

# Conservation versus Development in East Africa's Drylands

by Daniel Stiles



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***Does the economic potential of some indigenous plants offer a possible solution to the conflict between people and wildlife in East Africa's marginal lands?***

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Much of East Africa is made up of 'drylands', defined by the United Nations as the arid, semi-arid, sub-humid and productive parts of the hyper-arid climatic zones. Most of the larger game parks are found within these climatic zones as well. Today, it is largely within these dryland regions that the battle to conserve wildlife is taking place. The fight has largely already been lost in the high potential agricultural areas, except for a few pockets of protected forest or national parks, which find themselves under great pressure from the surrounding population.

More and more people every year, particularly in Kenya, are moving from the overcrowded high potential farmlands into the bush of the drylands. Slash and burn shifting cultivation and livestock grazing are the typical forms of subsistence of these poor segments of East African society. Without expensive inputs such as irrigation, fertilisers and pesticides, it is very difficult to practise sedentary agriculture and build up a highly productive farm. Shifting cultivation and overgrazing by livestock are leading to destruction of the natural vegetation – mainly various types of thorn bush and savannah, which also happen to be the habitat of the majority of East Africa's remaining wildlife.

There is still abundant land to support

*Vernonia galamensis might well be the most important new plant for the 1990s. The seeds produce an oil and epoxy acid that have great potential as an environmentally sound replacement for volatile solvents.*

## ... drylands

viable wildlife populations, but with an exponentially increasing human population it is clear that this situation will not last very far into the future – particularly with the destructive land use practices of today. Even the use of extensive crops such as cotton, wheat and rice, which are favoured by local governments and aid agencies for 'proper' agricultural development in the drylands, results in the destruction of the natural vegetation. It also leads to the long-term environmental problems of soil salinisation, a build up of toxic wastes and other soil, water and health hazards as they require high inputs.

It has become a cliché to talk about 'environmentally sustainable development', but nevertheless the concept is with us for the foreseeable future. It is a concept that has many proponents but almost no practitioners. Kenya's President, Daniel arap Moi, has pointed out in many speeches recently that the future in Kenya lies in the drylands and he has implored people to find ways of making them productive. The same could be said for the rest of East Africa. If sustainable development is not carried out right from the beginning in the fragile drylands, the future will be short. Already, large parts of northern Kenya, central Tanzania, north-eastern Uganda and the dry Rift Valley have undergone desertification, but little land has been irreversibly affected and it is not too late to rehabilitate it.

One area that has, strangely, received little interest from local governments or aid agencies is the use of indigenous natural resources that need no or low inputs. The most obvious natural resource

is the indigenous vegetation. Not very pleasant to look at in the dry season, this *Acacia-Commiphora* thorn bush bursts into flowers and greenery during and after the rains. Myriads of wild animals and birds make use of its abundance for food and shelter. Does it have anything to offer to humans, other than secondarily to our livestock?

From the times of antiquity and the first century A.D. *Peryplus of the Erythraean Sea*, and through the accounts of Persian, Arab and Indian traders from the 9th to 18th centuries, the aromatic resins of Zinj (East Africa) have been mentioned as valued items of commerce. The principle resins are frankincense and myrrh. Few people realise that the East African drylands are full of the trees which produce these resins, and many other resins, gums, oils and extracts of high economic potential. There are also shrubs with great potential, such as *Aloe*, *Vernonia*, *Lawsonia* and others.

The products from these trees and shrubs are a renewable resource, and commercial exploitation of them can be carried out in such a way that no environmental damage is done to the land. Since wildlife poses little or no threat to the products (except for baboons and ostriches which eat gum), the traditional conflict between farmer and wild animal is largely avoided. Although there are many trees and shrubs with potential, let's review a few of the better developed ones:

***Acacia senegal*:** This well known 'wait-a-bit' thorn tree produces gum arabic, a natural substance sought after for use as an emulsifier or stabiliser in a wide variety of food and beverage products, printer's ink, paper, textiles, pharmaceuticals, etc. The Sudan currently provides 80-90 per cent of



The aromatic resin of *Commiphora* trees is used in perfumes, food flavourings and incense.

