Biofuels and the politics of mapmaking

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Abstract: On a world scale companies and governments are acquiring tracts of land from rural communities across the developing world in what some describe as a global "land grab." Yet looking into local settings reveals that negotiations and arrangements are often piecemeal and halting, with little resemblance to a coordinated seizure of land. Conflicting maps, overlapping territorial claims, and unclear acquisition processes are creating land disputes, mistrust, and ambiguity. Resulting cycles of contention are enabling companies to obtain—even appropriate—some land. Still, in at least some locales the process is doing more to undermine development opportunities for all parties.

To probe into these local politics of mapmaking, this article draws on fieldwork from 2010-11 in Tanzania's Rufiji District, located in the lower floodplain of the Rufiji River. Companies, one might surmise, should be able to exploit information asymmetries to wrest control of land from local villagers. Interviews, primary documents, and field observations reveal, however, that this is not occurring as much as one might expect along the lower Rufiji River. The politics of such land acquisitions, we argue, would seem to be better understood in terms of cycles of contentious politics, as an ongoing process in which movements and counter-movements vie for control through the strategic use of images, maps, and discourse.

This research extends the understanding of the processes changing global agriculture and energy production by bridging the frames of the "politics of mapping" and "cycles of contention" to more fully reveal how and why control over land and resources is shifting in the global South.

Biofuels and the Politics of Mapmaking

Highlights

< We analyze how the local politics of mapping is influencing biofuel negotiations. > Conflicting maps and land claims and information gaps create mistrust and ambiguity. > In resulting cycles of contention, firms are able to acquire some land. > But, as fieldwork in Tanzania reveals, the outcome is not a coordinated “land grab.” > Instead, the process thwarts development opportunities for companies and communities.

Biofuels and the Politics of Mapmaking

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Introduction

Is the current investment in agricultural and forest lands in the developing world a “global land grab”? From a global perspective, foreign companies and governments are sweeping up large tracts of land across the global South for everything from food crops to biofuel plantations to projects for carbon sequestration. For critics, such efforts are little more than a renewal of colonialism. Yet, at the local level, land deals are often ad hoc and tentative, and do not resemble a coordinated, controlled seizure of land. In many cases protracted land negotiations and lengthy court cases have stalled investment. Companies have rarely coordinated efforts, with negotiations generally isolated and often secretive. Many projects remain in pilot phases, and at least for some, companies have been unable to plant any crops at all.

Resistance to these projects equally lacks a united voice. The views of government officials, local elites, and villagers are mixed on the value of attracting external investors to rural areas, and views on biofuels are divided across multiple identity and interest lines. Some are keen to attract investment, create jobs, and increase the income-generation from land; others, however, fear the loss of local control and worry about the marginalization of smallholders and pastoralist groups.

Some developing countries have developed large tracts of land for biofuel feedstocks—most notably for sugarcane-based bioethanol in Brazil. Most, however, are experiencing stalled projects and ongoing battles over land and development. Particularly in sub-Saharan Africa, the outcomes so far have largely been lose-lose: communities and environmentalists perceive a loss of control over land and ecosystems, and corporations and developers have yet to turn a significant profit. Moreover, this is not a case of a few deals gone wrong, but rather appears to be a systemic pattern of unresolved struggles over land acquisition and development paths. In this paper, we aim to make sense of these ongoing, cyclical, and unresolved struggles.

Drawing on the geographic and anthropological literature on mapping and counter-mapping, we

unpack the ways in which various actors are making and responding to claims, paying particular attention to how the representation of space is being used as a strategic tool. We draw on work on framing, discourse, and land control strategies to better understand how and why these rural areas seem to be trapped in patterns of negotiation in which no parties seem to benefit, illustrating our analysis from biofuel proposals in eastern Africa. Fieldwork in Tanzania's Rufiji District (rural, coastal eastern Africa) and in the capital, Dar es Salaam, during 2010 and 2011 shows a contested, halting, and checkered negotiating process for companies seeking to acquire land for biofuel crops.

The language of unused (or, more commonly, underused) land permeates discussions of biofuel investments in the Rufiji District. Competing maps and surveys, and control over access to them, are providing some opportunities for more powerful actors—especially biofuel companies in conjunction with national or local elites—to gain an upper hand in negotiations. Similar outcomes are occurring elsewhere (e.g., Cotula et al., 2009; Vermeulen & Cotula, 2010) and the overall result does indeed look, from a distance, like a global land grab. Yet, close up, our research in the Rufiji shows that the politics of mapmaking is complicating negotiations over territory and resources, making the processes of acquiring land for commercial agriculture *and* resisting such projects more difficult. Various parties are using maps and surveys to claim legal or traditional rights, bolster land claims, and mask or ignore existing uses and users. Moreover, unclear or missing maps, and understandings of space through landmark-based rather than quantified, gridded land areas, create an equally, if not more, difficult problem: all parties end up less able to control land negotiation processes.

In situations of uncertainty and unequal knowledge about land, as the political ecology literature draws out well (Bryant, 1998), more powerful actors tend to determine social and environmental outcomes. Consolidating the knowledge of mapped and “unmapped” land can provide an opportunity to mask unofficial land uses and claims as well as gain control of land labeled as “empty” and “unproductive.” Yet, as the biofuel cases in the Rufiji District illustrate, ambiguity of maps and territory

is difficult for corporations to wield strategically during negotiations. The political economy of both domestic and (especially) transnational investments requires companies to seek some level of security in negotiations and land acquisitions, which, in cases of such unclear land transfer processes, remains elusive.

The resulting politics involves shifting movements and counter-movements vying for control through the strategic use of images, discourse, and maps (Pye, 2010): a politics we see as best understood theoretically as contentious performances, and, over time, as episodes of contention that build on existing land claims and struggles (Tarrow, 2010; Tilly, 2008; Leitner et al., 2008). This approach builds on work linking political geography with contentious politics, as in Larsson's (2007) study of mapping, land rights, and reform in Thailand. In the Rufiji District, which contains a mosaic of mangroves, tidal and freshwater wetlands, and coastal forests, biofuel proposals are only the latest incarnation of repeated and contentious attempts at development (from rice, cotton and prawn farming to large-scale irrigation and dams).

