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Digital wiki map of pastoral geographies in eastern Senegal

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Abstract

The persistence of transhumance systems requires continued access to key pastoral resources that together allow the seasonal movement of livestock herds over long distances. In dryland West Africa, these pastoral resources are vulnerable to competing land uses - particularly agriculture. The mapping of pastoral resources is needed as a necessary but insufficient first step in local to national efforts to manage competing forms of land use in ways that do not threaten transhumance as a form of land use. In the hopes of spurring analogous efforts elsewhere, a new digital map of the transhumance system in eastern Senegal is described. Not only does it provide detailed information about key transhumance resources (water points, encampments, corridors, pastures), but allows these to be updated, queried and questioned through an on-line interface.

Keywords: West Africa, Transhumance, Livestock corridors, Digital cartography, Participatory mapping

Pastoral geographies remain insufficiently understood by many development agencies, government ministries, and local authorities in dryland Africa. These geographies are composed of encampments and water points linked by livestock paths which facilitate the seasonal movements of livestock over hundreds of kilometers. Ignorance of these features has contributed to inadequate planning and development efforts and, in some cases, unnecessary exclusions of pastoralists from much needed resources (pasture, water). A fuller appreciation and understanding of pastoral geographies is needed at multiple levels of governance from village chieftaincies to national governments. We describe a pilot project in West Africa that allows such information collected through participatory mapping activities to be uploaded, verified, and accessed for planning efforts in a web environment. The hope is that this effort will serve as a model for similar efforts.

Pastoral resources, including pastures, water points and livestock paths, are under threat due to agricultural encroachment in many agro-pastoral areas of West Africa. In most cases, land use competition is driven less by an absolute shortage of land but by poor coordination and cooperation among different social groups and institutions. These institutional failures are shaped by a number of factors, but a lack of information about the qualities and locations of these resources plays an important role. Previous mapping of pastoral resources has not generally provided necessary information for land use planning and resource management efforts. With some exceptions, governments have not sought to clearly define the locations of key pastoral resources for their protection. Maps have tended to be overly general, portraying broad axes of herd movements. Pastoralists have also been reluctant to divulge the locations of key pastoral resources to state actors.

In the past decade, livestock mobility has increasingly been recognized as an important feature of climate change resilience. Still, continued agricultural expansion has led to the enclosure of key resources (pastures and water points) and more barriers to movement along livestock paths. Land use competition has contributed to farmer-herder conflict in many locations. Governments have passed legislation supporting pastoralist rights, and pastoralists have increasingly looked to the government to protect the key resources necessary for their livelihoods. In the context of widespread decentralization, local communities and districts are involved in land-use planning, resource use agreements, and conflict management. They have been assisted by a myriad of non-governmental organizations. The products of these efforts have often produced community-derived maps of

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livestock paths, pastoralist campsites, and water points in the immediate vicinity of villages or within local districts. Local customary leaders and government authorities are left with little understanding of how these local resources are tied, via herd movements, to broader resource networks. Moreover, the products of these efforts are often buried (and die) as grey literature reports. In short, there is little growth of knowledge of pastoral resources that can be used to guide policy and broader planning efforts.

A collaboration among three partners - the University of Wisconsin and Syracuse University in the USA and the Institut Sénégalaise de Recherches Agricoles (ISRA) in Senegal, resulted in the development of a digital map prototype to facilitate the collection of geospatial information about pastoral geographies (Figure 1). The project began with fieldwork in eastern Senegal focused on the collection of information about three types of geo-referenced features: pastoral encampment points, water points, and livestock corridors. Information collected about these features include not only their physical properties[1] but also their level of formal and informal recognition by local communities and government as well as the degree in which access is inhibited by cropped fields. A two-stage approach was followed to collect this information. First, the location and characteristics of pastoral features were collected with a locally knowledgeable herder guide. Second, this information was verified in commune-level meetings with farmers and herders. A fuller description of the methods used is described in a previous article in this journal (Kitchell et al. 2014).

The project mapped and characterized 5,000 km of corridors, 744 encampments, and 1,010 water points in eastern Senegal. These data were used to populate a digital map that we hope will continue to expand as users add new content in the coming years (http://couloirs-transhumance.org/). The map allows non-registered users to explore the map and data content. Features are denoted as icons on a satellite image backdrop. Users can choose an interface in English or French. Clicking on a feature provides information about the feature and a ground-level photo if available. Users can measure distances and areas as well as perform more complex queries. For example, one can identify encampment points, with known managers and experiencing limited agricultural pressure, that have at least one well within 5 km supplying good quality water throughout a typical dry season. In this way, the website represents an important resource, not only for those working in eastern Senegal, but as a teaching tool about (agro)pastoral geographies. As a teaching tool, the site may prove useful not only to university students but as a training tool for policymakers and livestock specialists interested in pastoral production.

