

Land Acquisitions in Tanzania: Strong Sustainability, Weak Sustainability and the Importance of Comparative Methods

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Abstract This paper distinguished different analytical approaches to the evaluation of the sustainability of large-scale land acquisitions—at both the conceptual and methodological levels. First, at the conceptual level, evaluation of the sustainability of land acquisitions depends on what definition of sustainability is adopted—strong or weak sustainability. Second, a lack of comparative empirical methods in many studies has limited the identification of causal factors affecting sustainability. An empirical investigation into the sustainability of land acquisitions in Tanzania that employs these existing concepts in a methodologically rigorous manner offers an opportunity to more clearly addresses ethical questions surrounding international land acquisitions. My findings indicate that it should not be assumed that sustainability necessarily hinges on issues of strong sustainability, particularly that all village lands represent critical natural capital. As a result of its unique history of Ujamaa villagization, Tanzania villages often have ownership of significant tracts of unused land that mitigates the risk of violating conditions of strong sustainability. Issues of weak sustainability appear to be more important to villagers—particularly the degree of man-made capital benefits derived from projects. While compensation rates for lands acquired were low and the process lacked transparency, low compensation rates are not sufficient grounds for rejecting land acquisitions as unsustainable. When projects deliver significant man-made capital benefits, low compensation rates were not a politically salient issue amongst villagers. Finally, results suggest that some prioritization of man-made capital over biodiversity can be ethically defensible when the decision-making process goes through legitimate village government bodies and benefits reach poor villagers.

Keywords Land acquisitions · Weak sustainability · Strong sustainability · Comparative methods · Food security · Tanzania

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Introduction

When might large-scale land acquisitions in developing countries be sustainable? Food security is a particular concern for biofuel projects which might compete for arable land (Runge and Senauer 2007), but land rights are also a concern for carbon offset forest projects (Unruh 2008). Yet land acquisitions and the economic transformations they precipitate can be a sustainable development strategy under certain conditions (Kay 2009, 2002). Determining what these conditions are, I argue, depends in an important way on how we define sustainability and the methods we use to assess it. This paper distinguishes different analytical approaches to the evaluation of the sustainability of large-scale land acquisitions—at both the conceptual and methodological levels—and demonstrates their significance through detailed analysis of afforestation and biofuel projects involving land acquisitions in Tanzania.

First, at the conceptual level, many criticisms of land acquisitions are really counter-arguments about what constitutes sustainable development. Sustainable development is notoriously difficult to define (Lélé 1991; Bernstein 2001: 62–131; Ott et al. 2011). I argue that evaluation of the impact of land acquisitions depends on what definition of sustainability is used—strong or weak sustainability (see Neumayer 2003). Both definitions embrace the definition of sustainable development as *development that maintains the capacity to provide non-declining utility for infinity* (Neumayer 2003: 7). Neumayer defines capital as “those items that form the capacity to provide utility” (*Ibid.*). The two paradigms differ, however, in their acceptance of economic substitutability between critical natural capital (CNC) and man-made capital (MMC).

A second, methodological problem confronting research into land acquisitions is that comparative empirical evaluations are often lacking, which limits the identification of causal factors. Most research into forest carbon offset projects (Boyd et al. 2007; Gong et al. 2010; Karumbidza and Menne 2011) and biofuel projects (Habib-Mintz 2010; Sulle and Nelson 2009; Cleaver et al. 2010; Martin et al. 2009) has relied on “one-shot” case-studies. While mindful of the benefits of case-studies (McKeown 1999), because of a lack of a control group they are unable to attribute outcomes observed to specific causal factors: “what would have happened to outcome (Y) if there were no intervention (X) or if the intervention (X) had been different?” (Langbein and Felbinger 2006: 59). A lack of comparative methods is not confined to research into land acquisitions, but have obscured the evaluation of other development initiatives (Clemens and Demombynes 2010).

I demonstrate the importance of these conceptual issues and methodological issues through investigation of two cases of international land acquisitions in Tanzania. The first case investigated is comprised of two afforestation carbon offset projects located in Mufindi and Kilombero Districts operating under the Kyoto Protocol’s Clean Development Mechanism (CDM) and associated with nearly 30,000 ha of land acquired from five villages (CDM-PDD 2007, 2008). Both afforestation projects have been implemented by Green Resources Limited (GRL), a Tanzanian subsidiary of a Norwegian forest company. The second case is a jatropha biofuel project located in Kisarawe District, about 50 km from Dar es Salaam,

involving an initial land acquisition of approximately 8,000 ha by the British-based Sun Biofuels (John 2010; Cleaver et al. 2010: 38–42; Lane 2011; Sun Biofuels 2009; Simbeye 2010, Simbeye 2011). Importantly, this project encountered financial problems and has been suspended since 2011. Both the afforestation and biofuel projects have been the subject of intense scrutiny, including from the international media and NGOs (Carrington et al. 2011; Carrington and Valentino 2011; Oxfam 2008; Karumbidza and Menne 2011; Mousseau and Mittal 2011). A theme running through much of this literature is that the land acquisitions have been unfair to local villagers who have received insufficient compensation for lands transferred while being put at risk of food insecurity because of the loss of land and the CNC that it represents.

While there are risks in extrapolating from only a few cases, my findings indicate that it should not be assumed that the sustainability of land acquisitions necessarily hinges on issues of strong sustainability, particularly that all lands involved represent CNC. Risks of violating the conditions of strong sustainability is mitigated in the case of Tanzania because villages often have ownership of significant tracts of unused land as a result of Tanzania's unique history of Ujamaa villagization. Issues of weak sustainability seem to be more important to local residents—particularly the degree of MMC benefits derived from projects. By setting low compensation rates for unused village land, the state does assign a part of the “burden of the cost of development” to villagers themselves—to borrow from Sah and Stiglitz (2002:3)—but this is in itself not sufficient grounds for rejecting such projects as unsustainable. Overall, my results indicated that large-scale land acquisitions can be a sustainable development strategy under certain conditions: (1) the transfer is Pareto efficient at both the local and national levels by targeting unused village land in a manner that does not undermine food security nor culturally important sites and (2) a portion of the capital squeezed out of the rural sector is later returned in the form of subsidies towards rural development.

Strong Sustainability and Weak Sustainability

This study is unique in framing research findings explicitly in terms of strong and weak sustainability. Strong sustainability requires that CNC be maintained or increased to ensure sustainability. The main difficulty with operationalizing strong sustainability is distinguishing CNC from other forms of natural capital. An expansive definition of natural capital is problematic because it does not recognize the need to prioritize certain elements of natural capital over others (Neumayer 2003: 24). CNC recognizes natural elements that provide significant functions to humans, the absence of which would lead to sharp declines in the capacity to maintain utility, or would risk such declines (Ekins et al. 2003: 176; De Groot et al. 2003). Biodiversity is not necessarily part of CNC. While biodiversity is increasingly being considered in terms of the ecosystem services it provides and contribution to ecological resilience (Hooper et al. 2005), it is unclear how critical a function biodiversity plays in specific circumstances (Thompson and Starzomski 2007). This may be unsettling for environmentalists, and I return to the issue later.

Weak sustainability defines sustainability in terms of the total utility offered by CNC and MMC, with rising MMC capable of substituting for declines in CNC. To ensure sustainability, it is necessary to maintain intact the sum of CNC and MMC, though recognizing that one can replace the other. As Neumayer explains, “[t]his means that natural capital can be safely run down as long as enough MMC is built in exchange” (Neumayer 2003: 22). The difficulty with evaluating weak sustainability is demonstrating that MMC is able to substitute for CNC should it be compromised.

Issues of weak and strong sustainability are not without debate. Many environmental philosophers are skeptical of the distinction between natural capital and CNC and the emphasis on economic “utility.” For example, Norton urges that “a full-fledged definition of sustainability will specify some stuff the loss of which will make people in the future worse off than they would have been had the stuff been saved, but *worse off in some noneconomic way*, in a way that affects an important social value such as communal values” (Norton 2005: 339, my emphasis). The problem is, of course, identifying an alternative method of valuation. Norton and others have appealed to a Habermasian discourse ethic as an approach to sustainability (Norton 2005: 277–290; Purdon 2003). Putting aside the standard critique that a discourse ethic free of power relations is utopic (Allen 2009), there is an assumption that a communal process will lead to strong sustainability.