This contentious politics of control over land (and other associated resources, including water and labor), we argue, is creating *some* opportunities for domestic and foreign companies to define available land in the Rufiji—and, especially where this land is deemed unproductive, to allow them to take over the areas to plant biofuel feedstock (e.g., sugarcane). Yet, we argue further, it is contributing more to creating an unpredictable negotiating context than to facilitating a corporate takeover, and is causing delays and ambiguity that foster misunderstandings and mistrust. Each episode of contention is building on a history of conflict over land, becoming increasingly antagonistic, and hindering both development opportunities and environmental protection.

Our findings in the Rufiji District reveal the difficulty of developing biofuels sustainably across the world's poorest countries. Uncertainties in mapping in Rufiji are limiting information and contributing to frequent changes in plans and agreements. Companies end up with incentives to be secretive and

manipulative. Government officials end up unaware of many of the local negotiations. And communities end up frustrated and disillusioned. This is making it harder to enforce regulations, monitor companies, and provide the consistency and certainty needed for longer-term investments for sustainable agriculture and forestry projects. Such outcomes increase tension among parties that otherwise might be able to work together to foster better food, energy, and environmental security—a finding consistent with international development research more generally (e.g., Newell 2010, 2007, on agricultural biotechnology; Clapp & Fuchs, 2009 and Clapp & Wilkinson, 2010 on food governance; Utting & Clapp, 2008 on corporate accountability).

To develop this analysis we build on political geography, political ecology, and other critical political science work, and ask: how, and under what conditions, are maps and land surveys creating or reinforcing state control? What is the role of corporations in these processes? Which maps guide land allocation, especially in rural areas? How does territorial mapping relate to the concepts of “productivity” and “efficiency”? And, finally, how are the resulting discursive and cartographic dynamics influencing negotiations over biofuel development?

We organize our answers around three themes: historical claims over territories and resources; maps and discourse; and the consequences of the contentious politics of biofuels. The first section introduces the politics of biofuels and then, building on work in contentious politics, analyzes past conflicts over development in the Rufiji District to set the stage for an analysis of recent biofuel negotiations. The second section draws on the mapping literature in political geography to reveal how competing maps (and the absence of maps) are complicating negotiations over biofuels in Rufiji. The third section draws out the implications of the politics of mapping for biofuel projects, and analyzes the consequences of contentious processes characterized by starts and stops, mistrust, ongoing environmental degradation, and few economic opportunities. No one, we will show, consistently benefits here: not states, corporations, or even local elites—and especially not local communities or

ecosystems.

The politics of biofuels: Land deals & coastal Tanzania

“Tracts of land are being given out to foreign investors,” Tanzanian lawyer Stanslaus Nyembea told a journalist in January 2012. “By 2008, around 20 foreign companies and other 5 were [involved] in joint ventures. Potential land for food production such as in Rufiji, Rukwa, Mbarali, Rufiji, Kisarawe, [and] Wami [districts] was identified and/or allocated to bio-fuels companies. Since then, 4.5ml ha of land have been requested by bio-fuel investors out of which 641,179 ha have already been allocated to investors, processes going on” (quoted in Kitabu, 2012).

Nyembea paints a striking picture of the potential scale of land acquisitions for biofuels in Tanzania. If all of these land deals were approved and enacted, biofuel investors would control 5% of Tanzania’s total land area. A deeper look, however, reveals that many foreign and local investors, especially in the coastal region, only have tenuous access and no secure rights to the land. For many, cultivation is only at trial scales or is on hold completely; and rising political and economic uncertainty over the viability of biofuels has eroded the investor confidence. Why, if this is the case, are some communities and many non-governmental organizations (NGOs) and independent observers lamenting large-scale land grabs? Part of the explanation, as we’ll show next, is rooted in the history of contentious land claims in Tanzania.

Contentious histories & disputed land control

Tanzania has revised its land laws several times over the last 15 years. Particularly notable were changes to land claims and disputes, such as the 1999 Land Act No. 4 and Village Land Act No. 5, the

2002 Land Disputes Court (Tribunals) Act No. 2, and the 2004 (Amendments) Act No. 2 (Mortgages) (NLUPC, 2010). According to these laws, land falls into one of three categories: village land (roughly 70%), reserve land (28%, comprising forests, wildlife areas, etc.), and general land (2%). Overall, “radical title” is vested in the President on behalf of citizens, and the President has power to transfer land between categories. The Commissioner for Lands is responsible for overall land administration, and Village Councils manage land at the village level (NLUPC, 2010). These laws represent a break from colonial-era land management, and involve different legal and administrative regimes in rural and urban areas (Mlole, 2002). At the village level, the laws are intended to protect customary rights to land by providing communities with mechanisms to gain legal title to traditional lands.

For a private company to lease land, the national government must transfer it from village to general land. Villages must agree through a prescribed decision-making process, laid out in the Village Land Act No. 5 of 1999. To initiate this process, companies can either go through the Tanzania Investment Corporation (TIC) or contact a village directly. The Village Land Act specifies that for tracts of land smaller than 250 hectares, villagers can agree to the transfer and the District Council can approve or reject the decision; for larger tracts, the Minister responsible for land decides after the Village Council and District Council make recommendations. It also requires parties to resolve compensation issues before any transfer of land.

On paper, then, Tanzania’s land laws protect community rights and recognize traditional forms of land tenure. Communities can claim traditional occupancy rights to land, and, through communal decision-making processes, can in theory choose whether and how private investors gain access to land. Decision-making is intended to be participatory and controlled from the local level. The state, while maintaining ownership of land under a formerly socialist system and retaining sole right to transfer land between land use categories, cannot grant land rights to investors without the consent of the community.

In practice, however, this community-based control runs into problems. Land laws are in fact intricate and disputed, with the recent changes still failing to resolve uncertainties. Furthermore, land legislation rests on a complex colonial and post-colonial history. Analyzing how social relations, historical patterns of control, and strategies of enclosure intersect with codified legal rights is necessary to understand resource access and governance. Rather than an uninterrupted history of community lands and local uses, rural Tanzania has a history of state disruption, changing laws and territorial allocations, and state-society conflict. Many villages, for instance, were created during the early period of independence, through Nyerere's "villagization" movement ("ujamaa"), in which entire communities were moved to communal lands (see Scott, 1998: 223-261). This disrupted traditional knowledge and land uses, dislocated identities and livelihoods, and created confusion over land claims and community boundaries.

