Global Environmental Change 22 (2012) 332–341

Contents lists available at SciVerse ScienceDirect

Global Environmental Change

journal homepage: www.elsevier.com/locate/gloenvcha

The REDD menace: Resurgent protectionism in Tanzania's mangrove forests

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ARTICLE INFO

Article history:
Received 3 January 2011
Received in revised form 3 October 2011
Accepted 16 November 2011
Available online 26 December 2011

Keywords:
Environmental history
Environmental justice
Carbon forestry
REDD+
Global climate change

ABSTRACT

Reduced Emissions from Deforestation and Degradation (REDD+) is being proclaimed as "a new direction in forest conservation" (Anglesen, 2009: 125). This financial incentives-based climate change mitigation strategy proposed by the UNEP, World Bank, GEF and environmental NGOs seeks to integrate forests into carbon sequestration schemes. Its proponents view REDD+ as part of an adaptive strategy to counter the effects of global climate change. This paper combines the theoretical approaches of market environmentalism and environmental narratives to examine the politics of environmental knowledge that are redefining socio-nature relations in the Rufiji Delta, Tanzania to make mangrove forests amenable to markets. Through a case study of a "REDD-readiness" climate change mitigation and adaptation project, we demonstrate how a shift in resource control and management from local to global actors builds upon narratives of environmental change (forest loss) that have little factual basis in environmental histories. We argue that the proponents of REDD+ (Tanzanian state, aid donors, environmental NGOs) underestimate the agency of forest-reliant communities who have played a major role in the making of the delta landscape and who will certainly resist the injustices they are facing as a result of this shift from community-based resource management to fortress conservation.

1. Introduction

Reduced Emissions from Deforestation and Degradation (REDD+) is a financial incentives-based climate change mitigation initiative designed to compensate national governments and subnational actors in return for demonstrable reductions in carbon emissions from deforestation and degradation and enhancements of terrestrial carbon stocks (Agrawal et al., 2011). This paper examines this "new direction" (Anglesen, 2009) in carbon forestry by analyzing the politics of environmental knowledge that are redefining socio-nature relations in the Rufiji Delta, Tanzania, to be amenable to markets. We investigate the environmental narratives that inform a case study of World Wide Fund for Nature (WWF) and Tanzanian state carbon forestry projects[1]. These narratives portray local resource users, the Warufiji, in negative terms as recent migrants who are destroying the mangrove forests. This mistaken view forms the basis of a resurgent protectionism which aims to expel the

[1] The Rufiji Delta is listed as a WWF Tanzania REDD readiness site for REDD pilot projects, http://www.reddtz.org/images/110310/a%20map%20showing%20pilot%20areas%20for%20redd%20activities.pdf (Accessed on 30 November 2011). For a map showing approximate location of REDD related civil society actors (e.g. WWF) in the Rufiji Delta, Tanzania, see United Republic of Tanzania, October 2010, National REDD Information and Communication Strategy 2010-2012, (p. 46), http://www.reddtz.org/images/Indepthstudy/redd information and communication strategy.pdf (Accessed on 30 November 2011). The TZ-REDD Newsletter (Issue 5, September 2011, pg. 14) states "WWF has conducted awareness-raising campaigns on the REDD project in Mbeya, Iringa, and Rufiji Districts" see http://www.tnrf.org/files/REDDNewsletter5.pdf (Accessed on 30 November 2011). For the contract between the Norwegian Ministry of Foreign Affairs and the WWF Tanzania Country Office that is "one of nine REDD+ pilot projects undertaken by NGOs under the Tanzania-Norway partnership" with reference to the Rufiji Delta, see http://www.norway.go.tz/PageFiles/253880/WWF_contract.pdf (Accessed 30 November 2011). Information on WWF's "Building Mangrove Resilience" project in the Rufiji Delta can be found at http://www.climateprep.org/2009/12/04/building-mangrove-resilience-to-climate-change/ (Accessed on 30 November 2011).

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doi:10.1016/j.gloenvcha.2011.11.006

Warufiji from lands they have occupied for millennia (Havnevik, 1993; Chami and Mswema, 1997).

Carbon forestry management plans have so far assumed that "forest" is a clearly understood category (Noordwijk and Minang, 2009). We argue that current forest definitions within the context of REDD+ do not take into consideration the environmental history or the agency of forest-reliant communities in the making of forested landscapes. We seek to demonstrate how the Rufiji Delta is a socio-natural landscape shaped by past and present resource management practices, a "forest" definition that complicates the prevailing narratives that inform carbon forestry management.

At the center of our critique is the framing of the "environmental problem" in which the Warufiji are depicted by foresters, environmentalists, and donors as poor stewards of the mangrove forests. We argue that this representation builds upon a "misreading" of the human–environmental history of the Rufiji Delta (e.g. Fairhead and Leach, 1996; Forsyth and Walker, 2008). Our counter-narrative provides an alternative environmental history that presents the Warufuji in a very different light. It also highlights the politics of environmental knowledge in which carbon forestry is presented as a "sustainable" alternative to indigenous resource management practices which are demeaned as "destructive" and "illegal". We suggest that a major consequence of this ahistorical framing is a paradigmatic shift in natural resource conservation from community-based natural resource management (CBNRM) to fortress conservation, a shift that has been aptly called "resurgent protectionism" (Adams, 2009; Forsyth and Walker, 2008; Wilshusen et al., 2002). The protectionist conservation paradigm views human use of nature as inimical to biodiversity conservation and by extension to carbon storage. This normative view contrasts with more recent approaches that assume that human–environmental interactions can produce sustainably utilized environments (Zimmerer, 2006; Bassett, 2010).

Climate change mitigation plans for the Rufiji Delta currently focus on the anticipated impacts of climate change (sea-level rise) for a particular biophysical exposure unit (mangrove forests) that needs to be offset by adaptation and mitigation strategies to enhance the resilience of that biophysical unit (mangrove reforestation) (O'Brien et al., 2007). Within the context of the Tanzanian state and WWF's climate change "adaptation strategy" (Cook, 2009), mangrove reforestation reduces the ability of Rufiji farmers to cultivate rice for subsistence needs and thus poses a direct threat to their livelihoods. Indeed, after the forests are made more "valuable" for the carbon market ("REDD ready"), the Tanzanian state plans to relocate villagers out of the delta[2]. Although current REDD+ policy frameworks do not explicitly seek to exclude people from living in forests or utilizing forest resources, the proposed eviction plan for the Warufiji is one portentous example of how human rights may be subservient to the monitoring and verification requirements of carbon forestry. The removal of the Warufiji[3] "simplifies" the mangrove forests in order to make levels of carbon sequestration "legible" for carbon markets (Scott, 1998). We illustrate how this shift from a CNBRM to an ecosystem-centered vulnerability approach for forest conservation supersedes priorities that seek to balance livelihood and environmental concerns. In the ecosystem-centered vulnerability approach, the concern with sustainable livelihoods and social vulnerability are of secondary importance.

Our goal in writing this paper is to draw attention to the potential for "lose–lose" scenarios of climate change mitigation and adaptation projects that fail to integrate environmental justice concerns with conservation priorities. This is important as the success of carbon forestry hinges on the compliance of local populations to new power relations implicit in REDD+ policies. We argue that forest-reliant communities will resist these policies to the extent that they undermine local livelihoods and are viewed as unjust. Local resentment and resistance will increase to the extent that carbon forestry projects marginalize those communities that live in proximity to and depend on key resource areas. Resource users in developing countries throughout the world are beginning to organize and demand access to land and their right to a decent livelihood (Perfecto and Vandermeer, 2008). The Warufiji are no exception. They have a history of fiercely resisting claims on their resources and labor by outsiders. By highlighting the environmental historical role of the Warufiji in the making of the delta landscape, we provide insights into the opportunity for local resource users to contribute to the creation of an agricultural and forestry matrix that is socially just and politically stable and that has the potential to conserve biodiversity in the long run (Perfecto and Vandermeer, 2008).

This paper discusses the implications of market-oriented conservation approaches that may threaten equity-oriented projects and the environmental justice dimensions to climate change despite its "rights-based and participatory approaches" (Anglesen, 2009). REDD+ threatens to shift control and management of natural resources from local to national and global actors. REDD+ may also have an unintended consequence of undermining decentralized forest management in Tanzania and elsewhere (Phelps et al., 2010). Our counter-narrative seeks to provide insights into natural resource management alternatives that are more socially just, desirable, and feasible. These alternatives are desirable because they have the potential to address conservation goals and feasible because the environmental history of the Northern Rufiji Delta illuminates the possibilities for sustainably utilized environments.

