MaGnuM
The Maasai, the Gnu and the Metropolis

UNDERSTANDING THE SOCIO-ECOLOGICAL COMPLEXITY OF WILDLIFE MIGRATION LANDSCAPES SOUTH OF NAIROBI NATIONAL PARK, KENYA – AN INTERDISCIPLINARY, COLLABORATIVE, AND OPERATIONAL APPROACH

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DESCRIPTION

Habitat loss and fragmentation are major threats to biodiversity and, incidentally, for the stability and existence of human society. The domination of nature by modern western societies is expressed by the transformation and simplification of the landscape matrix, which can cause disruptions in processes and degradation of ecosystem services. In this context, protected areas have been designed as a cornerstone of the conservation of wildlife and flora but failed at the same time to consider the many cases of coexistence and co-evolution of humans and wildlife. In addition, these protective islands overshadow the ecological importance of infill matrices, which are yet subservient, for example, to animal migrations, which provide major ecological functions. The conclusion therefore is that of a need to design new management approaches based on novel ways to perceive and to coexist with nature. The challenge is to better understand the causes and consequences of the transformations of the landscape, in particular seeking to reveal how ecological and social processes overlap and impact each other's. This challenge is significant because of (i) the complex nature of the systems studied, (ii) uncertainties within it, and (iii) the complex set of scales and interdependencies. The challenge is to learn to manage the processes while considering the aforementioned elements rather than imposing standardized requirements (e.g. maximum sustainable yield). Magnum is a science involved project that aims to address some of these issues from a case study that puts at its heart the fieldwork, interdisciplinarity, collaboration, and modeling. The study area includes (i) the Nairobi National Park, separated from (ii) Nairobi by an electric fence north but open to the south and communicating with (iii) a broad savannah south. Large mammals are heading in the dry season to the NNP, they leave for the semi-arid plains of the south during the rainy season. The land use change has accelerated since the late 1990s, particularly following divisions and sales of Maasai land and urban growth in Nairobi. Accordingly, the savannah artificializes and fragments, resulting in population decline of most wildlife species and accelerated socio-cultural transitions. The aim is to better understand how to produce the transformations of the landscape to better understand the issues and to encourage new management approaches with positive sum for its human and non-humans occupants. The assumption is that this requires (i) the mobilization of several disciplinary know-how and (ii) the co-participation of scientists and experts and laymen whose vernacular knowledge are likely to combine to promote reciprocal learning conducive to introduction of new management frameworks.
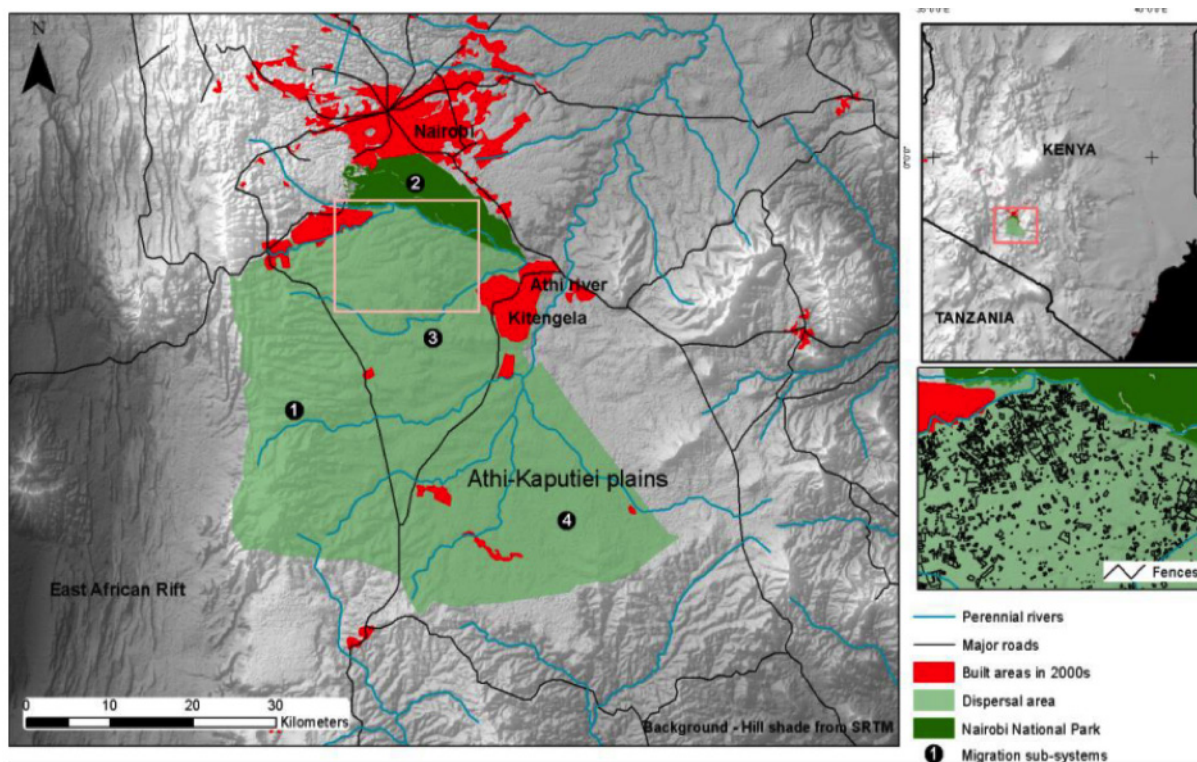