On the ground, efforts have been made to document local claims and to implement the government-sanctioned decentralization of natural resource management. For instance, work has been done to develop clearer baselines of local tenure and resource use. From the late 1990s to early 2000s, as Duvail et al. (2006) and Duvail & Hamerlynck (2007: 1437-1438) report and elaborate, the Rufiji District participated in community consultations, participatory mapping, and other information-gathering and capacity-building activities. The Rufiji Environment Management Project (REMP) supported assessments linking floodplain ecosystems and resources with local livelihoods, with the aim of informing management and development plans (outlined in Mwilawa, 2003, and discussed by Hoag, 2006: 472). The REMP was discontinued (Duvail & Hamerlynck, 2007: 1438), however, and local management and control remains uneven. Effective use of land laws requires a clear understanding of the areas and limits to those areas; despite many efforts to address the gaps, such clarity is still lacking, particularly in places with overlapping claims and contested histories.

In addition to tenure laws, national policy requires all villages to have land use plans; these are

mandatory to transfer land categories. Nonetheless, across Tanzania only 700 of over 11,000 villages apparently have land use plans, with reasons ranging from a lack of leadership to financial barriers to technical constraints. Disputes among communities over customary rights of occupancy and traditional access to land add another layer of complexity to mapping and planning processes. Few villages have had a land use plan before corporate investors express interest. This raises questions about who participates in the planning processes, how participation is solicited, and whether the interest of a company prejudices any future land use options.

In many instances land tenure and planning laws do seem to fail to protect community land rights and decision-making. Many villagers seem unaware of the extent of their lands and lack information about acquisition processes. Sudden shifts in negotiating positions and the rescinding of biofuel agreements, as the next section will show, are indicative of these knowledge and power gaps. This history of contention frames and constrains how villagers interact with governments and corporations. It further influences the conduct of contentious politics—how villagers gain voice and power in negotiations, and how resistance is carried out.

Contentious politics is episodic, rather than continuous, and builds on past interactions and outcomes. Many examples of claim-making demonstrate this, from civil rights movements to social revolutions (McAdam et al., 2001: 5). Changes in legal or political structures can open up new channels for advancing claims, with, as biofuel development in the Rufiji District reveals, the ability to navigate these depending on knowledge of the system and access to information.

Field studies & the case of the Rufiji

Coauthor Neville conducted fieldwork in Tanzania, in both the capital, Dar es Salaam, and in communities along the Rufiji River, over a series of visits from August 2010 to March 2011. Research

included site visits, formal interviews, and informal meetings and observations of meetings with government officials, company officials, NGOs, and independent researchers. This was done in collaboration with an ongoing project on the value of ecosystem services provided by floods and the potential for land transformation in the floodplains, with institutional partners from Tanzania, Kenya, and France,¹ and many of the site visits were in conjunction with the activities of these broader projects. Consequently, many of these meetings, visits, and observations were permitted under the conditions of anonymity; thus, few participants are named, and many are referred to only by sector or general role.

Interviews and meetings were held on several occasions with officials from two companies with interests in the Rufiji delta: Africa Green Oils and Eco-Energy (formerly SEKAB). Staff from international organizations (the World Bank and USAID) and NGOs (HakiArdhi, EnviroCare, and Lawyers' Environmental Action Team) were also interviewed. Site visits were made to four villages that AGO and Eco-Energy had approached: one had negotiated with AGO, and three had interacted with Eco-Energy. For the latter set of villages, focus group interviews were conducted during a trip to the Rufiji District from 14-18 October 2010. Discussions were held with the chairman and with groups of 5-7 villagers. The villages and villagers are left unidentified to respect confidentiality agreements. The groups were not representative of the diversity of the villages, but represent at least one set of community perspectives on the negotiations. In one village, all the small group representatives were men; in the other two villages at least one woman participated in each meeting.

During this study period, coauthor Neville observed meetings and participated in informal discussions about land negotiations with government officials from the Tanzania Investment Centre, Ministry of Land, Ministry of Energy, and National Land Use Planning Commission. Informal meetings and exchanges of electronic communication were also valuable, including with local government officials, academics at the University of Dar es Salaam, and officials from aid agencies, intergovernmental organizations, and NGOs.

Questionable control: Productivity and efficiency

Biofuel projects proposed in the Rufiji District are part of a long history of seeing African lands as empty, marginal, and in need of productive activities. In the context of the corporate-led, industrial-scale global food production regime, as Clapp & Fuchs (2009) and McMichael (2009) discuss, the district appears to be a prime location for intensive agricultural production. Developing cash crop production for export, especially ones with the potential to address climate change and energy security, would seem like a desirable strategy for rural development and investment.

Many analysts, however, have challenged the view that coastal and wetland areas in places like the Rufiji District are inefficiently used and unproductive. Writers such as Ngugi (2009) see this view of Africa as indicative of the colonial legacy: “When Europe contemplated Africa through the prism of its bourgeois desire to conquer and dominate, it saw nothing but uninhabited lands. A uniform rationale for European settlements in Kenya, Zimbabwe, and South Africa was that the land was empty of human beings.” Such metaphors and descriptions can become truths for current decision-making and perceptions. For instance, Hoag & Ohman (2008: 626) describe the Food and Agriculture Organization’s view of farming practices along Tanzania’s coast as “irregular and in need of standardization.” Hoag & Ohman outline efforts of development practitioners to rationalize these systems, in an attempt to understand the processes of knowledge production, mapping, and development in the Rufiji District. Within the local context, Havnevik (1993) highlights the wisdom of shifting and non-intensive use of fragile delta ecosystems for preserving long-term fertility and cultivation potential. Recent work, including Hamerlynck et al. (2010: 223-224), continues to document shifting cultivation as an adaptive strategy along the river, and records local perspectives on the yearly variations in resource availability and flood cycle adaptations.

Competing values and visions of development also shape debates over land transfers for biofuel projects, particularly those revolving around 'productive' uses of land. The language of efficiency is particularly powerful (see Princen, 2005), and the recent Food and Agriculture Organization's assessment of the potential impacts of biofuels on food production in Tanzania identifies a number of areas with high potential for agricultural intensification (Maltsoglou & Khwaja, 2010). Industrial production based on predictability and consistency, however, does not tend to be well-matched to an environment subject to variable conditions and shifting flood and drought regimes. Although fertilizers, irrigation, and pesticides can increase yields, the value of such intensified agricultural activity does not necessarily outweigh its costs. Characterizing the floodplain as an underused and empty land ignores these seasonal and variable conditions, and misjudges the sustainability of existing production.

