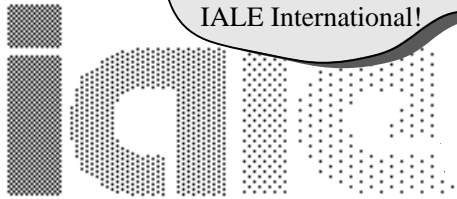


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Vol. 19 no. 3, August 2001



# Bulletin

## International Association for Landscape Ecology

### INDIGENOUS ECOLOGICAL KNOWLEDGE OF LANDSCAPE CHANGE IN EAST AFRICA

by Gufu Oba

Pastoralist herders in East Africa or for that matter in other parts of the world have two main things that concern them: livestock and landscapes. In both cases individual animals or landscapes have identities. To the herders, landscapes are resources that are distinguished from all others. In a study of pastoral peoples' indigenous ecological knowledge (IEK), I deduced the pastoralists' common perceptions about landscape change, and their abilities to classify and categorize landscapes in terms of grazing resource quality. The Wanyamwezi of central Tanzania for example classified the *miombo* landscapes into five categories based on the dominant plant species, soil physical characteristics and land use (Migomia & Oba unpubl. data), while the Booran in southern Ethiopia classified landscape units into six categories (Oba *et al.*, 2000). Among the 54 landscape patches that we surveyed, 36% were named after landscape features, 20% after plant species, and 10.7% after structures built by the people, 10.7% named after historical events, and 0.4% after wildlife species.

The identities of the landscapes under investigation have significance in terms of land use and location of grazing resources in time and space. Cultural influences on landscapes include water points, burial sites, land for rituals, and pastoralists' settlements. The latter influence landscapes in two major ways. First, the burial site of a famous individual may serve as the identity of a particular landscape. Second, the organic matter and soil seed banks imported by livestock help to form patchy woodlands when the sites are abandoned (Reid & Ellis, 1995).

Among the Turkana, knowledge of landscape variability is profound. The Turkana inhabit a semi-desert country

with poorer range resources than those of the Booran and the Masai, but their knowledge of landscape change seemed superior to those of their counter parts. In their harsh environment human survival is dependent on detailed knowledge of landscape change. The Turkana pastoralists identify 16 landscapes patch types within an area of 5000 km<sup>2</sup>. They have concepts that describe different levels of grazing impact on landscapes. They distinguish between severe levels of grazing (called *niirikaro to ngibaren*-which means that the herbaceous vegetation is eaten so much that none is left, always in reference to livestock), heavy grazing (*toyocha*), moderate grazing (*niekudioko nginye*-which means the vegetation cover is still present) and absence of grazing (*ninye dakitae*).



Rendille family migrating. The camel carries the family household.

Despite the varied linguistic differences, all pastoralists in East Africa describe landscape change in a similar way. Among the Masai of Tanzania, IEK of landscape level

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classification uses vegetation types, soils, and topography. They differentiate mist forest (called *Endim*) from high plateaus (called *Osupuko*) with cool climate and dominated by black clay soils, which is in turn distinguished from the hot plains (*Orpukele*) dominated by sandy soil and scarce vegetation cover. The Masai also distinguish landscape patches at micro-landscape patch levels. In their micro-level landscape patch classification, the Masai categorize grazing resources according to the degree of slope. For example, the upland landscapes (*Osupuko*) alternate with dry valleys (or bottom lands). They distinguish ridges of the uplands (called *Orkung'u*) from valley slopes (called *Andamata*) and the valley bottoms (*Ayarata*). The Turkana make similar distinction of landscape patches that they associate with isolated hills (*ngelelojo*), mountain pastures (*ngemor*), valleys (*abur*), plateaus (*ngimoria*), the plains (*kalapatan*), and riparian woodlands (*ngolorin*).