2. Theoretical approach

The remaking of human–environmental relations for REDD+ in the Rufiji Delta is an ambitious project that involves conceptualizing forest use in ways that are amenable to carbon markets. It entails a significant turnaround in conservation thinking where ecosystem health is prioritized over multiple land-use policies in which local communities assume some resource management authority. Before showing how this "new direction in forest conservation" (Anglesen, 2009) is unfolding in the Rufiji Delta, we introduce two key concepts that inform our theoretical approach: market environmentalism and environmental narratives.

2.1. Market environmentalism

Market environmentalism is the recognition that "nature" (as transformed into raw materials or resources) can be a key constraint on or opportunity for the location and organization of economic activity (Jonas and Bridge, 2003). Production processes based on the use of natural resources pose both obstacles and opportunities for capital and reveal the contradictory political-economic dynamics that shape everyday landscapes through which nature is produced, consumed, and regulated (Henderson, 1998; Jonas and Bridge, 2003). In its production and commodification, nature is enclosed, measured, and given market value (Lovell et al., 2009). This increasing incorporation of ecological conditions into global circuits of capital accumulation via

[2] Eviction plans are discussed in the "Report of the Meeting of the Division of Forestry and Bee-Keeping with Councillors, Executive Officers of the Wards and Villages in the Wards of Salale, Mtunda, Maparoni, and Ruaruke in Rufiji District" held in Nyamisati on 3 November 2009 (Personal communication, January 2010). See also "Government Issues Eviction Order to Forest Invaders" Bilham Kimati in the *Tanzania Daily News*, 29 January 2011.

[3] For an update see, "Villagers Evicted from Mangrove Site" Finnigan Wa Simbeye, *Tanzania Daily News* 30 October 2011, http://dailynews.co.tz/home/?n=25016&cat=home (Accessed on 30 November 2011) and "WWF Fears Backlash on Rufiji Delta Mangrove Forest Initiative" Finnigan Wa Simbeye, *Tanzania Daily News* 14 November 2011, http://www.dailynews.co.tz/business/?n=25497&cat=-business (Accessed on 30 November 2011).

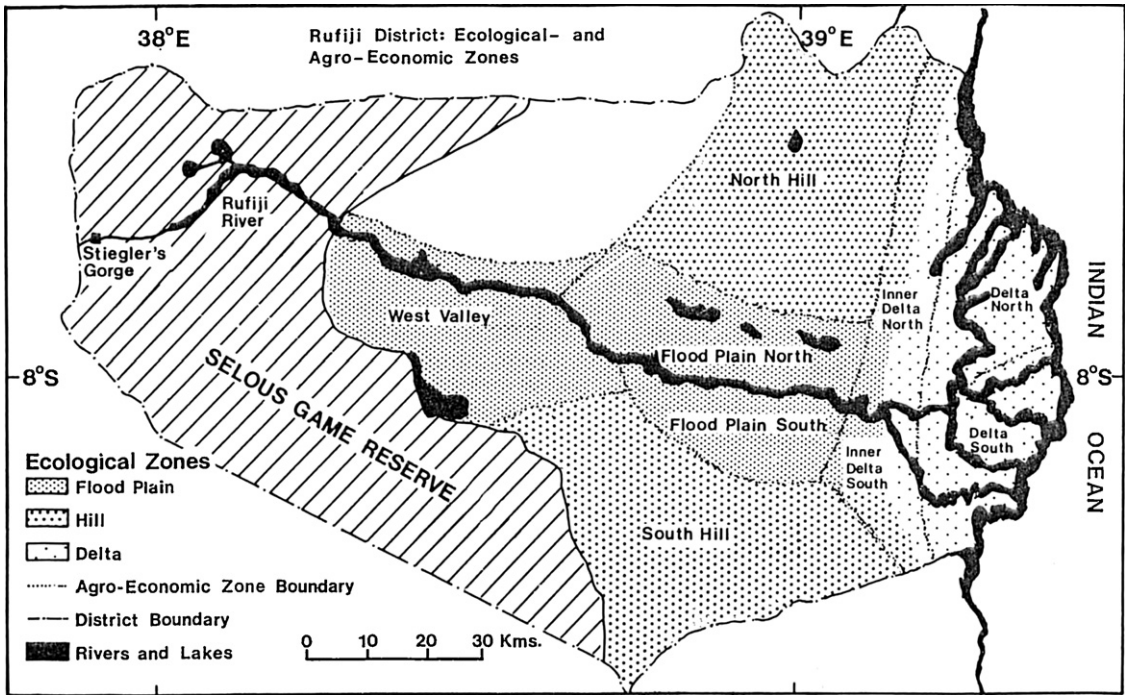

Fig. 1. Ecological and Agro-Economic Zones of the Rufiji District, Tanzania.
Source: Havnevik (1993). Used with permission of the author.

production and commodification has been referred to as "green capitalism" (Prudham, 2009: 1596). An example of green capitalism is the creation of markets for environmental services which effectively turn ecological processes and products into commodities that can be sold. Within this process the important question is not what a commodity is, but rather, what kind of characteristics do things take on when they *become* commodities (Castree, 2003: 277).

Green capitalism approaches view nature and society as conceptually distinct in the context of conservation (McAfee and Shapiro, 2010). It then reconnects them by subsuming ecology within the market economy (McAfee and Shapiro, 2010). The "splitting" of complex ecosystems simplifies them into legally definable and economically tradable property rights (Castree, 2003). This is particularly true for carbon markets. Carbon markets are one of a line of conversions of parts of nature into tradable commodities, including water, biodiversity, fish, and wetlands (Bumpus and Liverman, 2008).

For carbon to be exchanged and generate revenue, carbon reduction must be turned into a tradable commodity (Bumpus and Liverman, 2008). Offsets are generally commodified into saleable units through development of specific emission–reduction projects, the outputs of which can be quantified, owned and traded. Examples include the management of forests specifically to sequester carbon (Bumpus and Liverman, 2008). Complex forest ecosystems must be simplified into discrete processes and objects in order to define, standardize, and universally agree on their carbon content (Boyd, 2009). In the process, a fictitious commodity (Polyani, 1944) is created in the form of "carbon credits" that are generated from emission reductions and international investments in emission reduction projects (Liverman, 2009).

In the course of "selling nature to save it" (McAfee, 1999), elite political and economic actors wield considerable power in negotiating prices and regulating market participation (Liverman, 2004). Many indigenous groups in the global south criticize carbon sequestration projects for their simplified portrayal of terrestrial systems and lack of information on the socio-economic, political, and institutional implications of carbon sequestration (Boyd, 2009). One concern is that carbon trading will allow the global North to maintain high levels of resource consumption by paying southern communities a pittance for offsetting carbon emissions generated by inefficient industries (Liverman, 2009).

2.2. Environmental narratives

The analysis of environmental narratives is a useful approach to examine the ways environmental issues are framed by showing how and why environmental problems are defined the way they are (Taylor and Buttel, 1992). An environmental narrative is a simplified explanation of cause and effect relationships that assigns roles to different actors who are implicated (or not) in an environmental problem. They are stories that simultaneously simplify and stabilize complex and uncertain processes such as "deforestation causes biodiversity loss" (Forsyth and Walker, 2008). Narratives influence the questions asked, the knowledge produced, and the policies and responses that are prioritized (Forsyth, 2003; O'Brien et al., 2007). They also reveal much about the politics of environmental knowledge (Boyd, 2009; Forsyth and Walker, 2008). The knowledge that informs environmental narratives is always conditioned by values, power relations, and institutional histories and commitments. Knowledge production is highly selective in terms of who participates in problem definition and policy making (Scoones, 2009; Forsyth and Walker, 2008). Like all narratives, environmental narratives shape popular perceptions and appeal to policy makers seeking simple solutions (Forsyth and Walker, 2008). It is important, therefore, to consider the broader contexts of legibility and simplification, as well as the political economic conditions that give form and meaning to narratives (Scott, 1998; Watts, 2002).

The case study of the Rufiji Delta contributes to a growing body of literature that illustrates how powerful political interests have embraced the neoliberal project of market environmentalism and employ environmental narratives to design an international response to climate change (Liverman, 2009). As states and international environmental NGOs act on these narratives, these stories transmute into "received ideas" (Leach and Mearns, 1996) and have real effects for local resource users. Mangrove carbon

forestry projects in the Rufiji Delta illustrate these dynamics. Environmental narratives that label human activities as "unnatural" and that portray landscapes in ahistorical terms as pristine or "Edenic" in which nature is emptied of humanity but filled with wildlife and vegetation are used to vilify local subsistence level resource users as mangrove "destroyers" and "invaders" (Neumann, 1998; West et al., 2006). In the following sections, we argue that the Tanzanian state and WWF's portrayal of human–environmental relations represents a misreading of the environmental history of the Rufiji Delta. In contrast, we offer an historical account that portrays both the landscape and people in a very different light.