Biofuels and territorial claims in the Rufiji: Africa Green Oils and SEKAB/Eco-Energy

A close look at biofuel negotiations in the Rufiji District illustrates the uneven process of land acquisition, and introduces the role of spatial representation as a tool of contestation. Africa Green Oils (AGO), a Tanzanian company backed by UK and Norwegian investors (according to a document with shareholder data obtained from an official in the Rufiji District), was registered in 2007 with a stated goal of producing crude palm oil in the Rufiji District (as noted on the Certificate of Investments granted to AGO through the Tanzania Investment Centre in October 2008). An early draft of an environmental impact assessment (EIA) mentioned the oil could be used for biodiesel feedstock, but this was not mentioned in later EIAs, and in interviews in Dar es Salaam and in the Rufiji District in October 2010, company officials emphasized that their intended product had always been crude oil, and not biofuels. Despite company statements that it produces palm oil, not biodiesel, reports by researchers and NGOs have included AGO in studies of biofuel projects and plans (see, for example, Sulle & Nelson, 2009: 17).

Following negotiations with a number of villages, the company agreed to 3,800 ha from four villages: Nyamatanga, Rualuke A, Rualuke B, and Nyanjati. By April 2011 AGO had not yet secured the title deeds; nonetheless, with the approval of the villages and district, it had planted trial plots on 500 ha.

Interviews with company and district officials reveal the challenges involved in multiple and misaligned perspectives on land availability, and information gaps on territorial boundaries, even when both companies and communities think they are negotiating in good faith. The company, AGO's CEO Severin Kalonga explained, was initially seeking to negotiate with a series of villages for 30,000 ha of land (personal communication with Kalonga in Dar es Salaam, Tanzania, 13 October 2010). Eventually, it agreed to 5,000 ha from six villages. The company then began to assist the villages with land use plans and found that only 2,800 ha were actually available, in light of current and future land uses by the communities. The CEO opined that most villagers know the boundaries of their lands through landmarks rather than quantified land areas, and thus agreed to initial land allocations without the full knowledge of what those commitments meant.

Following these negotiations, the company understood that no further land would be available from those villages. AGO's future land acquisition remains uncertain, however: one district official interviewed thought more land could be made available, but that the district wanted to wait for evidence of success before allocating more land to AGO (personal communication with a Rufiji District official, Rufiji District, Tanzania, 14 October 2010).

Legal steps are still required to grant AGO full land title (surveys have not yet been finalized and the land transfer remains pending). Meanwhile, AGO already has oil palm trees in the ground. Uncertainties, information asymmetries, and unclear maps of land availability and boundaries have not stopped the AGO project. But they have caused delays and misunderstandings, reducing the project's scope at least in the short term. Unlike in some other cases of land acquisition struggles, the communities do not seem to be mounting any organized resistance to AGO. Still, reports of changes in

the agreements and land areas under consideration are reinforcing more critical voices that are arguing that information asymmetries between landholders and outside investors are allowing companies to manipulate planning. In the second case in the Rufiji, similar uncertainties and inconsistencies have not yet been overcome: Eco-Energy's plans for sugarcane production indicate more intractable difficulties.

In 2007, the Swedish-Tanzanian company SEKAB approached villages in the Rufiji District for land, identifying, with the help of the Tanzania Investment Centre (TIC), 12 villages as potential sites for a sugarcane plantation for bioethanol production. Four villages south of the river and eight villages north of the river were approached for potential land transfers, and according to a SEKAB document from 2007 (accessed at a district office in the Rufiji District, 16 October 2010), the company indicated that they had held at least one village meeting with each of 12 villages, and had either carried out or had plans for village assemblies, land surveys, and follow up village assembly meetings. SEKAB secured a Certificate of Incentives for investment in 2007 from the TIC.

Following a worldwide outcry over the emerging controversy linking biofuels to a global "food crisis" (Dauvergne & Neville, 2009), and liquidity problems caused by the 2007-09 financial crisis, the Swedish municipality involved in SEKAB withdrew from the company. The shares were sold to the Swedish company "EcoDevelopment," and the new ownership turned the Tanzanian operation into "Eco-Energy" (Center for Human Rights and Global Justice, 2010). SEKAB agreed to a ten-year offtake agreement for the ethanol produced (that is, it agreed to purchase a certain amount of bioethanol to provide a secure market), but is no longer a direct investor in the company.

An early SEKAB project document (from 19 December 2008, entitled the "SEKAB Cluster Concept," accessed in the Rufiji District on 16 October 2010), indicates the company was interested in acquiring 250,000 ha over 20-25 years. The company had identified 500,000 ha in the Rufiji District as potentially suitable land for growing sugarcane as biofuel feedstock. Accounts of efforts to secure land for these developments, though, differ across stakeholders, with various parties explaining the absence of a land

deal between villages and SEKAB in different terms.

One Rufiji District official said during an interview that SEKAB only secured 9,000 ha from four villages, yet the company claimed to have been offered 24,000 ha, which it then tried to map. In light of this dispute, the official alleged that SEKAB then bypassed the district in further negotiations, and approached villages directly. This may not represent the views of all local government officials, but it does illustrate the divergent understandings of stakeholders during negotiations, and the uncertainties involved in land acquisition and investment procedures. When asked about these concerns, a company official expressed surprise, stressing that the company has had positive relationships with the villages (personal communication with Anders Bergfors, Managing Director, Eco-Energy, Dar es Salaam, Tanzania, on 30 August and 25 October 2010, and follow-up email exchanges from October 2010-January 2011). Eco-Energy attributes project delays to the financial crisis, not to problems with land negotiations.

Villagers offered yet another account during group meetings in October 2010 with three of the 12 villages that had held meetings with SEKAB. In the first village, the gathered group said they decided to retract the initial offer of 1000 ha of land in late 2008 and early 2009 after SEKAB then surveyed 19,000 ha. Emphasizing that the community would not have agreed to the latter figure, the village secretary noted that the entire village is only 21,000 ha. In the second village, the chairman said the village had agreed, in 2007, to allocate 3,556 ha of land to SEKAB, but that villagers began to question this decision after discussions with the land rights NGO, HakiArdhi. This dispute did not progress very far, however, because, according to the chairman, SEKAB stopped communicating with the village, with no interaction apart from a visit in June 2010. Those in the third village said they initially agreed to offer 5,000 ha, but at a later village meeting decided to withdraw the offer. As with the second village, participants noted that the company was no longer in contact, and had not been seen since 2009. The change in willingness to transfer land shows how attitudes toward the company have changed over time, and how different

information and framing of the projects have influenced the perceptions of villagers.