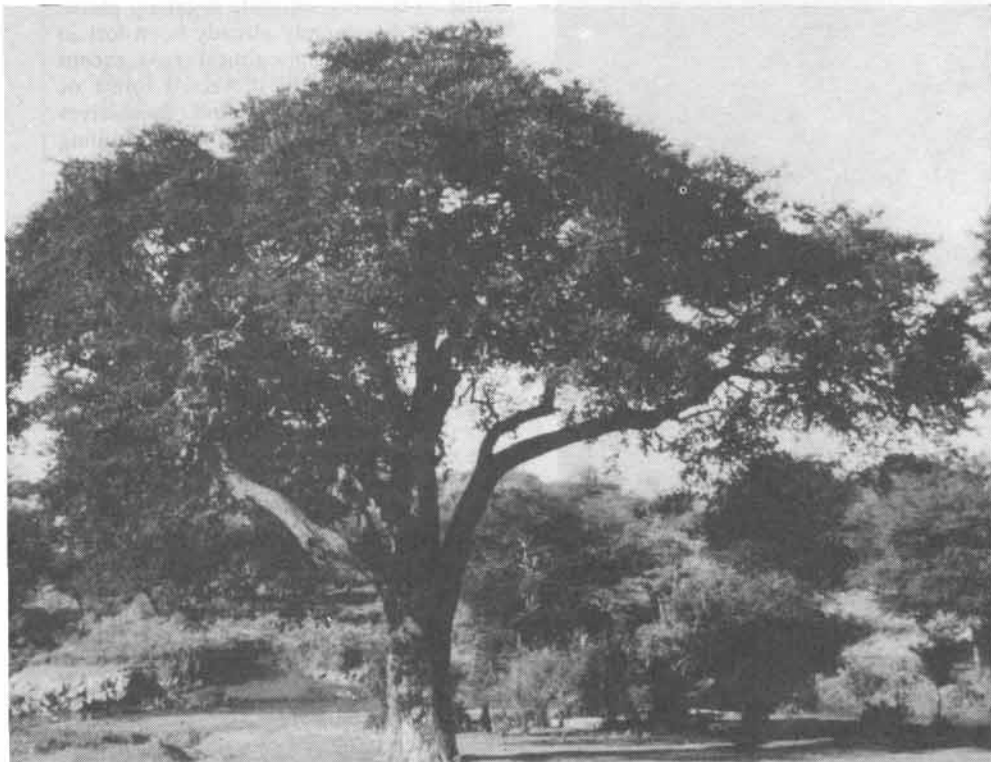
the world's supply, but there is great scope for increases in production to meet market demand. Over the last several years, due to falling production and rising prices, many users have switched to other gums or starch synthetics, but gum arabic is ideally the most desired because of its particular properties. This tree can grow in very dry areas (less than 300 mm average annual rainfall) in very poor soils. Gum collecting and marketing is being done on a small scale in parts of Kenya and Tanzania (and Somalia), but it is inefficient and quality control is poor.

***Sterculia sp.*** In India one species of this tree produces a gum called *karaya*, which is of considerable commercial and industrial importance. It is used as a thickening agent for printing pastes in the textile industry and in pharmaceutical and medicinal products such as lozenges, emulsions, lotions, sprays and pastes. It is also used in laxatives, and one collector in Kenya is selling it to a French company for this purpose. Other important uses for the gum are in the paper and leather industries, and it is employed in the food, baking and dairy industries because of its binding and water-holding capacities. Many *Sterculia* species have edible seeds, rich in fatty oil. If one or more of the East African species yields gum similar to *karaya*, it would have good market potential.

***Boswellia sp.*** This small, spindly tree produces frankincense, also known as *olibanum*. This resin is used in the production of incense, lotions, perfumes and food flavours. Top quality frankincense 'tears' command a very high price on the international market.

***Commiphora myrrha*:** The taxonomic situation of the *commiphoras* is confused and other names have also been given to the myrrh tree. In fact, more than one species might produce the myrrh resin. Myrrh is used in incense, pharmacology, perfumes, in the formulation of bitters and flavoured wines, and in flavouring beverages, candy and soups. An unknown quantity of myrrh is collected and exported from Kenya's north-eastern region to China and Japan, some of it through Somalia.

***Commiphora erythraea/holtziana*:** This tree produces the *opopanax* resin, which is similar to myrrh and used in perfumery and flavouring of alcoholic beverages. Another *Commiphora* species produces *opopanax*



The pods of *Tamarindus* yield tamarind, used as a flavouring in curries and in the making of juice and other food products.



similar in use to opopanax. These are also exported from north-eastern Kenya to the Far East.