3. Rufiji Delta, Tanzania case study

The Rufiji Delta contains the largest continuous block of estuarine mangrove forest in Africa, and is of considerable economic and conservation importance (Bryceson, 2002). Our focus is on carbon forestry projects in the northern Rufiji Delta islands, referred to as the Rufiji Delta North (Fig. 1). Observations and semi-structured interviews in Rufiji Delta villages (mainly Mshinzi and Mchele[4]), with the Forestry and Beekeeping Division (FBD) of the Ministry of Natural Resources and Tourism (MNRT), and WWF Tanzania representatives during doctoral dissertation fieldwork from 2008 to 2009, as well as continual communications with villagers through 2010, inform the case study.

3.1. Mangrove forest governance

All of Tanzania's mangrove forests have protected status. The Forest Ordinance of 1957 allowed for the creation of forest reserves by government decree after considering any objections by interested parties to this de jure transfer of rights from local communities to the state (United Republic of Tanzania, 1994). The FBD of the MNRT is currently responsible for mangrove forest management. The Tanzanian state has repeatedly used its authority over mangrove forests to exert control over Rufiji Delta communities and resources. For example, on September 2, 1987, the Forestry Division declared a ban on the cutting of all mangroves in the northern Rufiji Delta (Semesi, 1992). To enforce this ban, the state trained and posted forest officers to the area. The 1998 National Forestry Policy was replaced by the 2002 Tanzania Forest Act which forbids any person, without a license or other lawful authority, to cut, burn, or damage mangrove trees in the forest reserve area. This includes a ban on the expansion or opening of new rice farms (Semesi, 1991). Further, the Mangrove Management Plan established in 1991 designates the majority of the north Rufiji Delta mangroves as "total protection zones" which legally restricts forest access to scientific uses and protective functions only (Semesi, 1991). These restrictions remain in force today.

In addition to employing forest guards to enforce its policies, the Tanzanian state established agreements with forest communities to jointly manage the forest reserves. In 1998, the FBD initiated a joint management agreement (JMA) with villages in the Rufiji Delta North Mangrove Forest Reserve (Akida and Blomley, 2006). Communities are divided into villages, which are managed by elected village councils (Blomley et al., 2010). The 2002 Forest Act recognizes two different types of participatory forest management (PFM) (Blomley et al., 2010). The first is community-based forest management (CBFM) that enables village-level communities to establish village, group or private forest reserves on village land in which communities are both forest owners and managers. The second type is joint forest management (JFM) which takes place on reserved forest land that is owned and managed by the national or district-level governments (typically managed by the FBD). With the state and potentially other forest owners, village-level elected councils and environmental council representatives can sign joint management agreements (JMAs) for sharing the costs and benefits and responsibilities of forest management. Under this arrangement, village-level elected councils are "co-managers" of forests otherwise owned by the district or national governments. In theory, village governments have primary protection and management responsibility of the forest. The Forest Act of 2002, however, does not explicitly state how benefits of forest management under JMA are to be equitably shared with participating communities (Blomley and Iddi, 2009).

In Tanzania, research shows that there are few tangible benefits to villages participating in JMAs, especially in areas of high conservation value (e.g. Vihemäki, 2009 citing Kajembe et al., 2005; Blomley and Ramadhani, 2006). The paradox of the JMA project in the Rufiji Delta is that JMAs are presented as promoting "community participation" with Warufiji villagers, while at the same time the FBD prosecutes these same forest users for planting rice (Bryceson et al., 2005). For example, many Rufiji farmers were restricted from accessing JMA areas to grow rice because of mangrove reforestation policies. Rufiji villagers argue that this restriction has created conflicts and deprived them of their livelihoods (e.g. Bryceson et al., 2005; Akida and Blomley, 2006). Villagers also stated that the FBD now bears the sole responsibility of distributing licenses for logging mangrove poles. Villagers complain that their role as co-managers of forests is not taken seriously:

> "We still have no say in how our forests are managed. The foresters still come here, fine us, and put us in jail if we are caught cutting mangroves for our rice fields. (JMA) agreements did not change things for us because we are still restricted from using the forests" (Personal communication, October 2010).

Despite their presence within the delta for over 2000 years, the existence of ancestral burial grounds, and villages that have been formally registered (NEMC, 1997), the Warufiji's land rights remain highly uncertain. According to the Forest Ordinance of 1957, the Warufiji are regarded as "squatters" as they are occupying land declared as Forest Reserves (NEMC, 1997). Land tenure insecurity in Tanzania is further compounded by the National Land Policy (1995) which explicitly states that the President owns all land in Tanzania in trust for present and future generations and that the state can dispossess customary owners for "public interest" because land is "public property" (Shivji, 2006). Within forest reserves, the Director of the FBD recently stated that villages were registered "illegally and that directives have already been issued for the Commissioner of Lands and respective district councils to de-register the villages according to the Forest Act Cap 323 as revised in 2002" (Rugonzibwa, 2009).

3.2. REDD ready in Rufiji: climate change programs and proposals

The Rufiji Delta mangrove forests have attracted international attention for their conservation importance. The International Union for the Conservation of Nature (IUCN) designated the forests as part of the Rufiji-Mafia-Kilwa Ramsar wetland site in 2004 (IUCN, 2004). At the same time, WWF initiated the Rufiji-Mafia-Kilwa Seascape Program (RUMAKI) (WWF Tanzania, No Date). The RUMAKI Program aimed to address the "fundamental links between environment and poverty and between biodiversity conservation and sustainable livelihood development." [5] Initial

[4] To protect our research subjects, we have changed the names of individuals and communities discussed in this paper.

[5] See WWF Rumaki, Kilwa, Rufiji Seascape Programme Tanzania Factsheet, July 2004-June 2009, http://assets.panda.org/downloads/seascapefactsheet.pdf (Accessed 30 November 2011).

program goals included the "improved socio-economic well-being of coastal communities through sustainable, participatory, and equitable use and protection of their marine and coastal natural resources." [6]

WWF recently shifted its emphasis in the Rufiji Delta from conservation-with-development to conserving ecosystem health, in which the human development component is significantly diminished.[7] With funding from the Global Environmental Facility and the United Nations Environment Program, WWF has created a climate adaptation project called "Coastal Resilience to Climate Change" (Cook, 2009). For this project, WWF is working directly with the FBD (Cook, 2009).

This WWF mangrove conservation program is premised on the urgent need to improve the management and protection of mangroves, which are described as "the most critically threatened ecosystem in the world" (Cook, 2009). The program aims to "protect mangrove forests from the impacts of climate change, particularly sea level rise" (Cook, 2009). Project goals are to assess the vulnerability of mangroves to climate change impacts, and to develop and promote adaptation strategies that respond to these impacts (Cook, 2009). Adaptation strategies include reforestation with "climate smart" mangrove species (Cook, 2009). Project documents declare that one of the main "threats" to the mangroves is rice farming by local people (Cook, 2009).

To prepare for climate change, WWF is working directly with FBD officials at national and district levels to "replant and restore mangrove habitats degraded by illegal rice farming" in the Rufiji Delta North (Cook, 2009). District level WWF "adaptation coordinators" oversee and enforce mangrove reforestation in the Rufiji Delta North (Personal communication, FBD, January 2010). The FBD has been involved in mangrove reforestation in the Rufiji Delta since the establishment of the Mangrove Management Plan (Semesi, 1991). Some villagers describe the mangrove planting scheme as a long standing "tug of war" between themselves and the FBD. Renewed interest by WWF in the Rufiji Delta has intensified mangrove reforestation as a climate change adaptation strategy (Cook, 2009). The "Building Mangrove Resilience" reforestation project includes villages within the Delta North (Fig. 1). Many Rufiji Delta rice farmers stated they are resisting this mangrove reforestation project, particularly in their rice farms, by planting mangrove seedlings upside down or not planting them at all. Some villagers stated that they refused to plant mangroves because they were not given the choice. Villagers declared "tulilazimishwa" in Kiswahili, which translates to "we were forced or obliged" English (Awde, 2000) to plant mangroves. The consensus in one village, Mshinzi, is a formal "rejection" against the mangrove planting project. In another village, Mchele, the village leadership agreed to the project and a small number of villagers participate. The majority, however, are against the project. This reluctant group stated they would consider participating in mangrove planting project as long as they are able to continue rice cultivation, but most refuse to comply.