SEKAB maintains it has followed due process. At least one researcher at HakiArdhi, however, thinks the company did not follow mandated procedures for land acquisition in the Rufiji District (personal communication at HakiArdhi, Dar es Salaam, 16 September 2010). One Rufiji District official also said the company had erred in taking a top-down approach rather than contacting villages first (personal communication, Rufiji District, Tanzania, 14 October 2010), although this judgment is difficult to reconcile with an official land acquisition policy that advises foreign companies to work through the TIC, a centralized, national agency. Another district official claimed the district had proposed a stakeholders meeting with the villages, SEKAB, district officials, and the Ministry of Land, but that it was never held, and that SEKAB then disappeared during the financial crisis (personal communication with a Rufiji District official, Rufiji District, Tanzania, 16 October 2010).

Checking village meeting minutes and company land surveys might resolve these conflicting views. It seems that parties have not done so, however, as they continue to express differing accounts. For these ongoing disputes, records are difficult to obtain (although researchers at the University of Dar es Salaam are trying to track down village meeting minutes). Such disputes suggest that not only maps, but also procedural aspects of land negotiations and information access, are subject to conflicting views among stakeholders.

Interviews in the three villages indicate that many community members remain unaware of the change in company ownership and name, with respondents familiar with SEKAB, but not Eco-Energy. Several villagers said that SEKAB had “disappeared” in 2009, and were unsure whether the company wanted to acquire land. Eco-Energy, on the other hand, still expresses interest in resuming land negotiations, and is focusing on the four villages south of the river, although it has not ruled out the other eight. These plans suggest the company expects the communities to be open to the possibility of land transfers. Villagers’ comments varied, however, with at least some uninterested in further

discussions. The interviewed district officials and some villagers were quite clear that if Eco-Energy wanted to acquire land in the Rufiji, the company would need to start the land negotiation processes over again, from scratch.

The politics of maps

Biofuels & the representation of space

The literature on mapping and counter-mapping helps us to better understand the shifting and unclear dynamics of resource claims and access illustrated by the AGO and Eco-Energy cases, and why communities, corporations, and governments all claim to be losing out in these land negotiations. The political science literature on state formation and territorial control, as well as the political geography work on the politics of the representation of space, adds further to understanding the role of maps in negotiations over land and resource access and use.

In Tanzania, media reports tend to reinforce a contentious discourse over land use and boundaries. Illustrative examples include:

It is postulated by the proponents of 'biofuels' that enormous areas of unused (or under-used) land supposedly exist in Africa, which can be bought (cheaply) by commercial enterprises from the rich countries in the North (Madoffe et al., 2009).

and,

Mark Baker, of EI consultants based in Tanzania, is less equivocal: 'Recently, in Kilwa, the Dutch firm BioShape rejected land that is labelled barren, or idle, in favour of fertile forest,

the Namatimbile, the largest coastal forest in East Africa. Why did they do that if jatropa can grow on weak land? And anyway, what exactly is ‘barren’ land if it is being used extensively by pastoralists?’ (Mutch, 2010).

Regardless of whether such statements actually reflect the experience of communities and NGOs, it sets up maps, boundary markers, and the language used to describe territories, as key parts in the contestation over control of land.

As we will illustrate, difficulty in accessing consistent and detailed maps of existing land uses and stated land claims in the region is complicating negotiations over biofuels, and making it hard for parties to gain sufficient information to engage effectively. Such maps are only one barrier to open communication, but are a vivid example of how information access is limited and fragmented in the region—and, although we focus on a specific region in Tanzania, a review of secondary literature suggests that similar problems of reconciling land ownership and access are repeating across many developing countries where customary and statutory land rights and claims intersect and overlap (see Cotula, 2007, focused on West Africa; Chimhowu & Woodhouse, 2006, on sub-Saharan Africa; Tripp, 2004, on Uganda; Ho & Spoor, 2006, on economies in transition; Fitzpatrick, 2005, on Africa and the South Pacific; Valenta, 2003, on Brazil; and Benjaminsen & Sjaastad, 2008, on South Africa). In these cases, it is difficult for any party to negotiate and avoid disputes, as geographic information (along with other information) is both difficult to access and contested.

Competing maps and unmapped spaces

Scott (1998: 88) stresses that maps not only reflect the world, they transform it; moreover, “the most transformative maps have been those invented and applied by the most powerful institution in

society: the state.” Mapping can both allow the state and other powerful actors to seize control of land and resources, as well as provide marginalized populations the tools to reclaim those spaces. Described as “counter-mapping” and “mapping against power” (see Peluso, 1995: 384, Poole, 1995, and Brosius et al. 1998: 161-162, among others), representations of space can be used to make counterclaims that assert historical use, occupancy, and rights (see Bryan, 2009: 24). Scholars engaged in work on struggles over sovereignty through cartography acknowledge the complex power relations that these mapping efforts can reveal, with many highlighting the limits of such projects (see Hodgson & Schroeder, 2002: 79-82 for an overview of work on, and critiques of, counter-mapping). As Bryan (2009: 25) writes, in work referencing Bernard Nietschmann, “mapping lands from an indigenous perspective in order to counter colonial patterns of exclusion also opens up the possibility for new forms of assimilation,” and “old inequalities are often re-inscribed through recognition of indigenous rights.” These comments reflect the multiple ways in which boundaries, divisions, and enclosure can be used as tools for both claims and counterclaims over space and resources.

In the context of current negotiations over resource access and territorial control, mapmaking and control over maps not only reflects a struggle between states and societies, but includes many subnational and international actors, ranging from foreign governments to community groups to NGOs to corporations. Various stakeholders, as we see in the case of AGO and Eco-Energy, align and oppose along different lines—including livelihood strategies, development visions, conservation views, and ethnic identities—and these shifting and variable alliances use maps as a tool in these political contests for resource control. The spatial dimensions of contentious politics become relevant to these resource debates and the debates over land for biofuels build on longstanding contention related to place-based identity formation (see, e.g., Castree, 2004: 137; also, see Bryant, 2002, for work on the intersections of local, transnational, and “translocal” approaches to understanding group claims to resources and social movements around culture and territory).

Further, as with much of the related work on cartography and political geography, our analysis relies on work in political ecology. Impacts on local environments for political ecology analysts result not only from direct pressures by the surrounding communities, but also from indirect pressures from decisions and power structures beyond the bounds of the ecosystem itself, including often-distant relations of political economy. As Walker (2005: 74) articulates,

The increased integration of third-world land users into global markets under unequal relations of power was viewed as undermining these land users' keen localized environmental knowledge and long histories of successful adaptation to sometimes harsh and unpredictable environments ... creating a 'situational rationality' that could potentially force land users to degrade their environments in acts of 'desperate ecocide' (Blaikie and Brookfield, 1987: 13).