Among the East African pastoralists, vegetation and soil types are used to characterize land use suitability. Suitability of individual landscapes vary with season and the types of livestock. The pastoralists of East Africa assess rangelands in terms of potential grazing capacity (i.e. potential stocking potential). According to those surveyed, individual landscapes have inherent properties that determine optimal numbers of livestock that may be grazed. The pastoralists express stocking rates on nominal scales of low, moderate and high. The scales provide a basis for rating landscapes in terms of grazing values. The Masai use IEK of soils and plant species to allocate land between grazing and farming. They use soil colour to evaluate both fertility and crop suitability, while plant species are used as indicators. For example, the species *Lipia javanica* (*Osinoni*) and *Abutilon longiscupes* (*ardadai*) are shrubs that indicate decline in grazing quality but are used as indicators of suitable land for cropping (Mapundizi & Oba,

unpubl. data). Using soil for crop suitability assessment, the black soil (*engulukon narok*) and red soils (*engulukon nado*) are said to be suitable indicators for maize and beans respectively, while the grey and water logged soils (*Enturoto*) are infertile. By comparison, the stony volcanic soils (*Euwoyi-natisoito*) are suitable for growing maize and beans. The Booran and Turkana also use soils to categorize landscape patches, while all the pastoralists have an understanding of soil-salt licks.

The IEK about landscape suitability is developed from historical knowledge of landscape change. Consequently, landscape use is not haphazard but planned in accordance with an assessment of potential and suitability. Using factors such as grazing suitability, the pastoralists of East Africa allocate grazing to different landscapes during different seasons of the grazing cycle. The IEK of landscape suitability can be applied regardless of whether or not the pastoralists have traditionally occupied the landscapes, so long as familiar vegetation and soils are present. On the basis of soils and vegetation they would determine whether or not the particular landscape is more suitable for camel grazing than cattle grazing and vice versa. Linked to the IEK is the perception of change. Seasonal changes in land cover are acceptable events that could be reversed with the return of the rains. However, improper land use may alter the composition of vegetation.

We analysed how IEK and landscape change related to the increase in bush cover in southern Ethiopia. The pastoralists were asked to make assessments of range conditions and trends in relation to both grazing pressure, and the changes in herbaceous and woody vegetation cover. For the same landscape patches, we carried out the analysis using range survey techniques. The data was used to correlate the ratings made by the pastoralists and those by ecologists, and we found high correlation in the predictions. This and other data suggested that traditional range scouts made reliable predictions of landscape level changes. However, we noted differences in the way

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changes were interpreted. For example, the pastoralists on the basis of their historical knowledge rated trends in some landscapes as stable. Ecologists might interpret stability as a desirable state, after disturbance to the landscape is removed. Yet, in the view of the pastoralists, stability is relative to time and it may depict undesirable change in the landscape, if such changes for example resulted in increase in bush cover or increase in unpalatable plant species. Other differences might be related to concepts of landscape resilience, which the pastoralists in East Africa understand as potential grazing capacity. The concept of potential grazing capacity reflects how much a particular landscape can be stocked without being degraded or being able to recover after grazing pressure is removed (Oba & Kotile to be submitted). Potential grazing capacity is a landscape specific property, regardless of the current grazing pressure. The concept describes landscape resilience, a property that is not altered by the current land use. By contrast, landscape-grazing suitability may be altered by changes in plant species composition. The Booran of southern Ethiopia perceive that landscapes with perennial grass cover have a higher potential grazing capacity than those with annuals (Oba & Kotile to be submitted). Traditionally, landscapes that are perceived as having low resilience are grazed only briefly during the wet season, while those with higher resilience are grazed for long duration. Ecologists might believe that all of these landscapes have comparable qualities and that differences between them are attributable to management. I conclude by suggesting that IEK for assessing landscape change is useful for understanding effects of land use on changes in floral biodiversity. East African pastoralists have rich knowledge of biodiversity and are capable of



Booran pastoralists of southern Ethiopia meeting to make decisions. Picture by Gufu Oba June 1998.

identifying invasive plant species and those that are declining or those that have become extinct. I believe that misconceptions about rangeland degradation would be clarified by use of IEK research. What ecologists describe as land degradation is usually considered as temporal changes in landscape by pastoralists. Integrating IEK into landscape-applied research may, therefore, improve our understanding of landscape dynamics and help conserve grazing lands.