As thinking about strong and weak sustainability evolve it is timely to consider research that applies them towards real world issues. An empirical investigation into the sustainability of land acquisitions that employees existing concepts of strong and weak sustainability in a rigorous manner offers an opportunity to more clearly address questions of the “fair bequest package” of interest to philosophers, economists and practitioners which “cannot be answered at the abstract level alone” (Ott et al. 2011: 18). With relatively legitimate village governance structures in place, conditions in Tanzania approximate Habermas’s ideal conditions perhaps better than anywhere else in sub-Saharan Africa.

Land Tenure and the Legacy of Ujamaa

Land acquisitions are framed by Tanzania’s land tenure system which saw major reform in the 1990s, resulting in the *1999 Land Act* and *1999 Village Land Act* (Sundet 2005; McAuslan 2003; Roughton 2007; Shivji 1998). Significantly, the new legislation recognized customary land rights through the creation of a new land tenure category, Village Land, and customary rights to occupancy therein.¹ Village Land is now one of three basic land tenure categories created under the *Land Act* (s.4), alongside Reserved Land (generally protected areas and government forest reserves) and General Land under the authority of the central government. Significantly, General Land is the only category of land that can be leased to foreign investors (*Land Act*: s.22.1.b; s.25.1). But because of the extent of Village Land in Tanzania, foreign investment projects almost always involve some transfer of

¹ Section 7 (7) (c) of the *Village Land Act* affirms the occupation and use of Village Land in accordance with the customary law of the area.

Village Land to General Land. Approximately 70 % of Tanzania's land is Village Land, 28 % as Reserve Land but only 2 % as General Land (MLHSD 2010).²

The extent of Village Land is due to Tanzania's history, particularly the period of Ujamaa villagization. Ujamaa villages were initially conceived by President Nyerere in the late 1960s as “rural economic and social communities where people live together and work together for the good of all” (Nyerere 1968, 1967: 348, emphasis in original). They would also serve to facilitate the provision of essential social services, such as health and education. Yet the reorganization of rural society was not straightforward. Villagization was characterized by the relocation of residents from scattered homesteads into villages including, in certain cases, forced compulsion (McHenry 1979: 118; Schneider 2007). Nonetheless, the villagization period was also important for securing significant village governance organizations (Blomley and Iddi 2009: 8, 14). Consequently, villages have significant important decision-making authority over Village Land and village government approval was necessary in all land acquisitions investigated. Importantly, the *Village Land Act* also recognizes village boundaries as existing under previous legislation (s.7(1)) thereby recognizing Ujamaa village demarcations.

Methods

Research Design

The afforestation projects were identified from a list of CDM projects maintained by the United Nations. While there had been a number of biofuel projects underway in Tanzania at the time of fieldwork (Martin et al. 2009), the Sun Biofuel project was identified through discussions with local stakeholders.

To assess the sustainability of large-scale land acquisitions in Tanzania, a post test-only comparison group design was used to compare the socioeconomic conditions of villages involved in land acquisitions with control villages located 15–30 km away (Langbein and Felbinger 2006: 109–111). Six villages were selected in this way (Table 1). See Fig. 1 for location of the projects in Tanzania and Figs. 2, 3 for more detailed maps. Note that the afforestation and biofuel projects were over 400 km apart and in different climatic regions.

Fieldwork

Fieldwork was undertaken from January to May 2009 and included key informant interviews, detailed household and village surveys. Twenty-five households were randomly targeted per village. Due to logistical problems; however, the field effort in Mtamba was limited to only 17 household surveys. Household surveys sought quantitative and qualitative household socioeconomic information as well as local

² This was confirmed through interviews: “Seventy percent of the land in Tanzania, the authority to transfer that land is the village authority. Now the national lands, we have the reserve, that is the state land, the national parks and forests and all of this, and the land granted government. All this is thirty percent, formed under the authority of the nation,” Interview with Director General of Tanzania's National Land Use Planning Commission, Dar es Salaam, 30 March 2009.

Table 1 Basic comparative village statistics

Project	Region	District	Village	Population (n)	Households (n)	Household land holding (ha/HH)	Estimated current used ag village land (ha)	Estimated future land needs (ha)
Afforestation 1	Iringa	Mufindi	Mapanda	5,342	980	3.2	3,136	6,272
Control			Luhunga	2,781	519	7.0	3,633	7,266
Afforestation 2			Idete	4,163	883	3.5	3,091	6,182
Control			Ipilimo	2,675	604	3.7	2,235	4,470
Biofuel	Pwani	Kisarawe	Mtamba	889	240	3.7	888	1,776
Control			Magaruwe	548	154	2.6	400	801

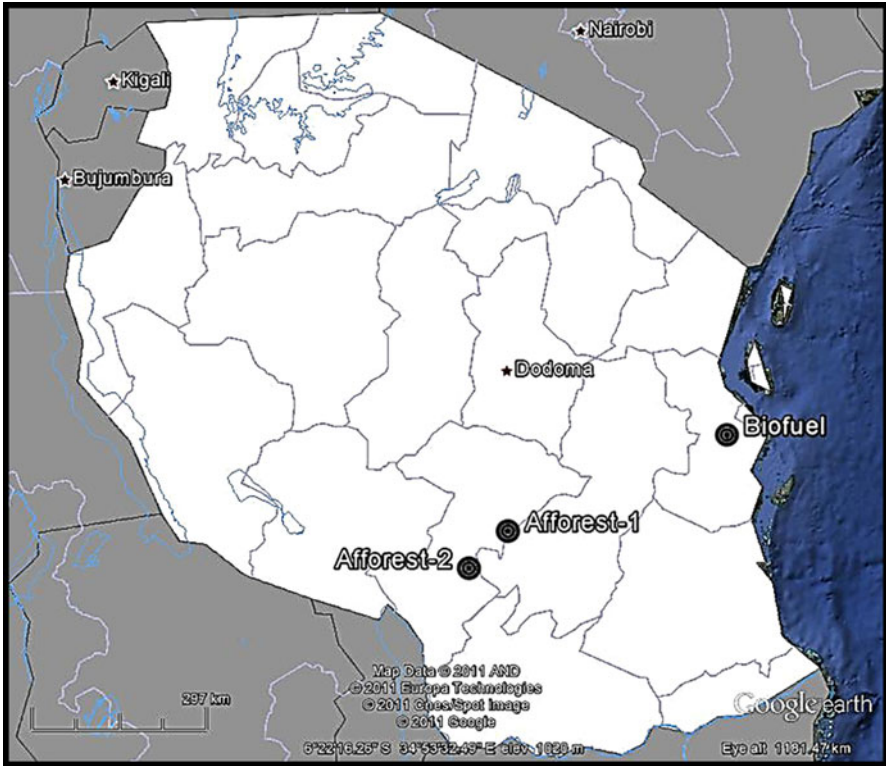


Fig. 1 Map showing location of afforestation and biofuel projects

impressions of the land acquisition projects. Specific questions about household food security status were also posed, but response rates were inconsistent and it was not possible to generate reliable food security groupings for statistical analysis—especially for the first afforestation project (Mapanda and Luhunga) and biofuel project (Mtamba and Magaruwe). Village surveys were assembled as focus groups or administered to key informants to obtain more general information about village socioeconomic conditions. All fieldwork was undertaken with an assistant who also functioned as translator when necessary.

Village level field effort was complimented by district- and national-level interviews and review of relevant documentation such as minutes from village and district meetings. Through district-level interviews I sought to understand the development context in which projects were situated and district administrative procedures surrounding land acquisitions. National-level interviews undertaken in Dar es Salaam focused on climate change, biofuel and development policy.

