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# Findings

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## Land Degradation and Population Growth in Sub-Saharan Africa: The Machakos Experience

Given the difficult economic situation in Sub-Saharan Africa, the burden of rural poverty and the rapid depletion of natural resources, policies that promote sustainable development are absolutely critical. One of the central questions is, in the context of a rapidly increasing population, limited resources and infrastructural problems, how does a country achieve both economic growth and reduced environmental degradation ? The answer would seem to lie in addressing two central issues:

- The compatibility of sustainable resource management with rapid population growth; and
- The possibility of turning around a degradational cycle towards conservation.

The experience from Machakos district in Kenya explains the importance of appropriate, market oriented policies and adequate infrastructure in enhancing the efficient use of natural resources, even with an increasing population. It rebuts the conventional assumption that increased population must necessarily have an adverse effect on land quality.

### Conventional View about Population Growth and Environment

The conventional view is that rapid population growth leads to environmental damage. The argument is that population growth increases demand for land for uses other than crop cultivation. This means fewer trees and therefore has an adverse effect on the environment. The situation is often made worse by over-cultivation, overgrazing, deforestation and climate changes, leading to the gradual spreading of deserts (desertification). Although population pressure may not always be the culprit, it is thought to always invariably exacerbate the problem.

Apart from increased utilization of lands, bad cultivation practices may strip vegetation from the topsoil and deprive it of nutrients and organic matter, thereby exposing it to erosion from the sun and wind. The pressures of population growth could be seen as contributing to the acceleration of these practices. In areas with pastoral activities, increased population growth is likely to lead to overgrazing and severe environmental damage.

Other non-demographic factors that may aggravate this situation include the presence of unequal distribution of farmland, which restricts access to better soils, pushing the growing number of people on to ecologically sensitive areas. Such sensitive areas include erosion-prone hillsides, semi-arid savannas and tropical forests.

The Machakos experience deviates from the conventional experience. Increased population leading to increased cultivation did not lead to environmental damage, but rather to improvements in environmental quality. This experience has potential for replication. On the other hand, the Machakos experience provides some validation for the hypothesis advanced by the agricultural economist, Ester Boserup, that increases in population density induce technological change and increase in farming intensity. Also, that there is an early stage in population growth when natural resources come under acute pressure.

### **The Machakos Experience**

The Machakos district is inhabited mainly by the Akamba people. It is in the semi-arid region of Kenya and covers an area of about 14,000 square kilometers. Land degradation in this district was observed as early as 1920. The area was subject to frequent and severe droughts as well as runs (soil erosion by storm water being the most dominant form). It was projected in those days that the land would not be able to support a projected population density of 67 persons per square kilometer in 1948. By the 1930s, the area was classified as being in an advanced stage of degradation.

The Machakos problem has its roots in colonial times. The main occupation of the population in the 1930s was livestock herding with subsistence cropping to meet basic needs. Lands bordering the Akamba on two sides (White Highlands), used as grazing fields for livestock, were taken and reserved for colonial settlement. Lands on the other two sides were also designated Crown Lands, whose use was controlled by the government. Hemmed in the middle, the Akamba grew in numbers and in livestock, clearing land for shifting cultivation ( slash-and-burn) and chopping trees for firewood and for the construction of their homes.

Government policies prevented the Akambas from undertaking work outside the reserve. This confinement, in addition to other agricultural production restrictions such as quotas prevented them from being able to take advantage of the market for their produce. The authorities, on the other hand, maintained that irrational increases in herd size, increases in population, and cultivation without use of manure were the major causal factors for the droughts.

In attempts to remedy the situation and restore the pastures, the government closed some areas to herds. Seeds were also resown and grazing prohibited in some areas. The use of "bench" terracing to control surface runoff was widely adopted, as the government emphasized soil conservation. There was also a move towards innovation and change in agricultural technology, including the breeding of early maturing varieties.

Land ownership has traditionally been individualistic, especially land for cropping, so that a significant amount of security existed even under customary law. Use of land has changed from livestock and subsistence cropping to primarily crop-oriented production. The absence of men in the 1940s led to the women taking-up leadership roles which has continued ever since. The Akamba have traditionally placed emphasis on education and development of local vocationally oriented schools. This helped widen the range of skills in small scale commercial activity and in technological innovation.