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## BOOK REVIEWS FOR *LANDSCAPE ECOLOGY* NOW BEING ENCOURAGED

Landscape Ecology's Editor-in-Chief Mladenoff has initiated a book review section for the journal. He asked Louis Iverson to be book review editor. Louis is looking for people willing to serve as book reviewers. In most cases, you do get to keep the book! Though not all details are in concrete, the system will work like this:

1. Interested reviewers should send CV and topics of interest to Louis, who will maintain the list for potential reviews.
2. To preserve independence of reviews, individuals may not request particular volumes to review.
3. As books come in to Louis, he will solicit reviews by supplying the cover and table of contents to the poten-

- tial reviewer. He will also ask if there might be a conflict of interest; if so, the solicitation will be withdrawn.
4. If the reviewer agrees to the review, the book will be sent.
5. The reviewer will be given approximately two months to complete the review.
6. The review should be crafted from the perspective of a landscape ecologist; i.e., books from other fields can be reviewed if they provide insights valuable to the field of landscape ecology.
7. The length of the review should be no longer than about one page of journal space.

8. If you have suggestions of 'must review' books, please send them (along with publisher information), also to Louis, who will evaluate the request. Know however, that you will not be the one asked to review the book (see #2 above). Whether the book will be reviewed also depends on several factors (e.g., will the publisher send the book, etc).

Please help make this a valuable service to our field! Please send your ideas and your CVs and topical interests to: Louis R. Iverson, USDA Forest Service, 359 Main Road, Delaware, OH 43015-8640 USA; Phone: +1 740-368-0097; Fax: +1 740-368-0152; E-mail: [liverson@fs.fed.us](mailto:liverson@fs.fed.us)



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## MEETINGS

August 25 - 31, 2002

**The 3<sup>d</sup> European Congress on Restoration Ecology**, Budapest, Hungary.

The topics of this conference are related to the mission of IALE. Thus contributions from IALE members are welcome. More information: Dr. R.v.Diggelen, Lab. of Plant Ecology, University of Groningen, P.O. Box 14, NL-9750 AA Haren, The Netherlands; <http://www.botanika.hu/restoration>

September 5-8, 2001

**The 10<sup>th</sup> Annual Meeting of the UK regional chapter of the International Association for Landscape Ecology (IALE-UK): Hedgerows of the World: their ecological functions in different landscapes.** University of Birmingham, UK.

This 10th annual meeting of IALE-UK aims to bring together researchers from around the world to take a fresh look at the ecological role of hedgerows. Hedgerows defined in a broad sense, i.e. lines of shrubs and/or trees which demarcate the boundaries of fields, have a much wider distribution than previously thought. The objective of the meeting is to examine and compare the structure and function of hedgerows in landscapes around the world. We will also consider whether there are aspects of their ecology that might offer new insights into some landscape ecological issues. This conference and the resulting book will be the first to review the distribution and ecological value of the Hedgerows of the World.

More information: Dr. Sandrine Petit, [spet@ceh.ac.uk](mailto:spet@ceh.ac.uk)

## MEETING REPORT

**1. Iberian Conference on Landscape Ecology, Bragança, Portugal, 17-21 April 2000:** The first Iberian Conference on Landscape Ecology, under the theme "Analysis and interpretation of cultural landscapes" was organized by the Escola Superior Agrária de Bragança, Dept. Ecologia of the University of Alcala, the Associação Portuguesa de Ecologia da Paisagem and the Association Española de Ecología Terrestre. There were 52 participants from Portugal, and 48 from Spain. The main aim of this conference was mainly to get together researchers and specialists from the two Iberian countries, working within landscape ecology applied at the specific Iberian cultural landscapes. In both countries, there is a growing community of specialists working within landscape ecology, but the group is still relatively small. Thus, and considering the proximity of landscapes and bio-physical conditions between the two countries, the interest of improving contacts and co-operations is clear. Another important aim was to progress in the discussion about the understanding and management of the specific cultural landscapes of the Iberian Peninsula. In order to create applied discussion, the Conference was organized in 1) one day of conferences, both by invited speakers, a round-table, submitted papers and posters, 2) two days of field trips including scientific presentations, both days including Portuguese and Spanish landscapes, one in the Natural Pares of Montesinho, on the Portuguese side, and of Sanabria, on the Spanish side, and another along the River Douro, also on both sides of the border, and 3) a closing day with one invited lecture, papers and the discussion of conclusions. The discussions were always enthusiastic and interesting, and the coming together of specialists from both countries proved to be extremely fruitful. It has been decided now that an Iberian Conference will be held each year. The next will be held in Alcala de Henares, close to Madrid.  
written by: Teresa Pinto Correia ([mtpc@uevora.pt](mailto:mtpc@uevora.pt))