Development Context

The socioeconomic conditions in the districts where projects are located provide context that informs sustainability evaluations. The geography of Mufindi district

farming. Unilever Tea Estates are located here, including a forest reserve for fuelling its operations, as well as a pyrethrum factory (Daley 2005). There are also at least three other major forest reserves in the district, including the central government's Sao Hill Plantations, a GRL timber mill as well as Mufindi Paper Mill—East Africa's largest paper mill (Christiansson 1985; World Bank 2003; GRAS 2011). The escarpment has also been tapped for its hydroelectric potential—completed in 2000, Kihansi dam provides 35 % of Tanzania's electricity (TANESCO 2010).

The biofuel project is located in Kisarawe district. Apart from subsistence agriculture, the economy of Kisarawe district had previously been based on the export of cashews (Jaffee 1994). But cashew production plummeted during the 1970s, and has not regained its previous stature (Mitchell 2004). As cashew production has declined, cassava production for export has increased and Kisarawe district is now the leading producer in Tanzania (GoT 2007: 18). The district is also renowned for its coastal rainforests, home to high biodiversity and endemic flora and fauna and three forest reserves: Pugu, Kazimzumbwi and Ruvu South (Burgess et al. 1998).

There have been frequent efforts to conserve forests in the area, including an extensive international NGO effort to engage local villages in Joint Forest Management, JFM (Kaale and Mwakifwamba 2006). Forests in the area are especially threatened by the charcoal trade. Ironically, the control village Maguruwe lost the vast majority of the Kazimzumbwi Forest Reserve in the midst of implementing JFM during the 2000s (Kaale and Mwakifwamba 2006: 19; van Beukeringa et al. 2007: 12). Similar problems have been reported for Ruvu South Forest Reserve, adjacent to Mtamba, where the situation has verged on the edge of violence as armed charcoal traders threatened villagers and government forest guards alike (Kaale and Mwakifwamba 2006: 19).x

Results and Discussion

Land Acquisition Process

The governments of all villages investigated had recognized jurisdiction over village lands, as they all possessed a Certificate of Village Land. Under the *Village Land Act*, possession such a certificate affirms the occupation and use of Village Land in accordance with the customary law of the area (s.7(7)(c)).

Village Council minutes in Mapanda record an initial meeting with GRL in June 1997, when the company requested 20,000 ha. At a subsequent Village Assembly meeting in October 1997, the Village Council recommended the area be given over. The vote was 272 to 1 in favor of the land transfer. Minutes from a Village Assembly meeting in September 1997 in Idete indicate that GRL initially sought a large tract of land, up to 70,000 ha. But minutes from a 1998 meeting of an ad-hoc District Land Acquisition Committee indicate that GRL initially requested 24,993 ha. This was reduced by the district government to 15,000 ha

though, in the end, only 11,663 ha was ultimately transferred in Idete.³ No minutes from the district government were identified for Mapanda's land transfer, but district interviews indicated a similar level of district over-sight occurred.⁴ Note that the final extent of Mapanda village lands transferred to GRL stood at 4,652 ha.

Because the acquisitions involved lands greater than 250 ha, it was necessary that GRL obtain approval from the National Commissioner for Lands at the Ministry of Lands and also undertake an Environmental Impact Assessment, or EIA (CDM-PDD 2007: 117). The EIA concluded that the project would "create employment to local community, generate revenue to the Government, contribute numerous socio-economic and environmental benefits as well as technology transfer to the country and the local community. The environmental benefits include conservation of biodiversity and ecological improvement through control of local microclimate and regulation of local hydrological processes in the project area" (CDM-PDD 2007: 129–132).

While a few individuals encountered in Mapanda and Idete questioned the land transfer on the grounds that it had not been sufficiently transparent,⁵ such disapproval appeared a minority. Most villagers indicated that they had the right to refuse the offer from GRL but chose not to. At the village focus group in Mapanda, there was an affirmative response from the group in response to a question about whether the village was better off.⁶ At Idete's village meeting it was stated "We could have said 'No'. No one can restrict us from saying 'No' but we accepted because it is our land."⁷

The land acquisition process for the Sun Biofuel project had been initiated in 2006 when Sun Biofuels convened a meeting of all villages whose lands were sought. Sun Biofuels is reported to have initially sought between 18,000 and 50,000 ha of land but only managed to acquire 8,211 ha (Sulle and Nelson 2009: 16; Cleaver et al. 2010: 39). This initial meeting also involved the Member of Parliament (MP) for Kisarawe District (Habib-Mintz 2010: 8; Isaksson and Sigte 2010), which raises concerns about political pressure to transfer land. Again, as a large-scale land acquisition, an EIA was required. This was awarded in 2009 (NEMC 2010: 30). In the case of Mtamba, its invitation to the initial meeting above arrived late (Oxfam 2008: 22). A subsequent meeting was held 23 August 2006 between Mtamba and Sun Biofuels, also presided by the MP.⁸ It is not clear from the minutes of this meeting that villagers knew the amount of land that they were

³ Mufindi District Government Officer, Mufindi Town, Interview TD1, 9 March 2009; Villager, Idete Village, Interview T32, 10 March 2009.

⁴ Mufindi District Government Officer, Mufindi Town, Interview TD1, 9 March 2009.

⁵ For example, one resident indicated that the Village Council set the terms of the agreement which was then presented to the Village Assembly as if the deal were already concluded, with the result being that "The right to saying 'No' [was] not there" (Villager, Interview T2).

⁶ Village Focus Group (T1), Mapanda Village, 6 March 2009.

⁷ Villager, Idete Village, Interview T30, 10 March 2009.

⁸ A copy of the 23 August 2006 village meeting minutes were obtained by the author and translated.

asked to transfer, though villagers sought to ensure employment and timely project information were part of the deal.

Given the MP's presence during meetings during meetings between villagers and Sun Biofuel, some Mtamba residents indicated that the village had been "like forced" to accept the agreement and that the project "was not explained."⁹ Another view however is that the presence of the MP legitimized the land acquisition:

[We] had that chance to say, 'No'. But you know who put this issue on the table? It was an MP in our country. As a MP, they are assumed to be working for public good...So if they say something, everybody says, 'Ok, it's good. We cannot object.' And that's what happened.¹⁰

Another villager stated that the decision for the land transfer was actually made by village elites before the Village Assembly could consider it: "[The Village Council] just told us 'We are giving them that place.' Nothing else, so we had to agree."¹¹

Strong Sustainability

Assessment of strong sustainability involves an evaluation of whether the land acquired from villages compromised CNC. Results presented here indicate that this effect depends to a large degree on the status of lands acquired prior to their transfer. While socioeconomic conditions such as population density can be important factors, Tanzania's unique history of Ujamaa villagization plays an important role.

Pre-Project Status of Lands

In the case of the afforestation projects, the lands acquired were not productive agricultural lands but mainly hilly *Hyparrhenia* grassland with a few scattered trees and shrubs (CDM-PDD 2007: 13–14, 2008: 8–9).¹² Villagers interviewed supported this view. For example, one respondent in Mapanda stated: "People were living there before but when the company came here, no people were living there. No one was displaced."¹³ He continued: "[GRL] said that they would be helping the village, especially social services, if they could be given that land that was bare land. No one was living there."¹⁴ It would be noted that, in early 2009 tree-planting activities were taking place at least 15 km distance from the villages. At the same time, grazing did not appear to be an important livelihood strategy in any of the afforestation project villages (Table 2). Livestock levels were low in Mapanda and its control village of Luhunga. While livestock levels were relatively higher in Idete

⁹ Village Government Focus Group (T8), Mtamba Village, 30 April 2009.

¹⁰ Villager, Mtamba Village, Interview T10, 1 May 2009.

¹¹ Villager, Mtamba Village, Interview T39, 1 May 2009.

¹² *Hyparrhenia* grasses are successful under conditions of low soil nutrient availability and are often associated with abandoned fields and are maintained by fire (Fynn et al. 2005; Garnier and Dajoz 2001).

¹³ Villager, Mapanda Village, Interview T20, 5 March 2009.

¹⁴ *Ibid.*

(relative to Mapanda/Luhunga), they were not significantly different from levels in Ipilimo except in the case of pigs which do not graze.