This reading of the broader structures of power and pressures of a globalized economy into the conditions of local environments and livelihoods provides a subtext for the analysis of how maps are drawn into the contentious politics of claim-making over local resources and lands. Biofuels are entrenched not only in local decisions about land use and agricultural crops, but also in global relations. The understanding of coastal East African land as fertile and available is strategically important not only to companies, but also to foreign governments addressing multiple energy security and environmental challenges. These local spaces are, therefore, implicated in political relations far beyond their borders, and the prevailing representations of the land have consequences at many levels.

Maps can be seen as physical objects and representations of a geographic reality: maps of the land, indicating existing infrastructure (roads, buildings), land uses (farming, forests, housing), and ecosystem features (rivers, cliffs, sea). Maps can also be seen as conceptual tools and representations of

social realities: maps of political borders, land claims, and future land use plans (noting, of course, that geographic realities are also social constructions). In Offen's (2003, especially p. 382) account of the relationship between mapping and cultural identity in northeastern Nicaragua, he describes maps as a process, not just a product, through which communities can declare and clarify cultural identity. This observation seems particularly relevant to dynamic social and ecological contexts, where communities are attempting to re-identify themselves in relation to social, political, and environmental changes.

Consequently, maps become part of a discourse through which actors jockey for social and political control. Harley (2009) describes maps as a kind of language or "literature," where actors use cartography codes as a tool of political power. For instance, as Scott (1998) describes, the organization of territories and populations into simplified and gridded spaces increases the legibility of those areas—making cities more "readable"—and consequently making it easier for the state to control and monitor its people. Along similar lines, Harley (1992: 524) notes that European maps provided opportunities for the "conquest, appropriation, subdivision, commodification, and surveillance" of land. The history of these strategies of state control has been particularly charged in state relations with indigenous people. Referencing a rich political geography literature on mapmaking, Offen (2003: 384) tells us:

Western mapping technologies have not been favorable to indigenous peoples. During the colonial period, maps materially and symbolically initiated the ongoing process of native land dispossession. As knowledge systems and didactic devices, maps helped create the reality they purported to represent and, thus, shaped and reflected the colonial project ... In the postcolonial era, new states reinforced their tenuous nationhood by deploying maps as logos to legitimize their territorial sovereignty and to spatialize a national identity ...

Cartography can be used in the process of strategically categorizing ecosystems as well as people for

political and economic ends. In an analysis of state control in Thailand, Vandergeest and Peluso (1995: 388) describe the use of such “internal territorialization,” through “proscribing or prescribing specific activities within spatial boundaries,” explaining that these internal “territories are created by mapping; thus modern cartography plays a central role in the implementation and legitimation of territorial rule.” For example, designating land as ‘forests’ or ‘forest reserves’ dictates whether—and how—land is allocated. It frames, too, what actions are ‘legal’ or ‘illegal’ on that land, from habitation to hunting to commercial activities. Land categories, reinforced through maps, can be used to impose or justify management restrictions regardless of the actual ecological value of the land.

While authorities and outsiders use maps to gain control, they also have the potential for multiple, conflicting ends: they can, depending on use, increase or reduce community vulnerability. In work on Latin America, Craib (2000: 8) writes, “Cartographic products, replete with power and with potential that is both emancipatory and repressive, are thus particularly useful items for historical analysis.” This is echoed in Sparke’s (1998: 463) work on Canadian land rights and claims, in which he explains the “ambivalent (post)colonial power relations of cartography—the fact that they can work both for and against colonialism.” Maps, as noted, can make landscapes more legible to authorities and limit territories to specific groups and uses. Clear boundaries can put communities at risk of greater state control and coercion. Conversely, though, communities can use maps to stake ownership claims in legal and bureaucratic systems—and in some cases even increase political power. In work on European colonization of the Americas, Harley (1992: 527) argues that “in some Indian cultures, maps were part of the intellectual apparatus by which the imposition of colonial rule was resisted.”

Moreover, maps can provide a means for community groups to reinforce identity-formation and assert control over local spaces. Offen (2003: 384) elaborates that “[o]ver the last two decades indigenous peoples have begun to employ Western cartographic conventions and technologies in an attempt to make their own maps about themselves and their lands (called ‘mapping back’).” Radcliffe

(1996: 23) points explicitly to the affective and identity dimensions of cartography, describing “imaginative geographies” through which “[v]arious social groups within the contemporary Third World are seeking creatively to reconcile their ‘place’ in the global map” and where “creative reorganizing of place and identity are of great interest as the ‘new’ world order and globalization help refashion identities and reposition countries in the global economy.” Consequently, the creation and transformation of identities through iterative processes of mapmaking and territorial claims become part of the process of contention among groups staking claims to land. However, Castree (2004: 139) reminds us that although “imaginative geographies” have productive possibilities, not all actors have equal power to control these processes. He cautions, “...rather than asking whose geographical imaginations are ‘correct’, we need instead to ask: who has the power to construct what geographical imaginations and with what effects? This does not—or should not—lead us into a flabby relativism where each and every geographical imagination has equal validity.” Further, in work on neoliberalism, imperialism, and violence, Springer (2011: 93-94) draws attention to “virulent imaginative geographies,” in which hostile and malicious renderings of space become dominant and operate as symbolic violence.

Springer (2011: 97) references Said (1993: 7) on the ideational aspects of geography: “Just as none of us is outside or beyond geography, none of us is completely free from the struggle over geography. That struggle is complex and interesting because it is not only about soldiers and cannons but also about ideas, about forms, about images and imaginings.” As part of this construction of social and affective—as well as physical—space, maps, then, are powerful tools of contentious politics during negotiations over land, through claims of use, occupancy, and marginality. These complement, as we see in Tanzania’s Rufiji District, other forms of discourse in the struggle to control land and resources.

Conflicting maps, overlapping territorial claims, and disputed land acquisition processes leave both communities and companies involved in land deals more vulnerable. Communities may promise more land than they have access to (or ability to offer) and companies may base economic plans and

proposals on land areas that later turn out to be unavailable and become targets for criticism about negotiations they assumed were legal and appropriate. Consequently, disputes become battles waged on uncertain and shifting grounds.