Fig. 1: Study area. Inset on right shows current fence and barrier network as mapped by Berthelin (2014).

APPROACH

The general objectives of the project are (i) to critically engage with the SES as a framework for recognizing and engaging with complexity in natural-social systems to better understand the causes and consequences of landscape transformations; and (ii) to improve methods relating to knowledge co-production in a critical fashion that is also linked to policy outcomes and feeds back into research. Landscape changes are the entry point because they are an expression of SES complexity. Also because landscape can be a focal point for management, changes in landscape composition and organization (e.g., increasing fragmentation) are the starting point. It is also because these changes are perceived differently by people (social and natural scientists, non-scientists), who can therefore more easily aggregate in the project.

The specialisms involved in the project include geography, ecology, demography, agrarian political economy, and ecological modelling. Together, they should allow for the development of a systemic, holistic, participative and prospective approach, where dynamic models will serve as learning and knowledge-sharing tools between scientists and non-scientists. In a project where spatial dimensions are critical to almost all aspects of the study, spatial models such as agent-based models (ABMs) are an appropriate way of simulating and communicating with non-specialists about spatially explicit processes and landscape, and are thus key instruments in the success of interdisciplinary and participatory activities. A wide array of methods will be deployed, from remote sensing- and GIS-based spatial analysis to field observation, ethnographic work and participatory mapping, surveys, questionnaires and focus groups.