One villager stated, "How can they [WWF adaptation coordinators and the FBD] tell us to stop planting rice? We are hungry because they have taken away our daily bread." WWF is aware of the Warufiji's resistance to previous mangrove reforestation efforts as illustrated in a quote by a Warufiji rice farmer in a 2002 WWF publication, "We are really surprised by this government, we do not know what they are thinking about us. We are required to plant mangroves in our paddy farms; will they send us food in the future?" (Wood et al., 2000: 320). Directly prior to the 2010 national Tanzanian elections, villagers from Mshinzi stated that mangrove reforestation strategies suddenly changed and they were given the choice to plant mangroves (Personal communication, October 2010). Meetings were held in Mshinzi village and elders warned that the handing out of small funds for planting mangroves was a "common tactic prior to elections" and "after the elections, things will change, and they [the FBD and WWF adaptation coordinators] will be against us [the villagers]" in terms of impeding villagers from farming rice. The village government and environmental council in Mshinzi stated that their decision to object to the project was superseded by higher authorities at the district level. The JMA co-management agreement exemplifies what Chhatre (2008) calls weak political "articulation" reflected in a lack of devolved power for decision making to representative and accountable local actors (Agrawal and Ribot, 1999).

In contrast to the WWF RUMAKI program's emphasis on poverty alleviation through CBNRM, new carbon forestry management plans are threatening to deepen poverty through dispossession. The Rufiji Delta is listed as one of six WWF Tanzania REDD readiness sites for REDD Pilot Projects.[8] REDD+ strategies for Tanzania list the "enhancement of state reserve lands" as a way to reverse the "drivers" (e.g. cultivation) of forest deforestation and degradation.[9] This is exemplified by the FBD's plans to begin a process of relocating rice farmers out of the delta.[10] The Director of the FBD made a statement in September 2009 that villagers residing in Tabora and Rukwa regions of coastal Tanzania will be evicted for invasions of forest reserves (Rugonzibwa, 2009). The Deputy Minister of MNRT also stated that "eviction exercises will later spread to the rest of the forest reserves countrywide and all settlers in forest reserves would be moved as stipulated by the law" (Rugonzibwa, 2009). Current plans are for farmers to plant trees in areas previously used for rice cultivation until they are relocated out of the delta (Personal communication, January 2010). This will result in evictions of more than 18,000 Rufiji Delta North village residents (Fig. 1).

In order to minimize the political fallout over the controversial eviction plans, the timing of relocations was on hold until the conclusion of the national elections in October 2010[11] (Personal communication, December 2009). In the meantime, the FBD and WWF adaptation coordinators organized meetings with villagers in the northern Rufiji Delta to "sensitize" them to the relocation project (Personal communication, January 2010). The FBD informed villagers of "what the consequences will be and how severe they will be" (Personal communication, December 2009). In response to the "sensitizing campaigns," village elders stated that they were trying to find documentation of their formal objections to the designation of the mangrove forests as Forest Reserves in 1957. Although village elders state that they "were not listened to at that time and there was no outcome," such documentation is needed to mount a legal case in Tanzanian courts against planned evictions.

We argue that the objective of WWF's carbon forestry projects[12] and the Tanzanian government's eviction plans are to make the Rufiji Delta "REDD ready" (Tanzanian REDD Initiative, 2010). The

[6] See footnote 5, "WWF Rufiji, Mafia, Kilwa Seascape Programme."

[7] Compare the WWF RUMAKI Seascape project, http://assets.panda.org/downloads/seascapefactsheet.pdf (Accessed 30 November 2011), with the WWF "Building Mangrove Resilience" project, http://www.climateprep.org/2009/12/04/building-mangrove-resilience-to-climate-change/ (Accessed 30 November 2011).

[8] See footnote 1, "WWF Tanzania's REDD Pilot Projects Sites" and related documents.

[9] Tanzania's National REDD Strategy Development: Supporting REDD Readiness in Tanzania, November 2009, http://www.reddtz.org/component/option,com_docman/task,doc_download/gid,22/Itemid,18/. (Accessed on 30 November 2011).

[10] See footnote 2, "Report of the Meeting" and "Government Issues Eviction Order to Forest Invaders." For an update, see footnote 3 "Finnigan Wa Simbeye *Tanzania Daily News*."

[11] In January 2011, the FBD issued a two-week eviction order to all "invaders of reserved forests countrywide" including the Rufiji Delta (Kimati, 2011). For an update, see footnote 3 "*Finnigan Wa Simbeye*."

[12] See footnote 1 carbon forestry programs.

main donor for REDD+ in Tanzania is Norway which has committed NKr 500 million towards the formulation and implementation of a national REDD+ strategy in Tanzania over the next five years. The FBD of the MNRT, with technical support from the Institute of Resource Assessment (IRA), is responsible for coordinating aspects of REDD+ and REDD-readiness activities (Tanzanian REDD Initiative, 2010). The role of WWF in Tanzanian REDD+ projects is outlined in REDD+ project documents, which state that "WWF can have a key role to play in supporting the implementation of the [REDD] strategy"[13] and "existing NGOs, may be in charge of overseeing the fair distribution of REDD+ funds through village level bodies in Tanzania" (Chiesa et al., 2009: 7). The threat of evictions and loss of access to important resources for livelihood security is another example of how international conservation interests can either directly or indirectly legitimate the state's use of "force" in resource management and contributes to the disenfranchisement of the Warufiji's resource claims (Peluso, 1993).

Tanzania is often heralded as the vanguard for local democratic forest resource management, due mostly to its decentralized state institutions (Blomley et al., 2010). Accordingly, Tanzanian REDD+ policies are currently being designed on existing forest management strategies such as joint forest management agreements (JMAs) (Burgess et al., 2010). However, we show how devolved decision-making in policy discourses do not necessarily lead to justice and equity in terms of resource access and actual local-level decision-making. Critiques of decentralized resource governance in Tanzania, particularly within the wildlife sector, are numerous and well documented by a number of scholars (Neumann and Schroeder, 1999; Igoe and Croucher, 2007; Igoe and Brockington, 1999; Goldman, 2003). This case provides a cautionary note for any REDD+ project modeled after a decentralized forestry scheme that is not decentralized in practice. It is a serious shortcoming in the context of REDD+ programs in Tanzania and elsewhere (Thomas and Twyman, 2005).

It is difficult to reconcile Tanzania REDD's participatory and benefit sharing goals (United Republic of Tanzania, 2010; Tanzanian REDD Initiative, 2010) with the rhetoric, practices, and plans of the Tanzanian state. Indicative of the contradiction between REDD+ policy and Tanzanian forest management is the statement made by the Director of Forestry and Beekeeping Department in November 2009, "I am here to make sure that forests are protected and therefore I will not wait to see these forests turning into deserts and we will do all we can, including the use of force, because for such a serious matter as this one, we do not need negotiations" (Saiboko, 2009).

If REDD+ programs genuinely seek to apply "rights-based and participatory approaches" in practice, then forest-reliant communities' calls for land tenure security and the development of compliance procedures and accountability mechanisms for its activities in Tanzania must be addressed (Griffiths, 2009). These same communities have been unable to benefit from payment for ecosystem services, such as Clean Development Mechanisms, because their land rights are not legally recognized (Blomley et al., 2010; Yanda, 2009). Therefore, the ambiguity around land tenure in forest reserves in Tanzania such as the Rufiji Delta legitimates concerns over scaling up REDD+ before land tenure is clarified (Sunderlin et al., 2009). In order for villagers to receive compensation directly from REDD+, the "legal quagmire" (Homewood, 2006 citing Shivji, 1994) of land tenure in Tanzania, particularly within Forest Reserves, must be addressed.

[13] See footnote 1, "United Republic of Tanzania, October 2010," p. 19.

3.3. Environmentalists' narrative of the Rufiji Delta

The conceptualization of carbon forestry projects in the Rufiji Delta builds upon a narrative of environmental change that is shared by international conservation organizations, the Tanzanian state, and aid donors. In this section, we present the common elements that frame this narrative. In the following section we offer an alternative reading of environmental history. Both the narrative and counternarrative demonstrate the centrality of politics and political economy in the framing of environmental problems and solutions.

The environmental narrative used by WWF and the Tanzanian state to support their carbon forestry activities pivots around the problem of adaptation to climate change (Cook, 2009; Wagner and Sallema-Mtui, 2010). The narrative has two major parts. The first is future oriented and predicts that a main consequence of global climate change will be a rise in sea level. The second part underscores the importance of maintaining the integrity of mangrove forests as both a bulwark against rising sea levels as well as to preserve biodiversity. The main problem in preserving the forests and its biodiversity is the presence of people who are viewed as "invaders" and "destroyers" of mangrove forests. Biodiversity loss is attributed primarily to illegal rice cultivation (Cook, 2009).