Maps as a tool of contentious politics

With satellite imagery and global information systems, the question is not so much whether maps exist, but what is recorded and at what scale. Maps indicating political boundaries and land tenure are of particular importance for negotiations over land access and use. Many maps exist of Tanzania, including satellite maps that show the terrain and villages (e.g., using Google Earth). This level of mapping, however, does not necessarily provide enough detail to address land ownership and planning questions, nor does it capture shifting land uses and changing political relations.

Additionally, in some cases maps might exist, but access to them is limited, or there are conflicting maps for the same location, indicating competing claims. Although detailed maps of territorial boundaries and ownership may sit in government offices (and possibly companies can pay for copies), these are unlikely to be easily available to local villagers. Consequently, although communities may have official authority over the land transfer process, they often lack access to the information necessary for such decision-making.

Field research in the Rufiji District revealed multiple maps of the region, including both satellite imagery and representations indicating political boundaries. In a number of cases, however, access to these maps was restricted or complicated. As noted, efforts have been made in the Rufiji to include communities in mapping work (Duvail et al., 2006), but these remain piecemeal and incomplete. As Hoag's (2006: 471) research in the Rufiji reveals, a longstanding history of exclusion persists, and is vivid in the memories of local people. Hoag (2006) provides accounts by local people of feelings of ongoing

marginalization in the development and use of knowledge about their lands and livelihoods, which date back generations and have persisted over changes in governments and authorities. This highlights the ways in which maps have been used as tools of control over time, and how representations of space can act as a currency of power and tool of enclosure.

Coauthor Neville's fieldwork in Rufiji District in 2010-11 confirms that, although in theory the Dar es Salaam mapping office should hold detailed maps of the region, these were not always available. Further requests might well yield these. But this does indicate that ready access to maps can be difficult. Such challenges are even greater for stakeholders living far from the capital, particularly those with minimal access to technology for sending and receiving information from outside the district. In theory, village leaders and district officials should have this information; yet, during a field visit to the Rufiji District (14-18 October 2010), in at least one of the villages and in a district official's office, several of the maps of the area were missing. Officials did not know where these were; nor did they have the equipment (or electricity) to make copies. Although just one observation, this does illustrate the divide between the official procedures and actual practice in information access and exchange.

Further, in the Rufiji companies generally treat maps of areas under consideration for acquisition as confidential during negotiations, and even once land transfers have been agreed to, some companies are wary of revealing too much about their production plans. Some companies were forthcoming with maps during fieldwork in Rufiji in 2010 and 2011 (e.g., AGO). AGO only made these available, however, following a visit with the company's CEO, an option not available to all interested or affected parties. Fragmented and limited information about planned land uses undermines development decisions and consultations. Beyond access, though, there also is an underlying question of who creates the maps and survey processes, and who decides which maps guide land allocation.

Maps, like discourse, are not clearly tools of domination, but rather part of a fluctuating process of competing claims. To frame this in political terms, drawing on Charles Tilly and Sidney Tarrow (e.g.,

Tilly & Tarrow, 2006; Tarrow, 2010; Tilly, 2008), maps are part of contentious performances, and, over time, episodes of contention. For Tilly & Tarrow (2006: 4), the claims of actors affect each other, leading to “coordinated efforts on behalf of shared interests or programs, in which governments are involved as targets, initiators of claims, or third parties.” The ongoing contestation over biofuel projects reveals the complexities of mapping. For Leitner et al. (2008: 157) contentious politics consists of “concerted, counter-hegemonic social and political action, in which differently positioned participants come together to challenge dominant systems of authority, in order to promote and enact alternative imaginaries.” Actors in contentious politics seek out opportunities to develop and extend collective action in widening cycles of contention (Tarrow, 1998). As with competing discourses, the consequences are unpredictable, as the conflicting maps make it not only difficult to organize dissent and resistance, but also to coordinate efforts to acquire land.

Larsson (2007: 775-777), analyzing the importance of local land struggles in Siam (Thailand) for national and international outcomes, refers to maps as “powerful political instruments,” and describes them as “part of an ongoing dialogue involving a multitude of actors and addressees.” On a similar scale, we see the global biofuel pattern as a product of many different local negotiations and struggles—and linked to past repertoires of contention, including contestation of maps, territorial delineation, and land laws. Corporate executives interviewed in the Rufiji District seemed sure that maps were available and that, apart from clarifying the extent of village land, there are not disputes over land allocations. This stands in stark contrast to some villagers’ claims that companies took more land than they were allocated, as well as to researchers’ complaints that maps were often difficult to obtain (Benjaminsen et al., 2009). Not only the content of the maps, but even their existence and availability, remain contested. Counter-mapping, in these cases, becomes not only a matter of challenging the content of maps, but also of gaining access to representations of land.

Contested and unreliable maps also bring challenges for seemingly-powerful actors wanting to

gain control. Despite corporate claims of adequate maps, the mapping processes do not necessarily create or reinforce state and corporate control. The absence of agreed-upon representations of land and land uses, along with ongoing conflicts over these claims, hinder government and investor understandings of what is happening at the local level, and makes it more difficult for governments to control land allocation processes, and less secure for investors aiming for predictable ownership.

Challenges in map-making

Tracking existing land uses is a difficult task for communities lacking access to technology and political information. Many small, rural communities in the Rufiji District have limited access to electricity, photocopiers, computers, and other technology. Even though communities tend to be aware of landmark-based boundaries, and know the practical limits of farms and grazing lands, this local knowledge does not transfer easily into standardized mapping systems, based on geographic coordinates and quantified land areas. The strategic use of maps can highlight or obscure these land claims, particularly when lands lie fallow for certain seasons or years, and can act as fodder in discussions of “unused” or “underused” lands and productivity.

Combined with an ecosystem in which periodic and seasonal floods lead to shifting agriculture and fluctuating land uses, political and social changes in Tanzania (associated with ujamaa and with changes in global political economy and distant trade relations) affect land use and complicate the process of mapping. These can create a divide between community knowledge and official maps. While maps can reflect historical claims, current land uses, and potential future uses, it is difficult to capture these concurrently, and to incorporate shifting uses. This makes it difficult to develop neutral maps, even when land laws appear to make the process of land transfers democratic and straightforward. Despite seemingly comprehensive public processes, this contributes to fragmented community

participation in Tanzania. Moreover, local actors do not agree on the barriers to the development of maps and land use plans. Asked why land use plans were missing, one interviewee said it was a result of the high cost of producing such plans; yet another said this was a weak excuse, as local knowledge is sufficient for creating these plans, and political interests, not financial resources, was the reason for the absence of community plans.

