

Agricultural Development at the Intersections: Finding Means of Directing Agricultural Development Towards Sustainability and Biodiversity Conservation, in the Nguruman Area of Kenya

Introduction

A cluster of Maasai Group Ranches located 130 kilometres southwest of Nairobi, Kenya, are seeking means to earn revenues from the conservation of their abundant wildlife resources. At the same time, a new and extremely compelling agricultural development alternative is presenting other means of income generation. At present, the local communities have made a clear commitment to conserving wildlife resources in certain sectors of the communally-owned ranch land, while enabling land subdivision and private agricultural development in another sector. Both of these specialized land allocations- to farming and to wildlife- have been made in the context of the traditional means of livelihood, transhumant pastoralism, still practiced across the arid grazing lands of the group ranches.

The group ranches lie primarily to the west of Lake Magadi, bordered by the rugged Nguruman escarpment on the west, and the Tanzanian border and Lake Natron to the south. Each group ranch is comprised of from 500 to 600 square kilometres. The climate in this region is hot and dry, similar to the Maasai Mara and Serengeti Plain, but with even greater extremes of high temperature and low precipitation. A large perennial river running through the group ranches, and four smaller rivers originating on the hills above the escarpment generate high water tables and seasonal flood plains that are responsible for the many vegetation types in the area. In addition to semi-arid plains, *Commiphora* bush, and lush grass pastures which spring up during the rainy season, the area includes massive fig forests lining the permanent rivers, vast *Acacia* woodlands, thick riverine forest, a large seasonal swamp and soda flats along the Magadi lakeshore (Brightwell et al. 1997, Agnew reports).

The three chief components of this agroecosystem will be briefly characterized below.

AGRICULTURE: The market in northern Europe for exotic vegetables is the engine behind the growth of export-crop farming in Kenya. The primary limiting resource in this endeavor is water, and schemes that have taken hold in "marginal areas" depend on gravity or energy-dependent irrigation. At Nguruman, export farming of horticultural crops has been growing steadily since its introduction several years ago. Originally, export farming, dependent on gravity irrigation, was confined to areas adjacent to streams originating in the hills to the west. Lately, larger farms, using pump-driven irrigation, have appeared in areas next to the Ewaso Ngiro River. Prices paid to farmers for their produce are low, but direct monthly payments from exporters are the primary source of cash in this region. The rapid growth of export farming is not, therefore, surprising. Approximately 500 hectares of land is now under irrigation, out of a potential 5000 acres in the Nguruman area.

WILDLIFE: A large variety of mammal species frequent the area, including elephant, lion, cheetah, eland, giraffe, wildbeest, eland, oryx and Grant's and Thompson's gazelle. Elephants at present remain in the thick bush of the escarpment, and do not pose conflicts with agriculture. Also in the more dense woodlands at the base of the escarpment, there are buffalo herds, warthog, waterbuck and bush-buck. The primate community is made up of baboons, vervet and colobus monkeys. The area is rich in bird life, especially raptors, and has been designated one of Kenya's "Important Bird Areas", key for conservation efforts as it is not in any protected category. In addition to wildlife viewing, it has been proposed that the area could support other activities such as game hunting (of guinea fowl) and wildlife-oriented field schools. The rivers and creeks of the region drain ultimately into Lake Natron, which is the primary site of flamingo breeding in Africa.

LIVESTOCK: Studies have shown that livestock production on one of the group ranches is actually above average for such an extreme environment- so long as land is not fragmented (Roderick 1997). One of the major reasons pastoralists in the Nguruman area have been so successful can be related to the strategy of having mobile herds, and a large land area in which to successively graze. The graze and browse resources

of one of the ranches has been carefully mapped; local personnel are available to continue to monitor the availability of the resource under yearly weather fluctuations.

The region thus is characterized by having a number of potential areas for both conservation and development. The potentials are promising, as are the potentials for conflicts between uses. Below, we lay out the intersections between uses, and what is envisaged for conserving and harnessing the biodiversity of the Nguruman area:

Intersections

WILDLIFE AND LIVESTOCK: The ranches are well supplied with water and there is no conflict between wildlife and livestock for water at present (Roderick 1997). The ease of movement of animals has been important to both livestock and wildlife in this area in the past. Land demarcation may reduce the ability of both to be mobile. Both wildlife and livestock depend on the same pasture - at the base of the escarpment - at the end of the dry season. In wet years, this is no problem, but in dry years there may be a competition for grazing resources. Tsetse fly has posed a conflict in the past between wildlife and livestock, but effective trapping technology introduced and now adopted by the community has reduced this challenge.

LIVESTOCK AND AGRICULTURE: With increasing land demarcation within the agricultural areas, sedentary farmers are developing a different kind of livestock production system, in which small herds maintained on supplementary feeding are more important than large nomadic herds. The success of livestock in the area has been based on a transhumant strategy; sedentary agriculture requires a new strategy, less mobile and more intense in a particular site. So far, soil fertility has required few inputs; nonetheless, years of confining livestock overnight in manyattas has built up a rich resource of animal manure can provide a ready input into agriculture.