WWF project documents indicate sea level rise as the main climate change threat to mangrove forests in the Rufiji Delta (Cook, 2009; Wagner and Sallema-Mtui, 2010). The 2007 Intergovernmental Panel on Climate Change (IPCC) estimates a rise in sea level of 18–59 cm by the year 2100 (IPCC, 2007). The impact of sea level rise in the Rufiji Delta could be the loss of coastal habitats as a result of flooding and erosion, and the loss of biological productivity (Ngusaru et al., 2001; Wagner and Sallema-Mtui, 2010). Since mangrove forests are widely viewed as buffering the coasts from higher seas and storms, their preservation is a top climate adaptation priority.

The narrative of causality also paints a picture of relatively recent immigration and forest degradation in the north delta area. "In the past," the people of the Rufiji Delta cultivated rice in the Rufiji valley flood plain (Ngusaru et al., 2001). After the "devastation" that occurred from a massive flood in 1968,[14] when the Rufiji river level rose by ten feet, President Nyerere ordered the relocation of flood plain communities to the northern part of the delta. This resettlement program was known as the villagization campaign "Operation Rufiji." The displaced farmers purportedly began clearing mangrove forests to "adapt rice farming in new areas in response to this rather adverse situation" thus causing a new and major threat to the mangrove forest in the Rufiji Delta North (Ngusaru et al., 2001: 10; Wagner and Sallema-Mtui, 2010: 7). The abrupt shift in the main course of the Rufiji River towards the northern part of the delta is also believed to have changed the patterns of erosion, deposition, and salt penetration.

The less saline conditions that were enabled by the aforementioned "northward shift of the Rufiji River flow" allowed farmers to expand rice cultivation into new areas in the Rufiji Delta North (Wood et al., 2000). In addition, the IUCN (2004) reports that the technique for the "environmentally unfriendly" and "illegal practice" of large scale cutting of mangroves for rice farming is said to hinder natural regeneration of mangrove forests due to alterations of the soil microclimate and the lack of seed-bearing trees as seed sources. The FBD Director expressed concern at a Southern African Development Community (SDAC) meeting on

[14] Others argue 1978 marks the time period when the main flow of the Rufiji River was directed northward towards the Delta North (Wagner and Sallema-Mtui, 2010: 35). Also refer to "Report of the Meeting" (footnote 2).

REDD in Arusha, Tanzania stating, "the rapid annihilation of the country's green cover is now going out of control" (Nkwame, 2010). In REDD+ project documents, the Rufiji Delta North is cited as having one of the highest cultivation rates, making it the "main driver" of mangrove deforestation and degradation.[15]

The extent of deforestation is reported in a land cover change study by Wang et al. (2003). The authors found a 1769 ha decline in mangrove forest cover in the Rufiji Delta between 1990 (49,799 ha) and 2000 (48,030 ha). Using satellite images, this study attributes "agricultural practices" as the principle cause of mangrove forest loss. The study is cited in Tanzanian REDD+ documents to chart trends in mangrove destruction (Kilahama et al., 2009). This quantitative measure justifies urgency to both protect and reclaim the mangrove forest to the natural state that purportedly characterized the Rufiji Delta prior to the expansion of rice cultivation. The politics that stem from this narrative are the strict protectionist measures, including evictions that currently define Tanzanian forestry policy for the Rufiji Delta. The take home message of the narrative is that rice farming must be stopped and mangrove trees planted if the mangroves are going to provide the critical ecosystem services needed in the context of rising sea-levels and the development of carbon markets.

3.4. An environmental historical and scientific lens of the Rufiji Delta

The environmental narrative that informs Tanzanian REDD project documents and REDD-readiness activities is flawed in three fundamental ways. First, it inaccurately describes the history of movement and settlement of people in the Rufiji Delta North. The narrative paints a picture of a relatively recent immigration of people, but archival records show the delta to be a socio-natural landscape in which farming and intensive logging were widespread since at least the nineteenth century. The area was yielding at least two rice harvests per year and mangrove poles were traded within local, regional, and international circuits. Second, the environmental science and environmental history that informs the narratives are exceedingly shallow. They do not take into account the patchy nature of the Rufiji Delta landscape that is derived in part from the fluvial geomorphology and in part from human use. This patchiness is described by 19th century explorers, colonial foresters, and contemporary environmental historians. Lastly, the threat of sea-level rise for coastal Tanzania is uncertain.

The claim that contemporary rice farmers in the Rufiji Delta North are recent immigrants that date from the villagization campaigns in 1968–1974 is historically and geographically inaccurate. The area where the villagers were planned to be relocated was not in the northern part of the delta, but further inland on higher and infertile escarpments referred to by Havnevik (1993) as North Hill (Fig. 1). Delta residents refused to comply with the government orders to move away from the fertile flood plain they had cultivated for generations (Sandberg, 1974; Sandberg, 2010). Rather than being recent immigrants, the Warufiji have populated the delta for centuries.

The Warufiji's refusal to leave the area during villagization is consistent with a long history of resistance to outside influences. The British consul to Mozambique, James Elton, visited the Rufiji Delta North in the late-1870s. In Elton's account of his travels, he stated that the "Rufiji sell but few slaves to the Arabs, who do not care to meddle with them" (Elton, 1879: 100). The most dramatic example of the Warufiji's resistance to external claims on their labor and resources was their resistance to the forced cotton cultivation policies of the German Colonial Government in 1902. The brutality of forced cultivation and its effects on rural livelihoods led to the largest peasant uprising in colonial Africa known as the Maji Maji rebellion (1905–1907) in which over 75,000 Africans were killed. Sunseri (2003, 2005, 2009) argues that the Maji Maji rebellion was sparked by the Warufiji's refusal to recognize the colonial state's claims to forest resources and their resistance to wage labor as wood cutters and tree planters for German colonial foresters. The Warufiji were also considered by President Nyerere to be the most supportive against the British in the struggle for Independence (Hyden, 1980). In 1996–1997, the Warufiji resisted attempts of foreign investors to build the world's largest industrial prawn farm in the delta. This history of delta resistance is tremendously important for what we might anticipate if the proposed evictions take place.

In contrast to environmentalists' portraits of an "Edenic" landscape prior to the 1970s, late 19th century explorers encountered a working landscape in the Rufiji Delta. The history of the region is intimately tied to the development of the coastal Swahili culture based on nearly two thousand years of trading connections between Zanzibari, Somali, Arab, Persian, and Indian traders and the coast (Havnevik, 1993; Chami and Msemwa, 1997). After 1730, the Omani engaged in extensive trading along the East African coast for mangrove poles. James Elton documented extensive settlements and trade during his travels along the Rufiji River in 1879. In the Rufiji Delta North, he described villages as "well built and populous near mangrove creeks in order for the large important trade for copal, ivory, wax, woods, and grain" (Elton, 1879: 91). In 1881, William Beardall was commissioned by the Sultan of Zanzibar to collect information of the country and people of the Rufiji Delta (Beardall, 1881). He described the Rufiji Delta North as "avenues of mangrove trees with inhabitants beginning to get in their second crop of rice" (641). In 1901, the German Captain Prussing also navigated through the same area and described loading places for wood and very suitable land for rice growing (Anonymous, 1901). In 1938, a British colonial forester stated that the area supported native villages, Indian and Arab shops, and some "good agriculture" (Grant, 1938).

Coastal traders highly valued mangrove poles from the Rufiji Delta. In the late 19th century, Rufiji was the main source of the mangrove trade for the Red Sea and Arabia (Sunseri, 2009). In 1899, the Sultan of Zanzibar had the right to exploit the Rufiji Delta for mangrove poles free of charge, despite the area being under control of the German Forest Department. At this time, fleets of Arab and Persian dhows that could load up to two hundred mangrove poles landed in the Rufiji Delta to load wood. Eighty to ninety percent of all wood exported from German East Africa originated in the Rufiji Delta (Schabel, 1990). In a five-month period from 1902 to 1903, the colonial government consumed approximately 280,000 logs of varying lengths for its steam engines (Sunseri, 2009). To maintain these forest resources, silviculture became a common practice. The German Forestry Department planted mangrove species for which demand was greatest. Merchants also prized the bark used for tanning and making resins (Barker, 1936). By the end of German rule, up to 78 percent of all mangroves in German East Africa were leased to bark exploiters (Sunseri, 2009). Mangrove forest exploitation accelerated considerably in the 1940s under British rule. In 1948, a mangrove concession was considered to be a "gold mine" (Havnevik, 1993).