Sun Biofuel claims that the lands acquired for their jatropa plantation were degraded coastal forest, over-exploited as a result of charcoal and firewood production: “No food cropping or community buildings were displaced and no communities were removed” (Sun Biofuels 2009). The balance of available evidence supports this view.

Interviews in Mtamba suggested that lands acquired had been used for growing palm trees, a source of clay for pottery, charcoal as well as some farming.¹⁵ It was not possible to confirm the extent of farming through interviews however. One respondent indicated that there had been “a lot” of farms in the area while another stated that the land was “bare land used for charcoal and poles.”¹⁶ But at the village meeting it was stated that compensation had only been paid to individuals with fruit trees located inside the project lands, with no mention of farms being displaced by the project.¹⁷ It seems likely that some agricultural land was displaced, but this was relatively small. In addition, very few households possessed livestock which suggests that grazing was also not an important livelihood strategy in the area. There was no significant difference in livestock levels between Mtamba and its control village. However, livestock levels amongst the two villages investigated in the context of the biofuel project were lower than that amongst the afforestation projects.

The degraded status of the lands acquired by Sun Biofuel is further substantiated by a recent NGO report which concluded that: “Much of [the Sun Biofuel project] area has already been degraded by the dense human population close to Dar es Salaam, although areas of natural coastal bushland, grassland and thicket are still present. The severe charcoal crisis is the major source of forest clearance both in and outside forest reserves” (WWF 2008: 52). NGOs promoting forest conservation concluded that “the intended output of reducing pressure and dependence on forest resources in Kazimzumbwi, Pugu and Ruvu South [Forest Reserves] was not achieved” (Kaale and Mwakifwamba 2006: vi). A last piece of evidence can be derived from satellite imagery of the area that shows extensive scarification of the biofuel project lands.¹⁸ The overall impression is that the land acquired from Mtamba for the biofuel project was heavily degraded by the charcoal trade and only used for agriculture to a limited extent.

CNC Impact

Lands acquired for the afforestation projects were found to have little effect on local CNC of the villages of Mapanda and Idete, positive or negative, as the planting sites generally took place on unused village lands at considerable distance from the village.

¹⁵ Villager, *Mtamba Village, Interview T38, 1 May 2009*; Villager, *Mtamba Village, Interview T39, 1 May 2009*; Villager, *Mtamba Village, Interview T40, 1 May 2009*; Villager, *Mtamba Village, Interview T41, 1 May 2009*.

¹⁶ *Village Government Focus Group (T8), Mtamba Village, 30 April 2009*; Villager, *Mtamba Village, Interview T39, 1 May 2009*.

¹⁷ *Village Government Focus Group (T8), Mtamba Village, 30 April 2009*.

¹⁸ Coordinates are 7° 5'0.00"S, 38°50'0.00"E.

Table 2 Household land holding, distribution of land use, expenditures and livestock across six villages in Tanzania

Project	Village	N	Mean land holding* (ha/HH)	Distribution of land use			Household expenditures		Mean livestock			
				Farm (%)	Tree plantation (%)	Fallow (%)	Uncultivated land (%)	Monthly average (USD)	% Food (%)	Cattle**	Pigs***	Sheep/Goats†
Afforestation 1	Mapanda	22	3.2	54.4	35.1	10.5	/	\$50.9	35	0.09	0.86	0.27
Control	Luhunga	26	7.0	40.8	40.1	16.3	3.5	\$45.9	67	0.04	0.71	2.1
Afforestation 2	Idete	23	3.5	57.1	8.7	13.6	18.9	\$26.3	38	1.2	0.13	0.22
Control	Ipilimo	24	3.7	59.7	8.5	9.0	22.8	\$29.1	59	3.8	1.3	1.0
Biofuel	Mtamba	15	3.7	51.3	/	16.6	29.0	\$148.5	68	/	/	0.13
Control	Maguruwe	24	2.6	65.6	/	25.8	8.2	\$73.0	46	/	/	0.08

*Independent samples t-test between each village pairing found no significant differences in mean land holding: Mapanda/Luhunga: $t(29.8) = -1.66, p = 0.108$; Idete/Ipilimo: $t(45) = 0.158, p = 0.875$; Mtamba/Maguruwe: $t(37) = 1.12, p = 0.272$. An additional independent samples t-test to account for unequal sample sizes between Mtamba and Maguruwe also found no significant difference in mean land holding (Mtamba/Maguruwe_{n=15}: $t(28) = 0.783, p = 0.440$). Finally, independent samples t-test did not find mean land holding significantly different between the four villages investigated in the context of the afforestation projects significantly higher than in the two biofuel villages, though there was a trend towards larger landholdings amongst the afforestation projects ($M_{Afforest} = 4.5$ ha/HH, $M_{Biofuel} = 3.0$ ha/HH, $t(129.9) = 1.75, p = 0.083$)

**Independent samples t-test between each village pairing found no significant differences in mean cattle possession: Mapanda/Luhunga: $t(46) = 0.562, p = 0.577$; Idete/Ipilimo: $t(40.7) = -1.63, p = 0.111$. Mean cattle possession was significantly higher amongst afforestation villages than biofuel villages (results not shown)

***Independent samples t-test between each village pairing found no significant differences in mean pig possession between Mapanda/Luhunga ($t(46) = 0.420, p = 0.676$). Mean pig possession was significantly higher in Ipilimo compared to Idete ($t(25.3) = -3.07, p = 0.005$) and amongst afforestation villages relative to biofuel villages (results not shown)

† Independent samples t-test between each village pairing found no significant differences in mean goat/sheep possession: Mapanda/Luhunga: $t(25.5) = -1.05, p = 0.306$; Idete/Ipilimo: $t(31.8) = -1.32, p = 0.198$; Mtamba/Maguruwe: $t(32) = 0.536, p = 0.596$. Mean sheep/goat possession was significantly higher amongst afforestation villages than biofuel villages (results not shown)

While there are legitimate concerns about timber plantations compromising ecosystem services, particularly water, this did not appear problematic at the time of fieldwork. Especially when planting on existing grassland ecosystems, large-scale afforestation can lead to important reductions in streamflow and water runoff (Silveira and Alonso 2009). Pine consumes important quantities of water, though less than *Eucalyptus* which is particularly water-demanding (Scott and Lesch 1997). However, villagers did not raise issues of water access in any of the villages investigated. Notably, the afforestation projects have implemented a monitoring program for water balance and water yield in the project areas (CDM-PDD 2008: 65, 2007: 81).

But the pine (and some *Eucalyptus*) monoculture afforestation projects clearly compromised biodiversity—though some of the original grassland ecosystem is protected along with riverine areas (CDM-PDD 2008: 62–64, 2007: 76–78). It is thus difficult to justify the afforestation projects in terms of biodiversity conservation. However, while biodiversity is a global concern it did not appear linked to local CNC in this specific circumstance. It is also worth noting that government-owned Sao Hill Plantation in Mufindi district is also comprised of exotic tree species while villagers, especially in Mapanda and Luhunga, were found to dedicate a significant share of their household land to pine too (Table 2). The use of exotics is not precipitated by the international carbon market *per se*, as has been suggested (Kosoy and Corbera 2010), but favoured by government and villagers as well.

There are concerns about the effect of the biofuel project on local CNC, particularly water access which was the most important development issue raised by Mtamba villagers.¹⁹ During the dry season there was only one reliable source of water available in the village,²⁰ which Oxfam found was on the land granted to Sun Biofuel (Oxfam 2008: 22). While Sun Biofuel granted Mtamba assurances that they would continue to have access to the waterhole, villagers did not have any documentation attesting to this during 2009 fieldwork. Mtamba Village Assembly minutes from 23 August 2006 indicate that villagers accused Sun Biofuel of placing the boundary without consulting them. While it is not clear from the minutes, this dispute may have been over access to water or, alternatively, burial grounds.²¹ Given current water scarcity in Mtamba, there is cause for concern with the biofuel project. High yields from jatropha require irrigation (Gerbens-Leenes et al. 2009), though its capacity to grow under dry conditions can appear to make it appropriate for arid regions (for example, van Beukeringa et al. 2007: 22).