Users can register on the site by providing contact information and a brief description of their interests. Representatives of organizations can provide links to their organization's website. Registered users have access

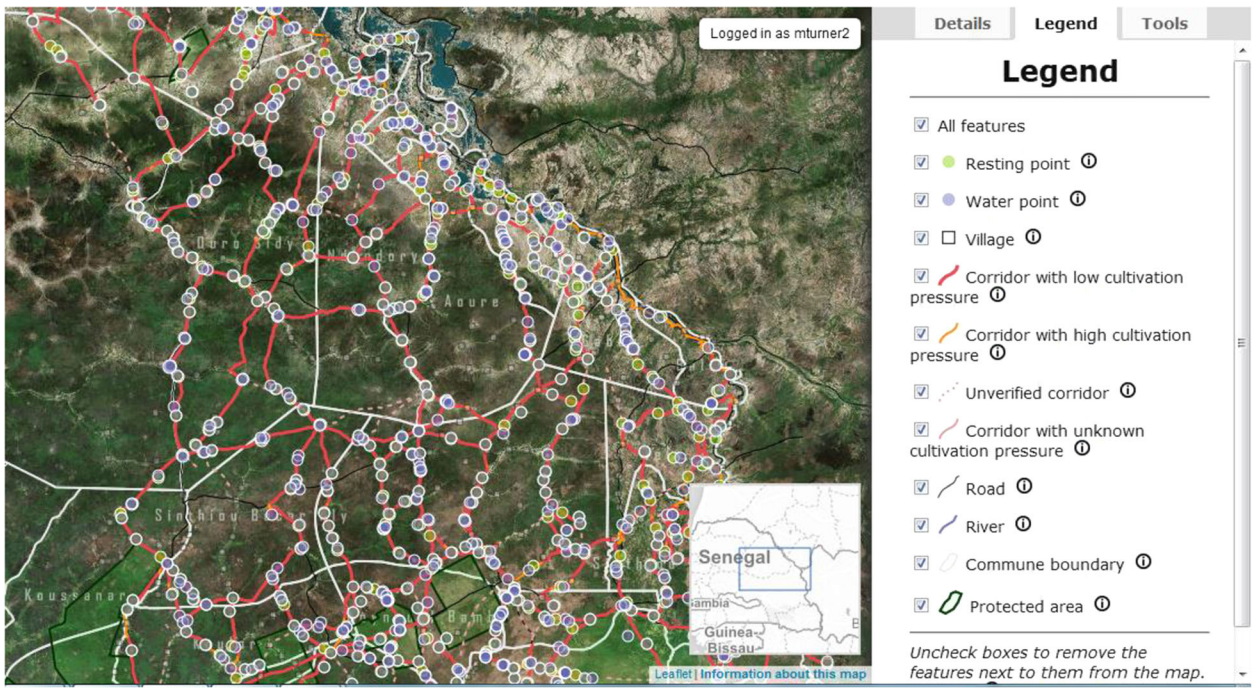

Fig. 1 Screen shot of broad-scale view of the digital map of transhumance networks in eastern Senegal

to additional functionalities, including the ability to download data, produce map pdfs to print, provide comments on specific map features, and upload map features. This allows NGOs working with rural communities to produce customized flat maps at various scales based on the features of interest to them. In addition, downloaded data are provided in standard GIS format (shape files) that governments and researchers can use for more detailed analysis.

Since the map is only accessible to those who have access to the Internet and who can read French or English, NGOs and local governments who are working with agro-pastoral communities, are the primary intended users. The wiki feature of the map allows registered users to make comments about particular features of the map (e.g. on the placement and information about particular encampments or water points) to improve data quality. In addition, new features can be added to the map by entering latitude/longitude coordinates or simply placing the feature on the map. A minimum amount of information is required to characterize any new feature (name, type of water points for water points, etc.). Livestock paths can be uploaded in a GPX file. The contributor of each added feature (including link to organization's webpage) is attached to each feature.

Digital maps, such as this one, hold strong potential as a tool to support pastoralism. By documenting key pastoral resources and their relationship to each other, these maps can act as important tools for efforts to protect livestock mobility and to better accommodate the needs of pastoralism and crop agriculture. These maps can serve as repositories of geospatial information about pastoral geographies that can greatly assist planning and policy efforts at local to national scales. They are dynamic. Their digital format allows them to be malleable as conditions change while maintaining a record as changes occur.

The hosting and management of this map will be transferred from the University of Wisconsin, Madison, to Pôle Pastoralisme et Zones Sèches (PPZS) based in Dakar, Senegal, in cooperation with ISRA (https://www.ppzs.org/). PPZS, as the regional centre focused on research and the dissemination of information on the material and institutional needs of pastoralism in West Africa, is the appropriate institutional home for the map. Through its efforts and collaborations across the region, we hope that the coverage of the map will continue to grow and serve as a useful example for similar wiki maps to be created elsewhere.

Endnotes

[1]Physical features for water points include the type of water point and informants' assessments of water quality and the number of months into the dry season that water is available in a typical year. Physical features of pastoral encampments include the seasonal quality of forage within a grazing radius of the site.

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All authors read and approved the final manuscript.

Competing interests
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