A second theme in the environmental narrative of mangrove forest destruction is centered on flooding. A massive flood is believed to have caused an abrupt change in the Rufiji river course northward bringing freshwater to areas that were previously too saline to cultivate. This component of the narrative neglects the historical accounts of rice cultivation as well as the dynamic ecosystems of river deltas. All river deltas continuously change their flow patterns and courses at differing scales in time and space (Sandberg, 2010). Furthermore, fluctuations and variability in

[15] See footnote 9 "Tanzania's National REDD Strategy Development."

flooding has occurred throughout the Rufiji river delta's history with new patterns of flooding every year, particularly during the long rains, that bring fresh water to places that were previously too saline (Marsland, 1938; Havnevik, 1993). Despite a continuous change in the patterns and courses of the Rufiji river delta, all of its river mouths tend to turn northwards as they reach the coast due to the overall net northward long-shore drift.

The Warufiji's complex shifting rice cultivation practices rely on this historical seasonal variability. They combine mangrove silviculture with rice paddy farming by abandoning rice paddy fields when they become too saline due to seasonal changes (small temporal scale) or river course changes (long temporal scale). Thus, Warufiji rice farmers plant and farm rice seasonally in relation to their predictions for salinity changes. It also makes it impossible for the Warufiji to grow rice everywhere at all seasons. Moreover, the closer to the mouth of the Rufiji River the greater the exposure is to salt water intrusion which reduces the area suitable for growing rice. The Warufiji also allow the mangroves to regenerate naturally while preparing new rice fields in less saline areas. Mangroves have a great propensity to regenerate themselves (Primavera, 2009). Natural regeneration of mangrove forests also contributes to higher biodiversity than silviculture, which often involves the planting of just a few species.

This extensive use of the Rufiji Delta North for farming, fishing, logging, and forestry demonstrates that the mangrove forests were a highly utilized environment that could hardly be described as "Edenic." Furthermore, the restrictions placed on mangrove forest land use by the FBD demonstrates how current land use in the Rufiji Delta North is not nearly as extensive as it was during the 18th and 19th centuries and even earlier. This environmental history illustrates how (1) it is problematic to suggest that a single major flood event would cause such an abrupt change in the course and direction of rivers in the Rufiji Delta to allow penetration of freshwater into an entire area it previously did not reach; and (2) Warufiji land use (e.g. rice cultivation) patterns take a mosaic form that mirrored the flooding, silting, and shifting river pattern.

In light of this mosaic land cover pattern, it is difficult to imagine the extent of environmental degradation projected by Wang et al. (2003). Mangrove vegetation is quite patchy, especially across multiple intersecting gradients of elevation, water and salinity levels, soil types, and wave exposure. These gradients affect the species composition, size, and growth patterns of mangrove trees on scales that are much finer than the satellite imagery resolution of 15 m and 30 m used by Wang et al. (2003). It is difficult to define the outer boundaries of a mangrove, and impossible to delineate the variations within a mangrove forest. One indicator of the difficulty in measuring land cover change in Tanzanian mangrove forests is the contradictory data. The World Mangrove Atlas (Spalding et al., 1997; Spalding et al., 2010), indicates that total mangrove forest cover in Tanzania has increased from 1155 km^2 in 1993 to 1286 km^2 in 2010.

The anticipated impacts of climate change, particularly sea-level rise, are considered to make conditions even more precarious for mangroves and heighten the urgent need to improve their management and protection (Cook, 2009). Using recent data from the University of Hawaii Sea Level Center, Benjaminsen et al. (2008) show that sea level in Tanzania is not rising. In fact, it appears to be falling. Mean sea level fall in the southern Indian Ocean are also corroborated by Wenzel and Schroter (2010), Woodroffe and Horton (2005), and Woodworth et al., 2007. Falling rates of sea-level are attributed to the rise of the coastline from thousands of years of tectonic plate movements associated with the East African Rift Valley (Benjaminsen et al., 2008). Therefore, at present, the Tanzanian coastline does not appear to be threatened by sea-level rise. Assumptions to the contrary do not take into consideration tectonic plate movements.

The long-standing practice of shifting rice cultivation combined with natural regeneration may have positive implications for biodiversity by creating minor perturbations and small changes and openings within environments as well as new niches for a wider variety of plant and animal species. These subsistence rice farming systems have also been recognized for at least two centuries in the Rufiji Delta and demonstrate that Delta North is an agroecological landscape. Thus, the question arises is what will happen to this complex and relatively stable socio-ecological system when carbon foresters and conservationists supplant the Warufiji in the Rufiji Delta North?

4. Revisioning REDD through an environmental justice lens

This paper has focused on the politically charged issues of environmental justice in the Rufiji Delta of Tanzania in the context of WWF and Tanzanian state carbon forestry programs to make the Rufiji Delta North "REDD ready." We have shown how in the case study of the Rufiji Delta, carbon forestry activities unfolding in anticipation of REDD+ are redolent with environmental injustices that threaten the livelihoods of the Warufiji. Our findings are four-fold. First, this case study validates the social and environmental justice concerns within the global climate change mitigation and adaptation literature associated with carbon forestry (Griffiths, 2009; Sikor et al., 2010). It shows how carbon forestry initiatives are redefining socio-natural relations in ways that threaten access to, control, and management of natural resources. In the process of making the Rufiji Delta "REDD ready" for carbon forestry markets, resource control and management appear to be shifting from local people in the Rufiji Delta to global actors.

Second, the study also demonstrates the ways this local to global shift in resource control and management are legitimated by narratives of environmental change (forest loss; rising sea levels) that have little basis in environmental history. Along with Sunseri (2009), we have demonstrated how the depiction of the Warufiji as invaders and destroyers of mangroves and forest loss as recent and abrupt, "erases the history of these forests as peopled spaces" (184). This misreading of the Rufiji landscape persists because it is central to the framing of environmental problems in ways that allow national and global actors to intervene in the landscape and livelihoods of the Warufiji. When this narrative is placed in the context of rising sea levels, it suggests an urgent need for intervention. In contrast, to this environmental crisis narrative, our case study suggests that the mangrove forests of the Rufiji can be reasonably described as sustainably utilized environments particularly when compared to historical forest use (e.g. timber extraction during pre-colonial and German colonialism). This re-reading of landscape and history reveals the injustices in current interpretations and recommends a conservation-with-development approach that supports existing practices of the Warufiji rather than their forcible removal from the forest.

Our third finding is that the Warufiji are resisting efforts to make the Rufiji Delta North "REDD ready" on the grounds that these efforts will increase their vulnerability and displacement. The Warufiji have a long history of resisting the claims on their labor and resources by outsiders. This begs the question in the formulation of REDD+ strategies, what incentives do REDD+ programs actually provide in order to change a history of resistance? The core issue at stake is the Warufiji's historical rights to land and water resources which national land laws and forest acts sometimes respect and sometimes reject. This is particularly relevant to the ability of REDD+ programs to constrain deforestation without seriously compromising food and livelihood security (Grieg-Gran, 2010).

Lastly, our case study legitimates concerns posed by Phelps et al. (2010), "does REDD+ threaten to recentralize forest

governance?" REDD+ sees decentralization of forest resource management as the key to empowering local communities. However, the Rufiji Delta case study reveals that the Warufiji have very limited representation with accountability and reduced access to significant material resources (Ribot et al., 2008). WWF, on the other hand, gains power by aligning itself with the Forestry and Beekeeping Division, while resisting downward accountability (Poteete and Ribot, 2011). Thus, resistance may be the only means for many Warufiji to defend themselves against the menace of REDD+, if it is implemented based on current carbon forestry governance in the Rufiji Delta. In order for REDD+ to result in both sustainable forestry and poverty reduction, the historical exclusion of forest-reliant communities from land ownership must be addressed. Equitable distribution in the form of securing the Warufiji's land tenure rights to resources is of primary concern. To carbon traders, however, an uninhabited forest greatly simplifies the logistical tasks of monitoring and paying for ecosystem services. The case study of the Rufiji Delta suggests that this "new direction in forest conservation" (Anglesen, 2009) may be overwhelmingly opposed by the people who stand to lose the most from such climate mitigation schemes.

Acknowledgements

The research for this paper was conducted while the authors were in receipt of a National Science Foundation Dissertation Improvement Grant. The authors wish to especially thank Ian Bryceson, Lisa Naughton, Ashwini Chhatre, Barbara Lynch, Andrea Wright, Julien Rebotier, and Carol Farbotko for their contributions and editorial suggestions. We also thank the two anonymous reviewers and the participants of the ICARUS write-shop and the Nature-Society Graduate Workshop for their very helpful comments.