It is also difficult to justify the biofuel project in terms of biodiversity. Instead of restoring the coastal forest, the biofuel project replaced it with a jatropha plantation. However, given difficulties posed by illegal charcoal extraction and establishing JFM in the area, forest restoration appears unrealistic. There are emerging opportunities under REDD and carbon finance in Tanzania (UN-REDD 2010) that may resolve some of the benefit distribution issues that currently complicate JFM (Blomley and Iddi 2009: 33).

¹⁹ Village Government Focus Group (T8), Mtamba Village, 30 April 2009.

²⁰ *Ibid.*

²¹ The Village Assembly minutes from 23 August 2006 do not refer to water or burial grounds but only areas of significant “community activities”.

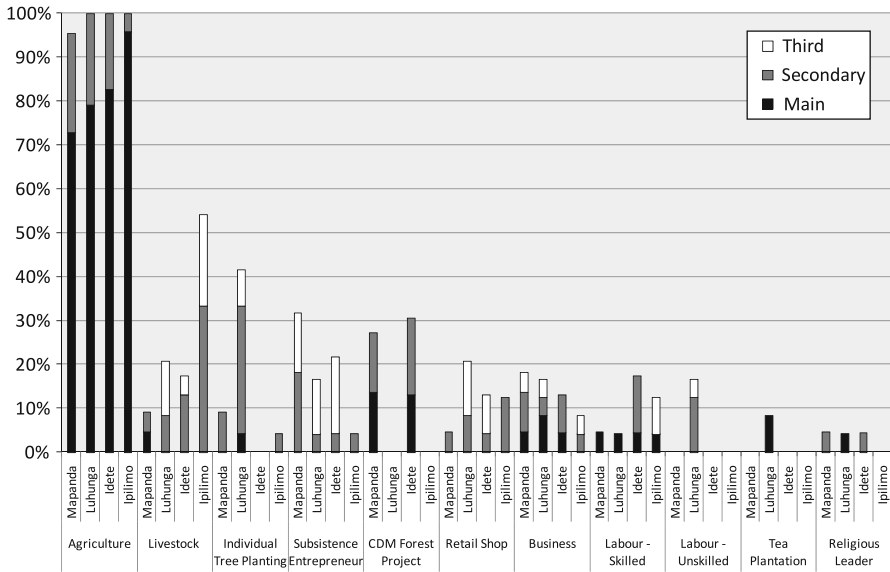


Fig. 4 Frequency of type of occupation across villages investigated for the afforestation projects

Weak Sustainability

In addition to the analysis of local CNC described above, weak sustainability also considers MMC benefits including employment, social service provision and compensation. Note that all monetary figures are based on a 2009 exchange rate of 1,305 Tsh equals 1 USD.

Employment and Social Services

The CDM afforestation project clearly delivered employment benefits at the local level, even displacing agriculture production to a significant degree as a primary economic activity amongst villagers (Fig. 4). Most villagers were highly favorable towards the afforestation projects in Mapanda and Idete, especially in terms of employment and income.²²

Nonetheless, villagers expressed three principle grievances about the performance of GRL: low wages, delays in providing agreed social services, communication and distance to the planting sites. For wages, the monthly salary of 65,000 Tsh (\$50 USD) per month for laborers in the afforestation projects is equal to the government’s official minimum wage (US Department of State 2009). The second

²² Village Focus Group (T1), Mapanda Village, 6 March 2009 and Village Focus Group (T4), Idete Village, 12 March 2009. In addition, one businessman claimed that in 2003 there was only one retail shop in Mapanda and that by 2009 there were several. Other improvements associated with the projects were daily bus service connecting Mapanda to the district capital and better roads (*Ibid.*). In Idete, respondents indicated that they were expanding their agricultural lands in order to sell surplus crops to employees working on the CDM projects (*Villager, Idete Village, Interview T31, 10 March 2009 and Villager, Idete Village, Interview T34, 12 March 2009*).

major criticism was the slow delivery of promised social services, which tended to be voiced mostly in Mapanda.²³ Third, the 2009 planting sites were at least fifteen kilometres from Mapanda and a 4 hour hike from Idete.²⁴

However, GRL had begun to address these concerns, particularly social services. In late 2008, GRL had entered into formal contracts with Mapanda and Idete whereby it agreed to grant 10 % of gross carbon revenues towards a list of prioritized development projects identified by the village. In explaining GRL's improved social responsibility, villager leaders pointed to Forest Stewardship Council (FSC) certification for the Mapanda project (Green Resources 2011) as well as competition from other firms for village land for afforestation: Highland, a small Kenyan forestry company, and Mufindi Paper Mill.²⁵ Subsequent to its land deal with GRL, in 2006 Mapanda transferred an additional 1,700 ha to Highland. In terms of wages, Highland offered slightly more than GRL at 2,750 Tsh/day versus 2,500 Tsh/day (US\$2.10 vs. \$1.90/day).²⁶ But villagers preferred GRL to Highland because the latter generally only agreed to cash payments instead of the provision of social services.²⁷ Similarly, in Makunga ward, adjacent to Idete, village lands had initially been granted to Mufindi Paper Mill for tree-planting, but the deal had been rescinded because the Mill had not fulfilled its contractual obligations for village service provision. The villages in Makunga ward had turned instead to GRL.²⁸

The biofuel project generated few MMC benefits. Sun Biofuel stated that 400 people across the 8 villages had been employed during this initial phase, and that employment would rise to 1,500 as the project continued (Daily News 2010; Lane 2010). In 2009, the Sun Biofuel project was only at its initial stage and employment in the project area by Mtamba residents was limited to manual labor, mostly clearing land—the clearing of 100 m² of land was reportedly valued at 20,000 Tsh (US\$7.7).²⁹ See Fig. 5. However, financial problems and drought in 2011 have forced the biofuel project to suspend operations and lay off 300–600 workers (Lane 2011; Simbeye 2011), though under new ownership the plantation may continue (Carrington et al. 2011). Consequently, there have been no employment benefits from the project. Also in contrast to the afforestation projects, it was learned during

²³ *Village Focus Group (T1), Mapanda Village, 6 March 2009; Villager, Mapanda Village, Interview T23, 6 March 2009.*

²⁴ *Village Focus Group (T4), Idete Village, 12 March 2009; Villager Government Focus Group (T14), Luhunga Village, Interview, 2 March 2009; Village Focus Group (T1), Mapanda Village, 6 March 2009; Villager, Mapanda Village, Interview T22, 5 March 2009; Villager, Mapanda Village, Interview T23, 6 March 2009.*

²⁵ One local government representative in Mapanda explained: “[B]efore the coming of Highland, Green Resources was slow. But after the coming of Highland, Green Resources is trying, competing in providing services for the village. For example, [the Village Council] wrote a letter asking [GRL & Highland] to provide some desks in the schools. [We] said okay, both of them, and then both of them provided assistance in taking timbers for building the secondary schools... so it seems that they have competition” (*Local Government Officer, Mapanda Village, Interview T3, 7 March 2009*).

