa Social Indicators
SSA continues high population growth rates above other regions
Rapid Urbanization in Africa vs. other regions
Rapid urbanization in selected individual countries
Most and least urbanized countries
Poorer countries also have faster urban growth rate
SSA child mortality rate continues high
High child mortality rates in 1990s
Decrease in Child Mortality since 1980
Greatest decreases and increases in child mortality rates since 1980
Lowest and highest rates of female literacy
SSA has lower overall access to safe water than other developing regions
SSA public health expenditure ratio comparable to rate for other low and middle
SSA total health expenditure ratio lower than other low and middle income regions
SSA public education expenditure ratio comparable to rate for other regions
Average public expenditure on education vs. average GDP growth rate since 1990
Overall literacy rate low in SSA compared to developed regions
SSA has lower percentage of primary school enrollment than other regions
SSA has lower percentage of secondary school enrollment than other regions
SSA life expectancy increases slowly; remains below other regions
Lowest and highest life expectancy

Trends in bio-physical, economic, and social indicators in Botswana and Niger

Bio-physical Trends

Botswana has lost cropland per capita faster than SSA
Botswana yields stagnant and lower than Africa
Botswana per capita food production has declined to SSA average
Botswana fertilizer consumption declined but has recently rebounded
Botswana deforestation less than Tropical Africa
Botswana uses low amount of water compared to SSA
Botswana uses low percentage of available internal water resources
Botswana protected area above SSA average; above IUCN
Botswana commercial/traditional energy balance
Botswana commercial energy consumption above average

Niger has gained cropland per capita
Niger yields stagnant and lower than Africa

Niger food per capita production average for SSA
Niger fertilizer consumption has recently grown
Niger gained and retained forest; Tropical Africa lost forest
Niger uses low amount of water compared to SSA
Niger uses higher percentage of available internal water resources than Africa
Niger protected area above SSA average ; below IUCN
Niger commercial/traditional energy balance
Niger commercial energy consumption below average

Economic Trends

Botswana has had high GDP growth rates
Botswana continues growth of GNP per capita
Botswana slows debt accumulation
Botswana has low debt service as percent of GNP
Botswana has low debt service relative to exports
Botswana Gross Domestic Investment annual average since 1990 above SSA
Botswana has received per capita ODA well above SSA average
Botswana has higher income inequality than Niger
Botswana has fewer workers in agriculture than SSA
Percentage of economy in agriculture declines in Botswana
Value added per agricultural worker higher in Botswana
Percentage of economy in industry grows in Botswana
Botswana has more vehicles than SSA
Botswana has more roads than SSA

Niger has had low and inconsistent GDP growth rates
Niger continues low GNP per capita without growth
Niger slows debt accumulation
Niger has higher debt service as percent of GNP
Niger has high debt service relative to exports
Niger Gross Domestic Investment annual average since 1990 below SSA
Niger has received per capita ODA slightly above SSA average
Botswana has higher income inequality than Niger
Niger has more workers in agriculture than SSA
Percentage of economy in agriculture remains high in Niger
Value added per agricultural worker low and stagnant in Niger
Percentage of economy in industry low and stagnant in Niger
Niger has fewer vehicles than SSA
Niger has fewer roads than SSA

Social Trends

Botswana lowers population growth rates to below SSA
Botswana lowers urban population growth rates
Botswana lowers child mortality rate

Botswana provides better access to safe water than SSA
Botswana public health expenditures higher than overall rate for SSA
Botswana spends more on education than SSA
Botswana overall literacy rate high for SSA
Botswana female literacy rates higher than overall rate for Africa
Botswana female literacy compared with male literacy higher than SSA
Botswana has higher percentage of both primary and secondary school enrollment
Botswana has seen decline in life expectancy to below SSA

Niger continues high population growth rates above SSA
Niger continues high urban population growth rates
Niger has high child mortality rate
Niger provides better rural access to safe water, poorer urban access
Niger public health expenditures lower than overall rate for SSA
Niger spends less on education than SSA
Niger overall literacy rate low for SSA
Niger female literacy rates lower than overall rate for Africa
Niger female literacy compared with male literacy higher than SSA
Niger has lower percentage of both primary and secondary school enrollment than
Niger has seen increase in life expectancy; remains below SSA

Sub-Saharan Africa Regional Trends

USAID is working in the countries where it is needed most.
Real GDP growth from 1990
ODA per capita vs. GNP per capita
Population vs. ODA
Average public expenditure on education vs. average GDP growth rate since 1990

Directory of C:\Africa_trends\ GIF Files

Graphics Interchange Format (GIF) files are used in HTML presentations. They have the virtue of being small in file size but they are not scalable to different sizes on the screen or on the printer without loss of image quality.

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H. Lists of HTML pages created and their structure

For the Web-based Development Analysis, files were created for the study as a whole, then for Africa, and for Botswana and Niger each. Then for each of these region and countries files were created for Biophysical, Economic, and Social indicators. Into these were inserted the references for the graphics files for each analysis (GIF files above).

From the index file one can go either into the indicators in the three areas or directly into the countries and then into the three areas for this country.

Printouts of these follow this page and the files are include on the EETA Zip disk.

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botswana.htm	10 KB	5/26/99
niger.htm	10 KB	5/27/99
nigerflag.gif	1 KB	5/21/99
nigermap.gif	8 KB	5/21/99
biophys.htm	9 KB	5/27/99
economic.htm	7 KB	5/25/99
social.htm	7 KB	5/26/99
bo_bio.htm	2 KB	5/24/99
bo_econ.htm	3 KB	5/25/99
bo_social.htm	3 KB	5/24/99
ni_bio.htm	2 KB	5/24/99
ni_econ.htm	3 KB	5/24/99
ni_social.htm	3 KB	5/24/99

For the presentation of the study as a Web-based version of the report, one file was created, eeta.htm, into which were inserted the references for the graphics files for each analysis (GIF files above).

eeta.htm	82 KB	6/13/99

I. Bibliography

Along with the data products World Development Indicators, Africa Development Indicators, Africa Live Database, and World Resources Database, a number of published works were also consulted.

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