References

Adams, W., 2009. Green Development: Environment and Sustainability in a Developing World. Routledge Press, London, UK.
Agrawal, A., Nepstad, D., Chhatre, A., 2011. Reducing emissions from deforestation and forest degradation. Annual Review of Environment and Resources 36, 373–396.
Akida, A., Blomley, T., 2006. Trends in Forest Ownership, Forest Resources Tenure and Institutional Arrangements: Are They Contributing to Better Forest Management and Poverty Reduction? Case Study from Tanzania. Unpublished Report. Food and Agricultural Organization, Rome, Italy, 34 pp.
Agrawal, A., Ribot, J., 1999. Accountability in decentralization: a framework with South Asian and West African cases. Journal of Developing Areas 33, 473–502.
Anglesen, A. (Ed.), 2009. Realizing REDD+: National Strategy and Policy Options. Center for International Forestry Research, Denmark.
Anonymous, 1901. The Rufiji Delta. The Geographical Journal 18 (4), 444.
Awde, N., 2000. Swahili Practical Dictionary. Hippocrene Books, NY.
Barker, R.B., 1936. The delta of the Rufiji river. Tanganyika Notes and Records 2, 1–6.
Bassett, T., 2010. Reducing hunger vulnerability through sustainable development. Proceedings of the National Academy of Sciences 107 (13), 5697–5698.
Beardall, W., 1881. Exploration of the Rufiji river under the orders of the Sultan of Zanzibar. In: Proceedings of the Royal Geographical Society and Monthly Record of Geography, New Monthly Series 3 11. pp. 641–656.
Benjaminsen, T.A., Bryceson, I., Maganga, F., 2008. Climate change in Tanzania: trends, policies and initiatives. Report to NORAD, Oslo, Norway, 41 pp.
Blomley, T., Ramadhani, H., 2006. Going to scale with participatory forest management: early lessons from Tanzania. International Forestry Review 8 (1), 93–100.
Blomley, T., Iddi, S., 2009. Participatory forest management in Tanzania: 1993-2009 lessons learned and experiences to-date. Ministry of Natural Resources and Tourism, Forestry and Beekeeping Division, Dar es Salaam, Tanzania, 72 pp.
Blomley, T., Ramadhani, H., Mkwizu, Y., Bohringer, A., 2010. Hidden harvests: unlocking the economic potential of community-based forest management in Tanzania. In: German, L., Karsenty, A., Tiani, A. (Eds.), Governing Africa's Forests in a Globalized World. Earthscan Press, UK, pp. 136–140.
Boyd, E., 2009. Governing the clean development mechanism: global rhetoric verses local realities in carbon sequestration projects. Environment and Planning A 41, 2380–2395.
Bryceson, I., 2002. Coastal aquaculture developments in Tanzania: sustainable and non-sustainable experiences. Western Indian Ocean Journal of Marine Science 1 (1), 1–10.
Bryceson, I., Havnevik, K., Isinika, A., Jørgensen, I., Melamari, L., Sønvisen, S., 2005. Management of natural resources programme, Tanzania. Mid-term Review of TAN-092. Phase III 2004–2006. Ministry of Natural Resources and Tourism and Royal Norwegian Embassy, Tanzania, 176 pp.
Bumpus, A., Liverman, D., 2008. Accumulation by decarbonization and the governance of carbon offsets. Economic Geography 84 (2), 127–155.
Burgess, N., Bahane, B., Clairs, T., Danielsen, F., Dalsgaard, S., Funder, M., Hagelberg, N., Harrison, P., Haule, C., Kabalimu, K., Kilahama, F., Kilawe, E., Lewis, S., Lovett, J., Lyatuu, G., Marshall, A., Meshack, C., Miles, L., Simon, A., Pantaleo, M., Munishi, K., Nashanda, E., Shirima, D., Swetnam, R., Willcock, S., Williams, A., Zahabu, E., 2010. Getting ready for REDD+ in Tanzania: a case study of progress and challenges. Oryx 44 (3), 339–351.
Chami, F., Msemwa, P., 1997. A new look at culture and trade on the Azanian coast. Current Anthropology 38 (4), 673–677.
Castree, N., 2003. Commodifying what nature? Progress in Human Geography 27 (3), 273–297.
Chhatre, A., 2008. Political articulation and accountability in decentralization: theory and evidence from India. Conservation and Society 6 (3), 12–21.
Chiesa, P., Dere, M., Saltarelli, E., Sandbank, H., 2009. UN-REDD in Tanzania. Project on Reducing Emissions from Deforestation and Forests Degradation in Developing Countries. v1.1. Johns Hopkins School of Advanced International Studies/UNEP World Conservation Monitoring Centre, 61 pp, Washington DC/Cambridge, UK.
Cook, J., 2009. Building mangrove resilience. WWF United States. 4 December 2009. <http://www.climateprep.org/2009/12/04/building-mangrove-resilience-to-climate-change/>. (Accessed on 21 November 2011).
Elton, J.F., 1879. Travels and Researches Among the Lakes and Mountains of Eastern and Central Africa. John Murray, London, UK.
Fairhead, J., Leach, M., 1996. Misreading the African Landscape: Society and Ecology in a Forest-savanna Mosaic. Cambridge University Press, Cambridge.
Forsyth, T., 2003. Critical Political Ecology: The Politics of Environmental Science. Routledge Press, London, UK.
Forsyth, T., Walker, A., 2008. Forest Guardians, Forest Destroyers: The Politics of Environmental Knowledge in Northern Thailand. University of Washington Press, Seattle, WA.
Goldman, M., 2003. Partitioned nature, privileged knowledge: community based conservation in Tanzania. Development and Change 34 (5), 833–862.
Grant, D.K.S., 1938. Mangrove woods of Tanganyika territory, their silviculture and dependent industries. Tanganyika Notes and Records 5, 5–16.
Grieg-Gran, M., 2010. Beyond forestry: why agriculture is key to the success of REDD+. IIED Briefing 201 (November), 0.
Griffiths, T., 2009. Seeing 'REDD'? Forests, climate change mitigation and the rights of indigenous peoples and local communities. Forests Peoples Programme, UK, 72 pp.
Havnevik, K.J., 1993. Tanzania: the Limits to Development from above. Motala Grafiska, AB, Sweden.
Henderson, G., 1998. Nature and fictitious capital. Antipode 30, 73–118.
Homewood, K., 2006. Politics in land and water management: study in Kilimanjaro, Tanzania. Africa Today 53 (2), 126–128.
Hyden, G., 1980. Beyond Ujamaa in Tanzania: Underdevelopment and an Uncaptured Peasantry. Heinemann, London, UK.
Igoe, J., Brockington, D., 1999. Pastoral Land Tenure and Community Conservation: A Case Study from North-east Tanzania. International Institute for Environment and Development, London.
Igoe, J., Croucher, B., 2007. Conservation, commerce, and communities: the story of community-based wildlife management areas in Tanzania's northern tourist circuit. Conservation and Society 5 (4), 432–449.
IPCC, 2007. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK.
IUCN, 2004. Information sheet on RAMSAR wetlands. <http://www.wetlands.org/RSIS/_COP9Directory/Directory/ris/1TZ004en.pdf> (Accessed on 10 December 2009).
Jonas, A.E., Bridge, G., 2003. Governing nature: the re-regulation of resources, land-use planning, and nature conservation. Social Science Quarterly 84 (4), 958–962.
Kajembe, G.C., Nduwamungu, J., Luoga, E.J., 2005. The impact of community-based management and joint forest management on the forest resource base and local people's livelihoods: case studies from Tanzania. Commons Southern Africa Occasional Paper Series, 822 pp.
Kilahama, F., Noudehou, A., Setshwaelo, L., 2009. UN-REDD programme-Tanzania quick start initiative. Draft Report, UNDP, Tanzania, 55 pp.
Kimati, B., 2011, Government issues eviction order to forest invaders. Tanzania Daily News. 21 November 2011.
Leach, M., Mearns, R., 1996. Challenging the received wisdom in Africa. In: Leach, M., Mearns, R. (Eds.), The Lie of the Land. Heinemann, Portsmouth, NH.
Liverman, D., 2004. Who governs, at what scale and at what price? Geography, environmental governance, and the commodification of nature. Annals of the Association of American Geographers 94 (4), 734–738.
Liverman, D., 2009. Conventions of climate change: constructions of danger and the dispossessions of the atmosphere. Journal of Historical Geography 35, 279–296.
Lovell, H., Bulkeley, H., Liverman, D., 2009. Carbon offsetting: sustaining consumption? Environment and Planning A 41, 2357–2379.
Marsland, H., 1938. Mlau cultivation in the Rufiji valley. Tanganyika Notes and Records 5, 56–59.