²⁶ *Villager, Mapanda Village, Interview T20, 5 March 2009.*

²⁷ *Villager, Mapanda Village, Interview T23, 6 March 2009.*

²⁸ *Ward Government Focus Group (T6), Makungu Village, 13 March 2009.*

²⁹ *Village Government Focus Group (T8), Mtamba Village, 30 April 2009.*

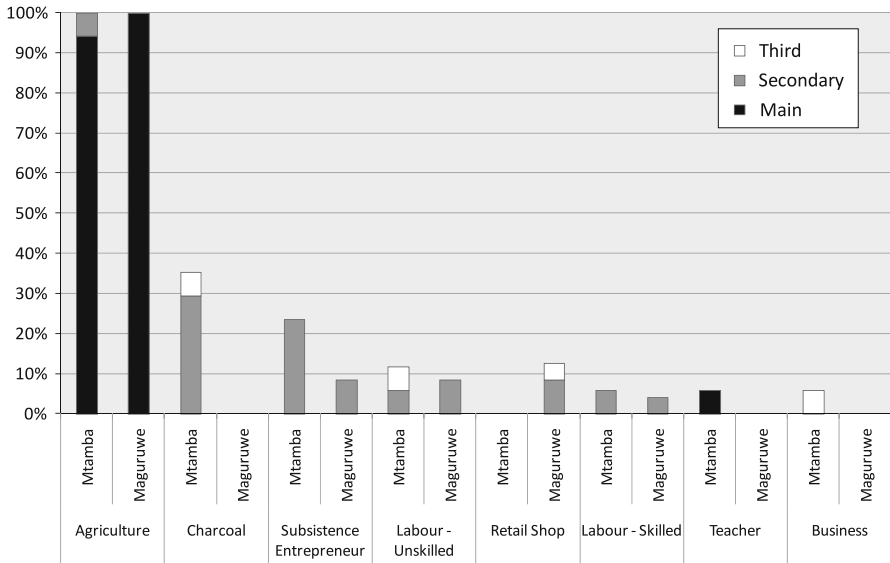


Fig. 5 Frequency of type of occupation across villages investigated for the biofuel project

interviews that Sun Biofuel had not made any commitments to the provision of social services.³⁰

Compensation

In some of the most significant legal reforms under the 1999 Land Acts, villagers are now entitled to “full, fair and prompt compensation to any person whose right of occupancy or recognised long-standing occupation or customary use of land is revoked or otherwise interfered with to their detriment” for lands transferred into General Land (*Land Act* s.1(1)g and *Village Land Act* s.3(1)(h)). However, the process of compensation lacked transparency.

Information on financial compensation is not published in any of the official documentation associated, but could be reconstructed from fieldwork and other secondary sources. An estimate of compensation paid to Mapanda and Idete villages involved in the afforestation projects is provided in (Table 3). Results indicate that compensation was provided to only a limited number of individuals (19 in Mapanda and 9 in Idete) who had made permanent investments in land such as farms, tree planting or clay pits and not other unused village lands. In total, US\$13,000 in compensation was paid for 681 ha to 28 individuals. This stands in contrast to the total land acquisition of 16,315 ha which I estimate had a local market value of between US\$100,400 to US\$225,900. That is, compensation stood at approximately 6–13 % of the value of total lands acquired. One resident who had received what he felt was insufficient compensation for lands he lost to the CDM project was told

³⁰ *Ibid.*

Table 3 Compensation payments associated with CDM afforestation project

	Mapanda			Idete		
	Individuals (N)	Area (ha)	Value (thousand USD)	Individuals	Area (ha)	Value (thousand USD)
Initial village land request	/	20,000	/	/	20,000	/
Village lands acquired ^a	/	4,652	\$28.6–\$64.4 ^a	/	11,663	\$71.8–\$161.5 ^a
Individual lands compensated	19	462	\$8.8 ^b	9	219	\$4.2 ^b
Unaccounted village lands	/	4,191	\$19.8–\$55.5	/	11,444	\$67.5–\$157.2
Annual rent paid to central govt	/	4,652	\$1.8 ^c	/	11,663	\$4.4 ^c

^a Based on a market rate between 0.008 and 0.018 million Tsh/ha for bare or idle lands derived from 2009 fieldwork

^b Based on a compensation rate of 0.025 million Tsh/ha, as was indicated to have been paid by GRL

^c Based on a rate of 494 Tsh/ha/year as indicated in the CDM-PDD (2007: 117)

Table 4 Compensation payments associated with biofuel project

	All villages involved in phase 1 of the Sun biofuels land transfer		
	Individuals (N)	Area (ha)	Value Thousand US\$
Initial village land request	/	20,000	/
Village lands acquired	/	8,211	/
Value as degraded forest	/		Unknown
Market value as farmland ^a	/		\$2,841.0
Annual value as productive forest ^b	/		\$220.0
Individual lands compensate	152	714	\$220.0
Unaccounted village lands	/	7,497	/
Value as degraded forest	/		Unknown
Value as farmland ^a	/		\$2,230.3
Annual value as productive forest ^b	/		\$174.0
Annual rent paid to central Govt ^c	/	8,211	\$3.0

^a Based on a reported value for farmland in Mtamba of 0.45 million Tsh/ha

^b Based on a reported annual value for productive forest of 0.035 million Tsh/ha per year (Sulle and Nelson 2009: 53)

^c Based on a rate of 494 Tsh/ha/year as indicated in the CDM-PDD (2007: 117)

“that is what [the Village Council] has received from GRL so they can’t do anything about it.”³¹ Nonetheless, he maintained “that there is benefit to the community in general...I am happy because [GRL] has assisted us to improve our livelihood.”³²

³¹ Villager, Interview T5.

³² *Ibid.*

The CDM afforestation project contributed significantly to MMC at the national level in the form of \$6,200 in annual rent paid to the central government.

Villager also gained little in terms of compensation for transferring their lands towards the biofuel project (Table 4). Total compensation for all 8,211 ha of the biofuel project lands was initially rumored at US\$613,000 but by 2010 had been reduced to US\$220,000 (Oxfam 2008: 22; Kisémbó 2007; Lusekelo and Felister 2008; Simbeye 2010; John 2010; Cleaver et al. 2010: 40). This was paid to 152 individuals for a total of 714 ha of land (Cleaver et al. 2010: 40; Oxfam 2008: 22). However, based on farmland prices observed in Mtamba, the market value of the total 8,211 ha acquired was US\$2,841,000. That is, compensation stood at approximately 8 % of the value of total lands acquired—if assuming lands acquired were productive farmlands. Note that farmland prices were significantly higher amongst biofuel project villages relative to those of the afforestation project. However, no price for degraded lands was observed during field work amongst biofuel villages. Finally, as a result of the land transfer, the central government has gained rent of \$3,000 per year though, as a suspended project, it cannot be assumed land rents still accrue.

It is clear from investigation of afforestation and biofuel projects that not all Village Land was compensated. Indeed, findings presented here clarify the ambiguity about the interpretation of unused village lands under the *Land Act* and *Village Land Act*. In practice, the definition of General Land under the *Land Act* as “all public land which is not reserved land or village land and includes unoccupied or unused village land” prevails, which significantly reduces the amount of compensation that is paid for the acquisition of unoccupied village lands. However, much of the public and media appear to subscribe to the interpretation of General Land in the *Village Land Act* as “all public land which is not reserved or village land” and expect compensation for all Village Land. For example, a recent publication on the Sun Biofuel paper writes “According to the Village [Land] Act of 1999, every piece of land has a value and without proper valuation, rights cannot be transferred” (Habib-Mintz 2010: 3994). However, Section 181 of the *Land Act* states that the *Land Act* prevails in case of conflict, which is consistent with research findings.

Food Security

Current Food Security Situation

The evidence presented here indicates that the food security situation observed during fieldwork was largely unrelated to land acquisitions but rather to local climate and the availability of rains. Evidence of this is provided by the comparative methods used: the food security situation was similar in villages involved with land acquisitions and their respective control villages—for both the afforestation and biofuel projects. Such a finding considerably reduces concerns about violation of the conditions of strong and weak sustainability.