ORGANIZATION

The project is structured around three Work Packages (WP). WP1 is devoted to the characterization of the social-ecological system under several perspectives – land, demographic issues in land use, governance of and modes of exploitation of natural resources, environmental issues concerning the mobility of wildlife and dynamics savannah. Methods of physical geography, humanities and ecology will be mobilized. WP2 aims to build digital spatial models to validate the conceptual models of WP1 and simulate co-built in the WP3 scenarios. WP2 seek to model the animal mobility, the land use change and management scenarios. WP3 aims to register a strong collaborative dimension in co-production of knowledge and simulation of multi-agent scenarios.
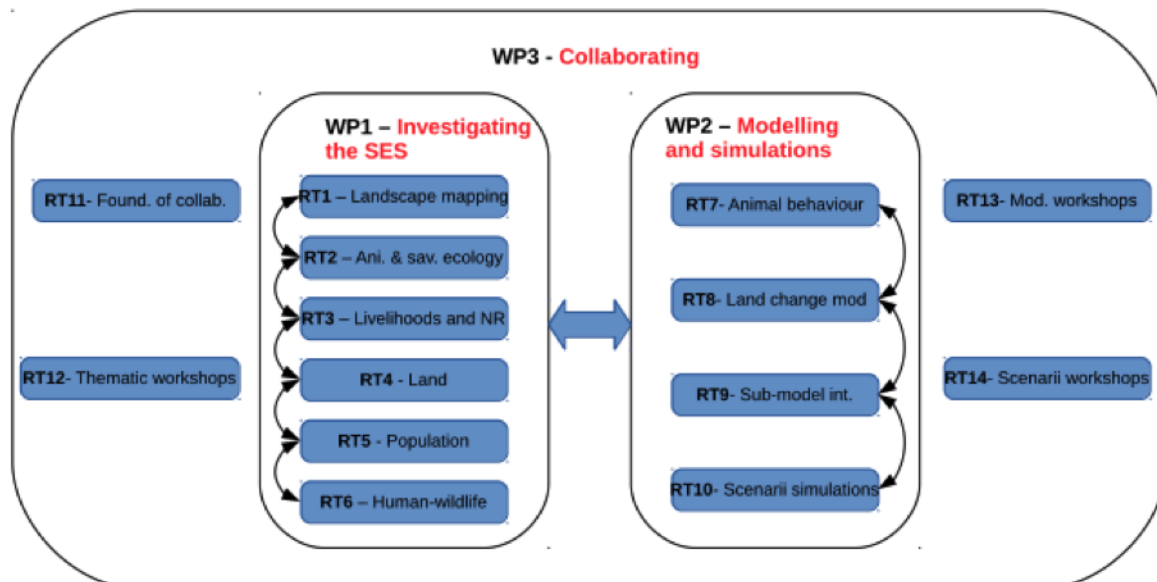

Fig. 2: Proposed work packages (WP) and research tasks (RT).

SCOPE

The main goal is to contribute knowledge about the origins of environmental change and their consequences on society at landscape and planetary scales. Accordingly, the purpose of this project is to improve our understanding of the complexity behind landscape changes occurring in an area, which is experiencing problems that are symptomatic of other settings in Africa and elsewhere. The project deals primarily with landscape fragmentation, which triggers a process-response cascade affecting human well being and the viability of wildlife populations in complex, interactive ways. This thread is commonly interpreted as being a consequence of the steadily growing encroachments of modern capitalist activities over natural environments. Dealing with such issues holds great scientific potential for social and natural scientists alike. Opportunities provided by the project will appeal to researchers invested in the study of socio-ecological systems (e.g., environmental geography, integrated ecology, ecological anthropology). Its modular methodology can serve other interdisciplinary project. Project outcomes should inspire environmental policymakers. The transfer of scientific knowledge to society is not straightforward and explains why this project stands on the two pillars of scientific and non-scientific (vernacular) knowledge. The second goal is to develop innovations capable of reducing human impacts on nature, of restoring natural environments, and of promoting human adaptation to new constraints and opportunities. This project is devoted to building knowledge that can serve local management issues. It is crafted around state-of-the-art innovations in the way interdisciplinary knowledge is co-constructed, integrated, and made transferable to stakeholders who value the promise of adaptive landscape management.

The diversity of specialisms involved in MaGnuM is suited to embracing the complexity of the East-African savannah SES. Prior research experience relevant to the study area was also perceived as key to dealing with the complexity of the issues investigated. WP3 is also a strong commitment to include and to formalize the participation of local experts, NGOs, stakeholders and officials.

WP1 and part of WP2 are dedicated to ecosystem patterns and processes. By systematically searching to assess past and present patterns with spatial heterogeneity and a wide range of socio-ecological processes, the project focuses on the dynamics that are transforming the landscape and the society. This is based on the assumption that better locating the present on the evolution lines is necessary in a context of growing uncertainty. Finding viable solutions to environmental issues cannot rely exclusively on the indefinite progress of reductionist science. Integrating different academic disciplines with the knowledge and perceptions of non scientists, as proposed by this project, offers a more holistic dimension and, through practices and exchanges, allows questions, hypotheses and methodologies. Thus seen, the project appears to be a convoluted form of activism for new epistemologies.