AGRICULTURE AND WILDLIFE: Pesticides in run-off from the agricultural areas are bound to impact wildlife further downstream. Of particular concern is the level of pesticides reaching Lake Natron, the primary breeding ground for East Africa's famous flamingo populations. Wild habitat provides a subsidy to agriculture, in providing nesting sites and floral resources for pollinators, and alternate hosts for natural enemies. This will only be true so long as agricultural development respects certain limits, and leaves a portion of wild habitat intact. At present, wildlife is not conflicting with human settlement, except some crop predation by buffalo, baboon and bushpig.

The challenge in sustainable development is to ensure a careful balance between these diverse sectors. While community members may lose some mobility in the future (their past strategy to deal with environmental change), a diverse economy may give them another form of mobility, to emphasize different sectors under changing conditions. For example, in years of drought, more emphasis may be put on ecotourism (as wildlife generally suffer less from drought than livestock and agriculture). In addition, the communities will also have diverse economic structures as they develop, between their traditional communal structure in the arid portions of the ranches, and a growing private sector in the agricultural zone. Equitable communal and private benefit schemes will need to be elaborated. Resource economists both at the African Conservation Centre and Stanford University's Centre for Conservation Biology could bring much needed economic expertise to bear on balancing growth between diverse sectors, and assessing the true costs of development which impinges on the provision of "nature's services".

In addition, we propose an insect-based environmental monitoring scheme to support the economic input. Why look at insects? (See graph, bugs in the system). Unlike theoretical economic models, or more abstract indicators, all the insect groups noted on the accompanying graph have direct impacts on growth and conservation. They can be seen and understood by all members of the community. The International Centre of Insect Physiology and Ecology, along with a number of local partners, is currently proposing and undertaking targeted studies which can help guide sustainable development and conservation in this pilot area, using insects as flagship species which occur throughout all agroecosystems in the Nguruman area. While each sector is important in its own right, insect research can provide some cross-cutting services and perceptions which can help to integrate the diverse threads.

Partners and collaborators

ICIPE; Magadi Conservation Trust; Emory University, USA; University of Haifa, Israel; National Museums of Kenya; Kenyatta University; African Conservation Centre; Kenya Wildlife Service; Kenya Trypanosomiasis Research Institute (KETRI), University of Nairobi, Stanford University Center for Conservation Biology, FAO.

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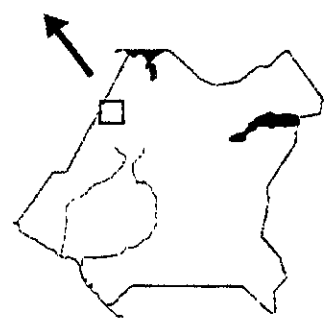
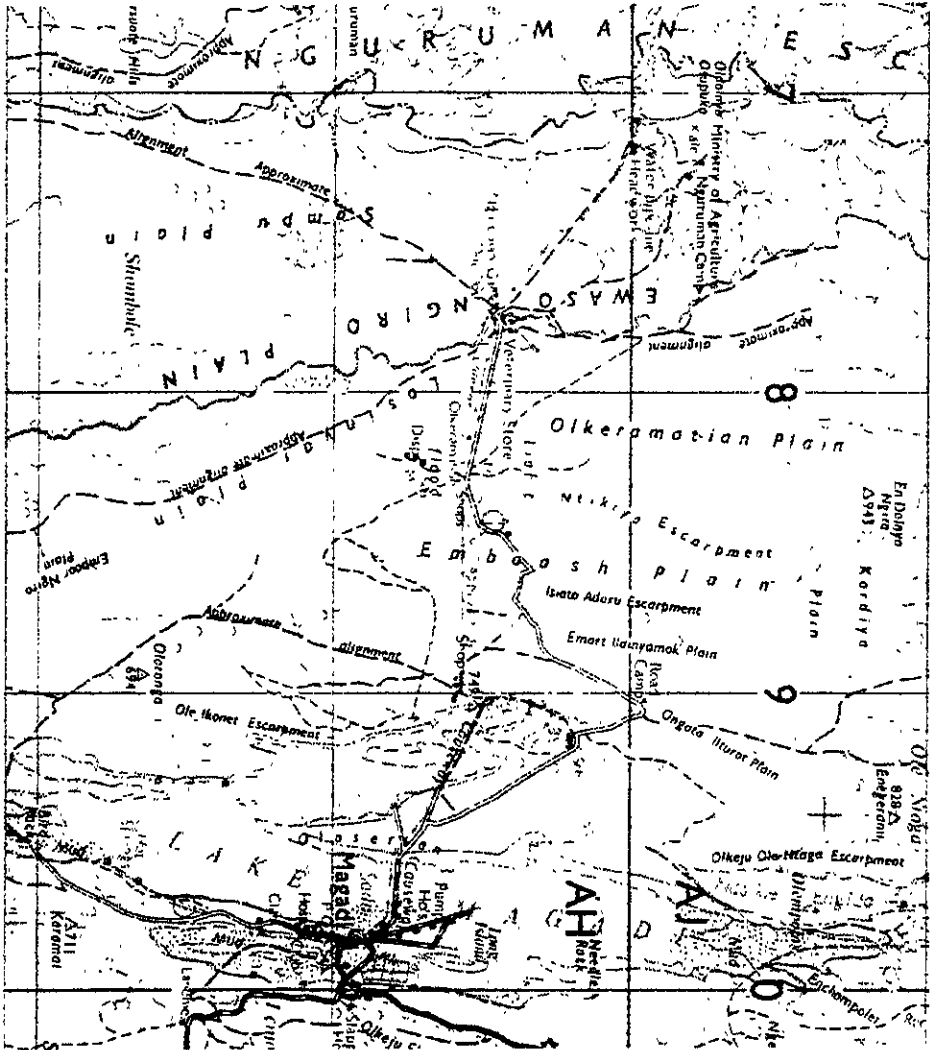
Further information about the ICIPE Nguruman Field Station:

www.icipe.org/environment/stations-nguruman.html

Contact information:

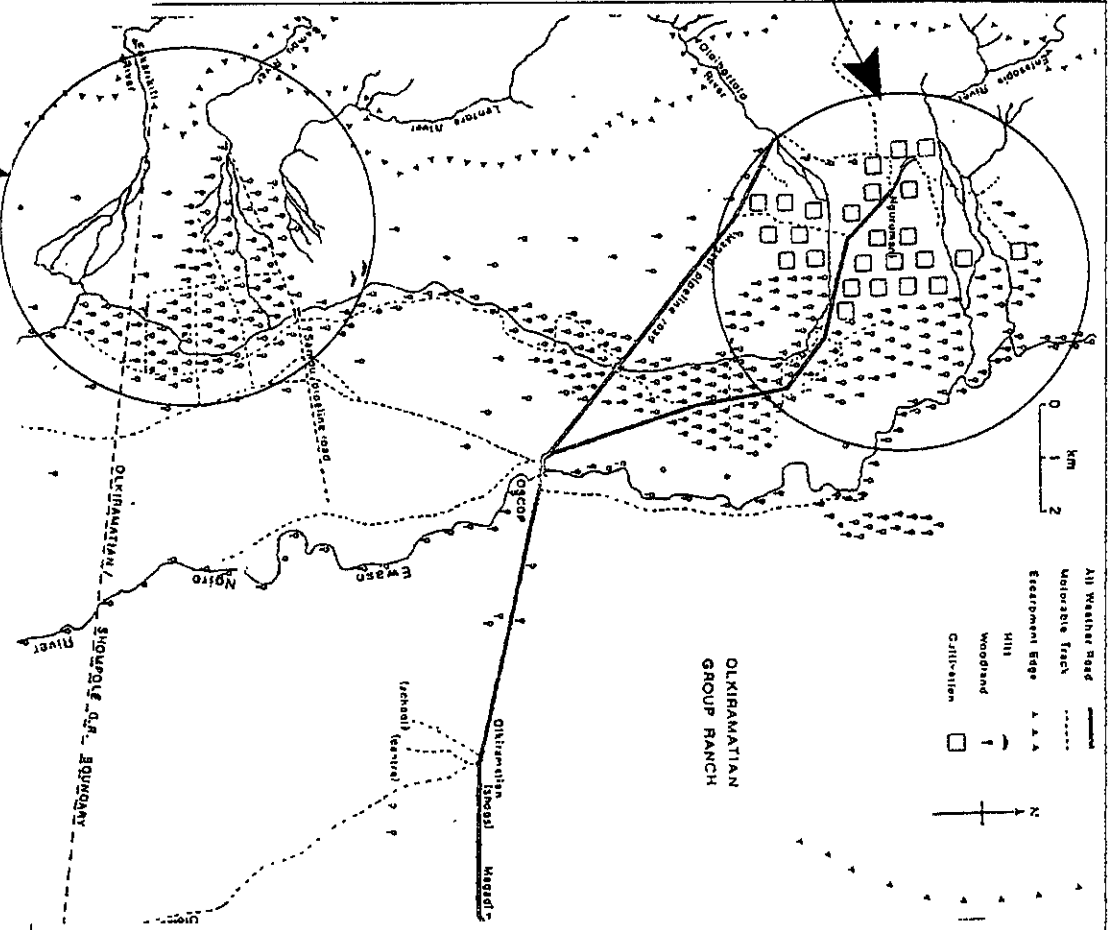
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Location of Case Study Site within Kenya

area designated by the Group Ranch for plot demarcation and agricultural development



area designated by the Group Ranch for wildlife and ecotourism,

(remaining area of Group Ranch used for livestock grazing, and by wildlife)

natural environment