Considering maps of each proposal independently and in isolation exacerbates the divides between groups with conflicting views about biofuels. Although a single biofuel project might not appear particularly disruptive to local activities and ecosystems, it is difficult to assess the impacts without considering the broader context. In an area with large tracts of lightly-used grazing lands and protected areas, one biofuel project might not draw too heavily on water resources or interfere with wildlife movements and grazing activities. In an area with multiple proposed projects and development plans, however, the cumulative impacts might be far more disruptive. Land use plans are developed for individual villages and companies. Environmental impact assessments are not required to consider the land use plans for neighboring villages outside the project area, or other planned water withdrawals or cultivation activities in the area. The use of only limited maps restricts consideration of impacts to bounded areas, and shapes the types of evaluations that are admissible in legal processes for altering or stopping a project. Additionally, these assessments are likely to fail to consider the need to safeguard land and water resources and access during times of drought or flood or for changing environmental conditions.

Consequences of contestation and conclusions

The outcomes of processes of contention are uncertain; and these involve shifting alliances and variable use of discourses by movements and counter-movements (Pye, 2010). Nonetheless, contention

for Tilly (2008) is not a disorderly, random process of disagreements and disputes. The strategies that competing parties employ in contentious politics are identifiable and comprehensible. In the case of disputes over biofuel proposals in Rufiji District, parties are resorting to strategies involving economic incentives, legal channels, media-based appeals, and direct persuasion tactics to attempt to secure land or prevent its transfer. Maps, as one tool in these processes, are being strategically wielded within accepted processes of claim-making in legal and social forums.

Biofuel projects may not be an ecologically or socially-sound solution to climate change and energy security, as their impacts on carbon footprints, biodiversity, livelihoods, and community land rights remain under dispute (McCarty, 2010; McMichael, 2010; McCarty & Zen, 2010; McCarty and Cramb, 2009). Still, antagonism, conflict over maps and land ownership, and incomplete projects are certainly not the best outcomes for communities, the economy, or the environment. For the Rufiji District this situation is opening some opportunities for companies and states to dispute land claims or frame land as unproductive—and thus increase the opportunities to win land claims disputes or take over territory from local communities for more “economically-sound” production, such as biofuel feedstock. Yet portraying this as a state-sponsored corporate “land grab” to expand biofuels is too simplistic. Processes of contention and exclusion are harming all parties, and the extreme poverty and reliance on land for subsistence in most villages means the *relative* harm is greater for these already-marginalized people. Overall, these processes, we find, are leading to lost economic opportunities and less secure investments, while also failing to provide livelihood options for communities that can replace unsustainable resource extraction activities.

The continued secrecy that surrounds biofuels and other agricultural projects in rural Tanzania, as the cases of AGO and Eco-Energy illustrate, is delaying the potential for agricultural production to yield benefits for communities, while also failing to secure land rights for local people. AGO has had some positive interactions with communities. Yet difficulties determining the extent of available land

complicated its early land acquisition experiences, with its business plans eventually facing major challenges when the expected tracts of land turned out to be unavailable. Even more concerning is Eco-Energy's interactions in the district, where communities continue to have limited information about the company, and the company and villagers express very different perceptions of their willingness to consider these projects.

Such settings will continue to attract private investors willing to take big risks; however, relying on the willingness of a few high-risk investors is not a viable regional development strategy. Areas with uncertain land availability, changes in land allocation between initial agreements and later surveying, and conflict-laden interactions with communities is unlikely to draw the investment hoped for by many villagers, nor ensure that investments are done responsibly and with high community participation.

The ongoing contention over projects in the Rufiji District, most recently over biofuels, is revealing. Biofuel companies, such as AGO, are starting to plant oil palm, but not at the rate and scale it was aiming for as uncertainties over land availability cause delays in production and misunderstandings with villages and government officials. Episodes of contention are growing increasingly antagonistic, and jeopardizing the chance to create socially- and ecologically-sound development projects. The disputes over biofuels extend an already-existing episode of contention, centering on resource access and control along the coast. The periodic and repeating initiation and halting of these projects increases both community and corporate skepticism about options, fails to provide economic opportunities or lasting ecological and livelihood protection for local people, and exacerbates problems of information access, state-society relations, and environmental degradation. Such processes are not random; yet outcomes fluctuate and are difficult to predict.

Further, beyond underscoring the need to recognize the complexity of biofuel politics, the insight from mapping and counter-mapping work reveals the importance of rethinking the tools of science, particularly when considering land use negotiations. Cartography and global information systems must

be acknowledged as representing relations of power, rather than acting as objective tools of measurement and management. These tools intersect with existing power relations and inequities of access. To understand the alliances and positions that emerge around biofuel projects in places like the Rufiji, analysts and participants must overlay histories of shifting authority onto current negotiations over resources, and must consider not only relations between communities and the state, but also the multiple layers of local community relations and identities. Communities, companies, and governments might all benefit from turning to work on maps and spatial histories of power to better engage in open dialogue and genuine land negotiations.

Across the global South the contentious politics of biofuels involves an uneven power struggle for control over food, fuel, and local territories (Borras, McMichael, and Scoones, 2010; Dauvergne & Neville, 2010; McCarty, 2010). Over time it is increasing the secrecy, instability, and antagonism in the case of the Rufiji District. Such an outcome benefits no one. The relative costs, however, are not equal: more powerful firms and states are able to navigate and capitalize on the resulting tensions and uncertainties better than community groups. Yet this conclusion does challenge the representation of biofuel projects as a simple land grab by multinational corporations and central states. It also reveals that the increasingly rocky and antagonistic struggle over local resources is not benefiting biofuel opponents, but rather hindering the creation of a process that could lead to more sustainable and inclusive development options for marginalized, rural communities.

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Endnotes

¹ GEOPAR and PACTER are joint projects with the French Institute of Research for Development, the University of Dar es Salaam, the National Museums of Kenya, and other partners (see http://www.ird.fr/kenya/representant_us/activities/stefanie.html for details on GEOPAR). The linked projects, which began in 2009, examine floods and development projects in wetland and coastal areas of East Africa, including Tanzania's Rufiji delta. These build on work done by these partners in the early 2000s on participatory mapping, community-based management, and land tenure clarification (see Duvail et al., 2006, for further details).

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