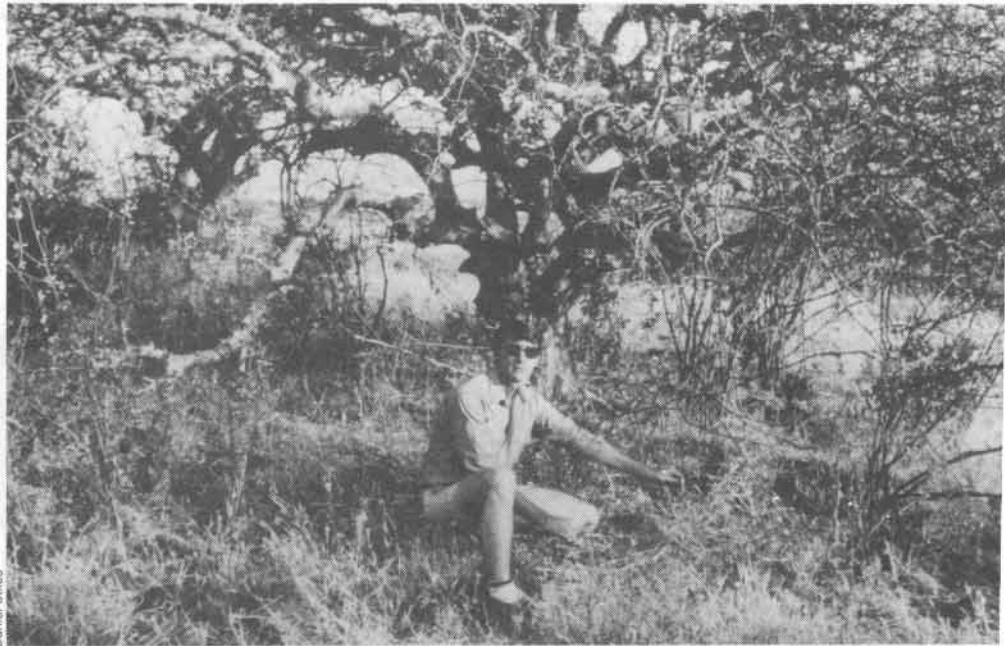
All of the *Boswellia* and *Commiphora* resins are often processed into resinoids and essential oils prior to their use, thus offering a secondary agro-industry in East Africa if they were to be developed. Studies are currently underway in the U.K. on the medicinal properties of the resins, which so far look very promising.

***Tamarindus indica*:** This attractive tree, which grows wild but can also be used as an ornamental plant in gardens, produces a large seed-pod and seeds which are edible. The fruit pulp can be used in curries or made into a drink or sherbet, and the seeds are eaten roasted, boiled or as flour. They are also used in the sizing of cloth, paper and jute products and as a vegetable gum in food processing.

***Lawsonia inermis*:** The leaves and young branches of this shrub, which grows along river and stream courses, produces a reddish-orange dye called henna used in the Muslim world for decorating women's hands and feet and dyeing men's beards. In the West it has become very popular for use in hair shampoos, conditioners and rinses. Extracts are used as wood stain and fabric dye and the essential oil of the flower is used in perfumes.

***Aloe sp*:** Aloes from Barbados and South Africa produce juices from the succulent leaves which go into skin creams, ointments and cosmetics. The latex is used in laxatives and veterinary medicines. East African aloes have potential in these areas, but past experience has been unfortunate. Large numbers of aloes were destroyed in northern Kenya in the early 1980s when word went around that the leaves and juice were worth money. This prompted President Moi to ban their destruction. Since aloe juice quickly loses its potency, due to oxidation, unless protected with additives, the several tons collected and dehydrated never found a market. Following testing, aloe species with economic properties could be grown and the juice properly treated for export sale.

***Vernonia galamensis*:** This annual shrub, which has several subspecies, is widespread in East Africa throughout many climatic zones. The tiny seeds




*The author in front of a Commiphora, producer of myrrh, opopanax and other valuable resins.*

produce an oil and an epoxy acid that have tremendous potential in the manufacture of plastics, nylons, industrial coatings, adhesives, varnishes and paints. It can act in the place of volatile solvents, which are being banned by environmental protection legislation as the gases they give off contribute to destruction of the ozone layer and to the greenhouse effect. The oil is biodegradable, which introduces the possibility of the biodegradable plastic bag. The plant likes to grow in shade, so it would be a good candidate for cultivation in an agro-forestry configuration, perhaps in plantations of some of the trees mentioned above.

Of course, the potential market for these products is a crucial factor. Markets are strange things, and they interact strongly with the quality, quantity, reliability of supply and price of any given product, which determine ultimate demand. Today's demand for a product is not necessarily an indication of tomorrow's, if the supply factors named above change. The supply of most gums and resins today is haphazard and relatively expensive, which limits demand. A well

organised and managed supply, however, could dramatically change the situation. People – and industry – prefer high quality natural products to chemical and artificial substitutes if all else is equal.

All of the plants named above are indigenous to East Africa and are a largely unexploited natural resource. There are others not mentioned here. In some areas, the trees are numerous enough to allow commercially viable tapping and collecting of the resins and gums in natural wild stands. In other areas, particularly on degraded land, it would be more practical to establish nurseries and plantations to rehabilitate the land. With proper planning and management, conservation of wildlife could be integrated into the development of these plants and their products. Who said money doesn't grow on trees? 

Daniel Stiles received his PhD in anthropology from the University of California, Berkeley. He first came to Kenya in 1971 to dig for early man at Koobi Fora and settled in Nairobi to teach at the university in 1977. From 1983 to 1988 he worked for UNEP and now he is an independent consultant and writer.

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