McAfee, K., 1999. Selling nature to save it? biodiversity and green developmentalism. Environment and Planning D: Society and Space 17 (2), 133-154.
McAfee, K., Shapiro, E., 2010. Payments for ecosystem services in Mexico: nature, neoliberalism, social movements, and the state. Annals of the Association of American Geographers 100 (3), 579–599.
NEMC (National Environmental Management Council of Tanzania) of Tanzania, 1997. Technical review of an environmental impact assessment fro an environmentally-responsible prawn farming project in the Rufiji Delta, Tanzania. Report submitted to the Tanzanian Government, Dar es Salaam, Tanzania.
Neumann, R., 1998. Imposing Wilderness: Struggles Over Livelihood and Nature Preservation in Africa. University of California Press, Berkeley, CA.
Neumann, R., Schroeder, R., 1999. Manifest ecological destinies: local rights and global environmental agendas. Antipode 27 (4), 321–324.
Ngusaru, A.S., Mgaya, Y.D., Francis, J., Sosovele, H., 2001. Root causes of biodiversity loss in Rufiji-Kilwa-Mafia and Mnazi Bay-Ruvuma estuary in Tanzania. WWF African Marine Ecoregion (EAME) Programme, Tanzania, 63 pp.
Nkwame, M., 2010. 420,000 hectares of forests disappear annually. Tanzania Daily News 21 November 2010.
Noordwijk, M., Minang, P., 2009. If we cannot define it, we cannot save it. Forests and climate change: adaptation and mitigation. ETFRN News 50, November 2009.
O'Brien, K., Eriksen, S., Nygaard, L., Schojolden, A., 2007. Why different interpretations of vulnerability matter in climate change discourses. Climate Policy 7, 73–88.
Peluso, N.L., 1993. Coercing conservation? The politics of state resource control. Global Environmental Change 3 (2), 199–218.
Perfecto, I., Vandermeer, J., 2008. Biodiversity conservation in tropical agroecosystems: a new paradigm. Annals of the New York Academy of Science 1134, 173–200.
Phelps, J., Webb, E., Agrawal, A., 2010. Does REDD+ threaten to recentralize forest governance? Science 328, 312–313.
Polyani, K., 1944. The Great Transformation: The Political and Economic Origins of Our Time. Beacon Press, Boston, MA.
Poteete, A., Ribot, J., 2011. Repertoires of domination: decentralization as process in Botswana and Senegal. World Development 39 (3), 439–449.
Primavera, J., 2009. Using mangroves for aquaculture–why should we? Challenges and Prospects of Mariculture in the WIO region. In: WIOMSA/IFS Workshop, Zanzibar, Tanzania, December 2009.
Prudham, S., 2009. Pimping climate change: Richard Branson, global warming, and the performance of green capitalism. Environment and Planning A 41, 1594–1613.
Ribot, J., Chhatre, A., Lankina, T., 2008. Introduction: institutional choice and recognition in the formation and consolidation of local democracy. Conservation and Society 6 (1), 1–11.
Rugonzibwa, P., 2009. More than 40,000 forest invaders for eviction in 14 days time. Daily News 22 September 2009.
Saiboko, A., 2009. Kazimzumbwi forest invaders ordered to quit. Daily News 23 November 2009.
Sandberg, A., 1974. Socio-economic survey of lower Rufiji flood plain Rufiji Delta agricultural system. Bureau of Resource Assessment and Land Use Planning 34. The University of Dar es Salaam, Tanzania..
Sandberg, A., 2010. Institutional challenges to robustness of delta and flood plain agricultural systems. Environmental Hazards 9 (3), 284–300.
Schabel, H.G., 1990. Tanganyika forestry under German colonial administration, 1891–1919. Forest and Conservation History 131–141.
Scoones, I., 2009. Livelihoods perspectives and rural development. The Journal of Peasant Studies 36 (1), 171–196.
Scott, J., 1998. Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed. Yale University Press, New Haven, CT.
Semesi, A.K., 1991. Management plan for the mangrove ecosystem of mainland Tanzania. Vol. I-10 Joined. Ministry of Tourism, Natural Resources and Environment, Forestry and Beekeeping Division, Dar es Salaam, Tanzania.
Semesi, A.K., 1992. Developing management plans for the mangrove forest reserves of mainland Tanzania. Hydrobiologia 247, 1–10.
Shivji, I., 1994. A legal quagmire: Tanzania's regulation of land tenure (Establishment of Villages) Act, 1992. Pastoral Land Tenure, 5. IIED, London, UK.
Shivji, I., 2006. Lawyers in neoliberalism: authority's professional supplicants or society's amateurish conscious. University of Dar es Salaam, Tanzania. 15 July 2006. Valedictory Address.
Sikor, T., Stahl, J., Enters, T., Ribot, J., Singh, N., Sunderlin, W., Wollenberg, L., 2010. REDD-plus, forest people's rights and nested climate governance. Global Environmental Change 20 (3), 423–425.
Spalding, M., Blasco, F., Field, C., 1997. World Mangrove Atlas. The International Society for Mangrove Ecosystems, Okinawa, Japan.
Spalding, M., Kainuma, M., Collins, L., 2010. World Atlas of Mangroves. Earthscan Ltd., London, UK.
Sunderlin, W.D., Larson, A.M., Cronkleton, P., 2009. Forest tenure rights and REDD+: from inertia to policy solutions. In: Anglesen, A. (Ed.), Realizing REDD+: National Strategy and Policy Options. Center for International Forestry Research, Denmark, pp. 139–150.
Sunseri, T., 2003. Reinterpreting a colonial rebellion: forestry and social control in German East Africa, 1874–1915. Environmental History 8, 430–451.
Sunseri, T., 2005. Working the mangroves and beyond: scientific forestry and the labour question in early colonial Tanzania. Environment and History 11, 365–394.
Sunseri, T., 2009. Wielding the Ax: Scientific Forestry and Social Conflict in Tanzania. Ohio University Press, Athens, OH.
Tanzania REDD Initiative, 2010. Tanzanian national REDD taskforce, national REDD projects and NGO REDD readiness projects. <http://www.reddtz.org/content/view/17/21/> (Accessed on 10 October 2010).
Taylor, P.J., Buttel, F.H., 1992. How do we know we have global environmental problems? GeoForum 23, 405–416.
Thomas, D., Twyman, C., 2005. Equity and justice in climate change adaptation amongst natural-resource-dependent societies. Global Environmental Change 15, 115–124.
United Republic of Tanzania, 1994. Report of the Presidential Committee of Inquiry into Land Matters. Vol. I. Land Policy and Land Tenure Structure. Government Printers, Dar Es Salaam, Tanzania.
United Republic of Tanzania, 2010, October. National REDD Information and Communication Strategy 2010-2012. Prepared by Reglia Media, Dar es Salaam, Tanzania.
Vihemäki, H., 2009. Participation or further exclusion? Contestations over forest conservation and control in the East Usambara Mountains, Tanzania. Diss. University of Helsinki.
Wagner, G., Sallema-Mtui, R., 2010. Change analysis of Rufiji-Mafia-Kilwa mangroves, Tanzania in relation to climate change factors and anthropogenic pressures. WWF Tanzania Country Office, Dar es Salaam, Tanzania, 158 pp.
Wang, Y., Bonynge, G., Nugranad, J., Traber, M., Ngusaru, A., Tobey, J., Hale, L., Bowen, R., Makota, V., 2003. Remote sensing of mangrove change along the Tanzania coast. Marine Geodesy 26, 35–48.
Watts, M., 2002. Green capitalism, green governmentality. American Behavioral Scientist 45 (9), 1313–1317.
Wenzel, M., Schroter, J., 2010. Reconstruction of regional mean sea level anomalies from tide gauges using neural networks. Journal of Geophysical Research 115, 1–15.
West, P., Igoe, J., Brockington, D., 2006. Parks and peoples: the social impact of protected areas. Annual Review of Anthropology 35, 251–277.
Wilshusen, P.R., Brechin, S., Fortwangler, C., West, P., 2002. Reinventing a square wheel: critique of a resurgent protection paradigm in international biodiversityconservation. Society of Natural Resources 15, 17–40.
Wood, A., Stedman-Edwards, P., Mang, J., 2000. The Root Causes of Biodiversity Loss. Earthscan Publications Ltd., London, UK.
Woodroffe, S.A., Horton, B.P., 2005. Holocene sea-level changes in the Indo-Pacific. Journal of Asian Earth Sciences 25 (1), 29–43.
Woodworth, P.L., Aman, A., Aarup, T., 2007. Sea Level Monitoring in Africa. IOC and UNESCO, Paris.
WWF Tanzania, No Date. Rufiji-Mafia-Kilwa seascape programme Tanzania. Available http://wwf.panda.org/what_we_do/where_we_work/east_african_coast/?uNewsID=21998. (Accessed on 30 November 2011).
Yanda, P., 2009. REDD+ Realities in Tanzania. In: Angleson, A. (Ed.), Realizing REDD+: National Strategy and Policy Options. Center for International Forestry Research, Denmark, pp. 38–39.
Zimmerer, K., 2006. Globalization and New Geographies of Conservation. University of Chicago Press, Chicago, IL.