Table 5 Crop productivity and input use across six villages in Tanzania

Project	Village	N	Mean crop productivity		Frequency input use					
			Maize* (kg/ha)	Cassava** (kg/ha)	Seeds (%)	Chemical fertilizer (%)	Insecticide (%)	Organic manure (%)	Hired labour (%)	Storage (%)
Afforestation 1	Mapanda	22	823	/	41	23	82	32	50	5
Control	Luhunga	26	913	/	31	46	73	27	23	27
Afforestation 2	Idete	23	1,329	/	30	/	/	/	35	/
Control	Ipilimo	24	1,185	/	58	29	71	58	54	54
Biofuel	Mtamba	15	645	4,654	6	/	/	/	13	/
Control	Maguruwe	24	438	3,780	42	/	4	4	13	/

* Independent samples t-tests between each village pairing found no significant differences in mean maize productivity: Mapanda/Luhunga: $t(34.2) = -0.607, p = 0.548$; Idete/Ipilimo: $t(44) = 0.430, p = 0.669$; Mtamba/Maguruwe: $t(16) = 0.65, p = 0.525$. An additional independent samples t-test to account for unequal sample sizes between Mtamba and Maguruwe also found no significant difference (Mtamba/Maguruwe_{n = 15}: $t(12) = 0.088, p = 0.931$). However, independent samples t-test found mean maize productivity between the four villages investigated in the context of the afforestation projects significantly higher than in the two biofuel villages ($M_{\text{Afforest}} = 1067 \text{ kg/ha}$, $M_{\text{Biofuel}} = 541 \text{ kg/ha}$, $t(106) = 2.36, p = 0.020$)

** Independent samples t-test between Mtamba and Maguruwe found no significant differences in mean cassava productivity: $t(17.2) = 1.71, p = 0.106$. An additional independent samples t-test to account for unequal sample sizes between Mtamba and Maguruwe also found no significant difference in mean cassava productivity (Mtamba/Maguruwe_{n = 15}: $t(25) = 1.31, p = 0.201$)

Table 6 Food security status across villages in Tanzania and Uganda

Project	Village	Food security status	N	Agricultural productivity		Land holding ha
				Maize kg/ha	Cassava kg/ha	
Afforestation 1	Mapanda	Food insecure	6	845	/	2.3
		Food secure	5	1,038	/	3.8
Control	Luhunga	Food insecure	5	860	/	5.7
		Food secure	10	1,097	/	2.2
Afforestation 2	Idete	Food insecure	1	1,977	/	2.1
		Food secure	21	1,289	/	4.0
Control	Ipilimo	Food insecure	0	/	/	/
		Food secure	24	1,185	/	3.7
Biofuel	Mtamba	Food insecure	5	563	4,100	0.6
		Food secure	2	62	3,521	0.6
Control	Maguruwe	Food insecure	12	237	3,713	1.2
		Food secure	4	99	4,007	1.5

The balance of evidence indicates that food security was not a significant concern amongst any of the four villages investigated with regard to the afforestation projects. Differences in maize and cassava productivity *between* villages pairings were not statistically significant (Table 5). Regarding food security groups for the villages of the first CDM afforestation project, the low sample size prevents conclusion from being drawn (Table 6). However, both villages in the second CDM afforestation project (Idete and Ipilimo) clearly reported they were food secure. However, maize productivity amongst the two villages investigated in the context of the biofuel project was significantly less than amongst the four villages investigated in the context of the afforestation projects ($M_{\text{Afforest}} = 1,067$ kg/ha, $M_{\text{Biofuel}} = 541$ kg/ha, $t(106) = 2.36$, $p = 0.020$). Note that the national average for smallholder maize productivity is estimated at 750 kg/ha (GoT 2003: xiii–xiv). The majority of villagers in Mtamba and its control Maguruwe reported that they faced food insecurity at some point in the 2008–2009 agricultural season (Table 6).

However, cassava yields in Mtamba and Maguruwe were relatively high and without any significant difference between villages (Table 5). Indeed, villagers were selling surplus cassava on the market. As a tuber, cassava is often suggested as a security food because of its capacity to remain in the soil until needed (Liu et al. 2008). Yet the traditional local dietary preference was for maize (Olson 1996: 610), which explains the somewhat raised food insecurity levels reported. During fieldwork, agricultural extension workers from the Ministry of Agriculture were found in Mtamba demonstrating methods and recipes for cooking cassava to encourage local consumption as a food security strategy.

Because of similar food security and agricultural productivity trends between project villages and their control, local climate remains the primary variable explaining why food security was not an issue for the afforestation projects but was

for the biofuel project. For example, the Mapanda ward government had banned the sale of food crops in 2008 given food shortages, apparently because of drought, though no ban was in effect in 2009.³³ As one village leader in nearby Luhunga explained, “In some years, the rain will not be enough and we face some shortage of food. It depends on the season.”³⁴ This is supported by other evidence. In late 2008/early 2009, weather conditions had been favorable to agriculture in central Tanzania where the afforestation projects were found (FEWS NET 2009c, 2009d, 2009a, 2009b). But early 2009 was a particularly bad year in eastern Tanzania where the biofuel project was located (*Ibid.*). Other factors affecting food security include lack of inputs, particularly fertilizer. Fertilizer use had achieved a certain degree of penetration in Mufindi district as the result of the government led fertilizer voucher system (except for Idete where villagers claimed fertilizer was not necessary).³⁵ At the time of fieldwork in early 2009, the voucher system had not yet arrived in Kisarawe district.

Long-Term View of Food Security

The analysis of food security above pertains only to the state of food security at the time of 2009 fieldwork and does not consider the needs of population growth. Population growth rates in rural areas of Tanzania suggest a doubling in 30 years (World Bank 2011). This doubling could be even faster given that all three project villages were seeing an influx of migrants, though in only Mapanda was this related to the land acquisition project.³⁶ Is there enough land available for expansion? Without information on the exact area of the villages involved, it is difficult to answer this question. Based on a doubling of estimated current agriculture land used, estimated future land requirements are presented in Table 1. It would be important to confirm exactly how much land has been retained for future agricultural growth in each village—something that was not feasible during 2009 fieldwork. However, despite being located in areas with different population densities (AfricaScope 2010), the size of household lands was not found to differ significantly between the afforestation and biofuel projects, though demonstrating a slightly larger trend in the former (Table 2).

There are two factors that would however significantly reduce the amount of agricultural land required for expansion. First would be increasing yields on current farmlands rather than opening up new lands (Jama and Pizarro 2008). A second factor that would reduce the amount of agricultural land required in the future is rural non-farm income. Rural non-farm income plays a significant role in assuring food security by providing income to purchase food in the face of external shocks

³³ Village Focus Group (T1), Mapanda Village, 6 March 2009.

³⁴ Villager, Luhunga Village, Interview T12, 1 March 2009.

³⁵ No fertilizer—organic nor inorganic—was used in Idete. Indeed, at the village council meeting it was stated that “even if the fertilizer was brought here, we will not participate because we don’t need it” (Village Government Focus Group (T4), Idete Village, 12 March 2009).

³⁶ Village Focus Group (T1), Mapanda Village, 6 March 2009; Village Government Focus Group (T4), Idete Village, 12 March 2009; Village Government Focus Group (T8), Mtamba Village, 30 April 2009.

Table 7 Summary sustainability table

Country/ project/village	CNC benefits	MMC benefits				Evaluation	
		Local MMC			National MMC	Strong sustainability	Weak sustainability
		Employ.	Comp	Opp. Cost			
Afforestation							
Mapanda	↔	↑	↑	↔	↑	Yes	Yes
Idete	↔	↑	↑	↔	↑	Yes	Yes
Biofuel							
Mtamba	↔ or ↓ ^b	↔	↑	↓ ^a	↔	No <i>if</i> CNC _L ↓	No

(↑) increased, (↓) decreased or (↔) maintained

^a Opportunity cost of lands transferred to failed biofuel project; ^b potential water scarcity issue engendered by jatropha plantations, though also avoidable

such as drought (Barrett et al. 2001). However, these strategies are only considered sustainable in terms of weak sustainability not strong sustainability.

Sustainability Assessment

A summary table synthesizing the strong and weak sustainability of projects on villages is presented in Table 7. The afforestation projects are found to meet the conditions of strong and weak sustainability. While biodiversity was clearly compromised by the CDM afforestation project, it is unlikely that biodiversity represented CNC. Ecosystem services that might constitute CNC do not appear to have been affected because of the distance of the planting sites from the village and management schemes put in place to address issues of forest fire and water management. Thus while CNC was not degraded by the afforestation projects, neither was it ameliorated. Yet the project produced significant MMC benefits. These MMC benefits outweighed the natural capital costs of the project because the opportunity costs of the land were low: the land was unproductive grassland that villagers had largely not been using. When these benefits are considered relative to CNC impact, the project appears to meet the conditions of weak sustainability. And while afforestation projects generate most of their employment at the initial stage (Coomes et al. 2008), there is an opportunity for additional local employment in the future—something which the EIA requires be first offered to villagers (CDM-PDD 2008: 68). GRL has set the bar even higher in terms of social service provision, despite indications of earlier delays, and carbon revenue sharing.