Over time, the population increase led to an increased demand for food, increased labor supply, more technological innovations and reduced transaction costs. With favorable market conditions, the subsequent increased cultivation led to a reduction in land degradation. The land degradation was thus reversed through increased cultivation. Generally, land productivity has improved. Between 1930 and 1990, there has been a 3-fold increase in the value of output per head, and a 10-fold increase in the value of output per hectare, from 1930 to 1990.

Contributing to the success in Machakos were the following key factors:

- Proximity and access to markets: The urban market of Nairobi is close and easily accessible. Transaction costs were therefore low, leading to high farm gate prices which made farming profitable.
- Adequate transportation infrastructure: This enhanced efficiency in the distribution of agricultural inputs and outputs.
- Provision of adequate health and education facilities.
- Provision of extension services: Information was readily available on soil conservation, moisture retention, intensification of farming and tree planting practices.
- Capital generation from outside agriculture through non-farm activities.
- Secure land tenure.
- Remittance from urban workers.

These factors helped to capitalize on the phenomenon of more people needing more food which then cost more (the output cycle) and on more people resulting in the availability of more and less expensive labor (the input cycle).

### **Possible Misinterpretation**

There is a tendency to misinterpret the Machakos experience as implying a constantly positive effect of population growth on land quality. Or suggesting that increased intensification is always compatible with environmental recovery.

The relationship between population growth and the state of natural resources depends on the type of environmental hazards and the process of degradation, whether desertification or erosion. Thus, even in Machakos it may be necessary to slow down population growth in order not to exceed the optimum population size, given the prevailing natural resources, infrastructure and services. The limiting constraints must be taken into consideration in determining the optimum population growth rate, be it natural resources or physical infrastructure.

### **Implications for Development Strategy: the Integrated Approach**

Some important lessons may be drawn from the Machakos experience for development projects in dryland areas. Despite an increasing population, positive environmental outcomes can be secured through a combination of agricultural intensification, improved infrastructure, land security and human resource development. While the lessons here are drawn with regard to the population and land degradation nexus, they could be generalized to address the issue of sustainable development as a whole.

- The most important derivative is that the problem of land degradation cannot be handled in isolation, of the overall development process. The appropriate strategy for solving both the environmental problem and the population problem in Africa seems to be an integrated approach with components of appropriate macroeconomic policy framework (input and output markets and land tenure), provision of services (education, health, agricultural extension) and adequate infrastructure (transportation, water and electrification). A lapse in one of these components may delay or derail the process of sustainable development. Especially for natural resource management schemes, the integration of activities involving several disciplines under different sectors, government support and an effective policy framework are important. Thus the importance of the macroeconomic reforms currently under way in several African countries cannot be overemphasized.
- Some implications can be drawn regarding the importance of population control measures. The constraints of limited natural resources and infrastructure point to the concept of an optimal population. This is a dynamic concept, depending on what the limiting factor is at a particular time and the potential for its increased supply. Rapid population growth must be accompanied by improved appropriate technology, crop mixes and capital investment, effective family planning programs and education for women. Funding constraints could restrict the success of these efforts.
- The realization of results from natural resource management and environmental projects takes time. In the Machakos case, while the problem was noted in 1920, the results of the mitigatory policies implemented were only realized in the 1990s. In the short run the changes may be unnoticed but add up to substantial change in the future.
- The active participation of local communities in the development process is critical to viability and sustainability.

Obviously, certain socio-cultural features are unique to the Machakos area. However, the experience is instructive in that it identifies certain key factors that are uniformly needed and achievable to establish the desired balance between population growth and environmental pressures on the land - a balance that is vital to the sustainable development of Sub-Saharan Africa.

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John English, Mary Tiffen and Michael Mortimore. 1994. Land Resource Management in Machakos District, Kenya, 1930-1990. World Bank Environment Paper No. 5. Environment Department. Washington, D.C.: World Bank. This study was prepared as one of the initiatives under the Sahelian Operation Review, funded by the Norwegian government and initiated by the Environment Division of the Africa region.