It is questionable whether the biofuel project meets conditions of strong sustainability, but it has clearly violated the conditions of weak sustainability—though for reasons that differ from popular interpretations. First, in terms of strong sustainability, water scarcity was a looming concern. Two futures are possible: one where Sun Biofuel (or its successor) competes for water with Mtamba and other

villages or one where the company invests in the appropriate technology to ensure that sufficient water is available for all parties (see Ewing and Msangi 2009). If done correctly, Sun Biofuel or its successor could bundle its irrigation needs with improved water provision for villagers. But in terms of weak sustainability, the biofuel project had imposed an important opportunity cost on villagers of Mtamba because they had transferred their rights to relatively fertile, albeit difficult to control land, with little in return. Sun Biofuels is often portrayed as having paid insufficient compensation for lands acquired (Lusekelo and Felister 2008). Controversy surrounding the project appears to have escalated significantly as the initial, rumored level of compensation dropped and the compensation process was delayed (John 2010). However, compensation does not undermine the weak sustainability claims of the project. Patterns of compensation were the same between the Tanzania biofuel and the CDM afforestation project, the latter which has not attracted significant controversy. Compensation was paid for an estimated 6–13 % and 8 % of total lands acquired for the afforestation and biofuel projects, respectively. The biofuel project was unsustainable in the sense of being a bad business deal, not because of levels of compensation.

The Ethics of Large-Scale Land Acquisitions

The afforestation projects were found to meet conditions of strong and weak sustainability, though it is questionable whether the biofuel project meets conditions of strong sustainability and has clearly violated the conditions of weak sustainability. However, a key finding is that food security was, at least at the time of fieldwork in 2009, not affected by land acquisitions. There is a popular assumption that, especially for the rural poor, all land represents CNC: “It is the same land that peasant producers across rural Africa require to support their livelihoods and smallholder production that is targeted for large-scale acquisitions” (Odhiambo 2011: 6). While true in certain circumstances, in the afforestation and biofuel projects investigated here, considerable tracts of village land were either not being used or outside the control of villagers. Food security was found to be determined to a greater extent by weather conditions and access to inputs. However, it is also clear that Tanzania’s land tenure systematically undervalues compensation for village land in a manner that transfers a significant part of the burden of development to villagers themselves. When projects deliver significant MMC benefits, this burden is tolerable; when projects fail to deliver, they deprive villagers of an important economic asset.

Overall, results indicate that land acquisitions are ethically defensible if two conditions are met: (1) the transfer is Pareto efficient at both the local and national levels by targeting unused village land in a manner that does not undermine local food security and (2) a portion of the capital squeezed out of the rural sector is returned in the future in the form of subsidies towards rural development. Greater economic benefits to Tanzania as whole would be realized when unused land is made available to those with the means to realize more productive use. Such a transformation can expand the rate of economic growth, first at the extra-village

level (national or urban) and, if properly managed, ultimately returning to rural society through economic benefits such as input subsidies and infrastructure development that enables economic substitution necessary for weak sustainability (see Kay 2002, 2009). But at the early stages of economic development, such as in Tanzania, the initial squeeze of peasant economies is most difficult because of the justifiable concerns of local populations about their own welfare and the intentions of the state as well as the relative independence of peasants: “Economic history is largely the story of how to capture the peasants” (Hydén 1980: 9). However, the Tanzania government appears to be honouring a social contract with rural society through subsidizing rural economic growth, such as the fertilizer initiative.

It is reasonable to expect that some amount of Village Land is opened up for foreign investment in Tanzania. Outside of Tanzania’s already extensive protected areas system, 97 % of the country’s lands are on Village Land that is currently unavailable for foreign investment. The extent of unoccupied village lands appears to be due, in part, to Ujamaa villagization in the 1970s which centralized the more scattered homesteads over which many Tanzanians still claim customary land rights. During the village meeting in Mapanda, for example, the unoccupied status of land acquired for the afforestation projects was explained as follows: “Not more than 50 [people had farms in the Mapanda afforestation project area]. They’re not sure. It’s like this—people were living there before, but they were living there before Ujamaa. So during Ujamaa [the] village, all of them, moved here. But maybe they left their things there, maybe trees. That’s what the company compensated.”³⁷ Under such circumstances, it is ethically defensible at the local and national to transfer such unused lands if they do not represent CNC and the transfer is rewarded by direct economic benefits to the village. However, the Tanzanian government needs to be more transparent about the land acquisition process, particularly rules surrounding compensation.

How do my findings sit in light of discussion about the ethics of strong and weak sustainability? As suggested earlier, environmental philosophers tend to find reason to believe that strong sustainability is more genuinely sustainable and therefore ethical (Norton 2005: 304–355; Ziegler and Ott 2011) while economists tend to see advantage in weak sustainability (Neumayer 2003). Who is right? They both are, depending on the circumstances. Because the ethical imperative for economic development differs between developed and developing countries, the normative predisposition to strong sustainability may not hold if this denies poor people the means to acquire MMC benefits, particularly if this does not reduce CNC. But in the cases investigated here, my conclusions are based on the separation of biodiversity from CNC. Biodiversity was clearly compromised in both project. If CNC is defined broadly to include all biodiversity—even if it not found linked to the provision of critical ecological services—then all the projects investigated would have violated strong sustainability and likely weak sustainability.

Nonetheless, I argue that some prioritization of MMC over biodiversity is warranted and ethically defensible in the case of the land acquisitions investigated because the decision-making process went through village government bodies and,

³⁷ Village Focus Group (T1), Mapanda Village, 6 March 2009.

at least in the case of the successful afforestation project, poor villagers were amongst the primary beneficiaries. While there are arguments that nature has a unique value on its own (Callicott 1986), I agree with Neumayer (2003) that nature has value if and only if humans value it. While improvements in the land acquisition process are necessary, village governments did appear to make the decision that the land transfer would bring them MMC benefits while CNC costs were manageable if not minimal. While village-level politics are not problem free in Tanzania (Brockington 2007), it is important to recall that village governments in Tanzania have considerable decision-making power over land acquisitions and approximate ideal Habermasian conditions perhaps better than anywhere else in Africa.

Conclusion

Large-scale land acquisitions in Tanzania can be sustainable when villagers significantly benefit in terms of non-farm income, the lands acquired have not been actively used and, in addition, the state directs a portion of surpluses back to the villages whose lands have been acquired.

While there are risks in generalizing from only a few cases, my findings indicate that it should not be assumed that sustainability necessarily hinges on issues of strong sustainability, particularly the assumption that all lands involved in land acquisitions represent CNC. In the cases investigated here, a lack of comparative methods has led previous investigators to attribute food insecurity observed in villages to land acquisitions though weather patterns and access to inputs appear more important. Because of low sample size and lack of clarity for some food security groupings however, this conclusion should be confirmed through additional research.

Issues of weak sustainability seem to be more important to local villagers and the source of much of the controversy surrounding projects—particularly the degree of MMC benefits derived from projects. Low levels of compensation and lack of transparency in their determination have undermined weak sustainability by raising the risks of land acquisitions for villagers should a project prove to be financially unviable and fails. This risk has been overcome in the case of the afforestation projects, where the direct economic benefits are currently high, but exposed in the biofuel project which did not meet conditions of weak sustainability.

This research suggests a number of remedies to improve the sustainability of land acquisitions. First, Tanzania's land tenure system needs to be revised in order to clarify the definition of General Land and compensation procedures for unused Village Land. Secondly, more transparent procedures need to be developed to provide information about lands sought and details of the agreement to villagers ahead of any acquisition. This will allow for more informed decision-making and lead to more realistic expectations about benefits. Third, the Land Acts should be modified to provide legal recourse for the return of village land if an investment project fails. Finally, the Land Acts could be amended to allow villagers the right to enter into contractual relations with foreign investors themselves, rather than requiring them to transfer lands to the central government as General Land. Village

Councils are already permitted to rent village lands to Tanzanians not resident in the village (*Village Land Act s.28*).

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