

ESTABLISHING THE DEREMA CORRIDOR IN THE EAST USAMBARA MOUNTAINS, TANZANIA: A STUDY OF INTENTIONS VERSUS REALITIES

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Declaration

I, Kelsey Miller, declare that this thesis is a result of my research investigations and findings. Sources of information other than my own have been acknowledged and a reference list has been appended. This work has not been previously submitted to any other university for award of any type of academic degree.

Signature.....

Date.....

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Abstract

By using the Derema corridor as a case study, this paper explores three overarching objectives. The first is to discuss the narratives used by various actors to frame the argument for establishing a forest corridor. The second is to examine how the compensation process for the creation of the Derema forest corridor played out, who were the winners and losers, and was it perceived as participatory by local people. The third is to study the restoration plans for the Derema corridor, and in general for the East Usambara Mountains.

The results indicate that although the ecological benefits of the Derema corridor are understood and appreciated by farmers, the compensation payments were insufficient to ensure a secure livelihood and strengthened local wealth differentiation. Participatory decision-making approaches that were mentioned in the conservation plans for Derema were not used or were insufficient in including the farmers from five villages surrounding the corridor. There is also an indication that the defined threat to the corridor, cardamom farming, needs more thorough research of its impact on biodiversity and sustainability, from a wider pool of researchers.

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List of Acronyms

ANR	Amani Nature Reserve
CBFM	Community Based Forest Management
CEPF	Critical Ecosystem Partnership Fund
DFO	District Forest Officer
EAM	Eastern Arc Mountains
EAMCEF	Eastern Arc Mountains Conservation Endowment Fund
EUCAMP	East Usambara Conservation Area Management Program
EUCFP	East Usambara Catchment Forest Project
EUM	East Usambara Mountains
EUTCO	East Usambara Tea Company
FBD	Forestry and Beekeeping Division
FINNIDA	Finnish International Development Agency
GM	General Manager
IBC	International Business Combine
JFM	Joint Forest Management
MNRT	Ministry of Natural Resources and Tourism
NGO	Non-governmental Organization
NOK	Norwegian kroner
PFM	Participatory Forest Management
RAP	Resettlement Action Plan
SSM	Sikh Saw Mills
TAS	Tanzanian shilling
TFCG	Tanzania Forest Conservation Group
URT	United Republic of Tanzania
USD	United States Dollar
VEC	Village Environmental Committee
WUM	West Usambara Mountains
WWF	World Wildlife Fund

1. Introduction

Fragmentation of ecosystems has become a widespread problem in the world, and the cause is most often anthropogenic. Various actors in non-governmental organizations (NGOs) and governments try to protect these ecosystems from further fragmentation through various means, depending on the species of concern. In Africa, NGOs and governments have often used a fortress approach to conservation, keeping people out with guards and fences because of the prevailing attitude that human activities are not compatible with wildlife conservation (Vedeld, 2002). It is important to examine, however, what kind of activities are going on in an area, and are they sustainable or not. Communities are more heterogeneous in modern times than in the past because of increased movement of different groups of people, and the concept of what are ecologically and economically sustainable activities is an ongoing negotiation (Robbins, 2012). The definition of what is “sustainable use” of an ecosystem tends to be different for different groups of people, whether in they are in government, non-governmental organizations (NGOs), or local communities. Those with political power are the ultimate decision makers, and their decisions have a profound impact on access to resources.

As an answer to the fragmentation problem, ecologists advocate for wildlife corridors for connecting important habitat patches, improving the movement of various species of plants and animals between larger ecosystems, and thereby strengthening the gene pool and increasing overall connectivity. In planning wildlife corridors, many aspects need to be considered, such as: What are the causes of ecosystem fragmentation? Are there rare species to protect or is overall biodiversity protection the goal? Finally, what is the appropriate size of the corridor to accomplish these goals? Certain human-induced changes can be beneficial to wildlife and increase forests, depending on the level of impact (Fairhead and Leach, 2000). A mixed agro-forestry system, adjacent to forests and wetlands, tends to increase biodiversity in an area because of the variety of habitats and forage. More extreme types of human-induced changes such as mining, monoculture cropping and housing developments tend to decrease biodiversity, as they only favor a

few species other than humans (Collinge, 2009). In debates over the creation of protected areas, any kind of human-induced change may be vilified and before proper study is done, local people are forced out of their home or lose their land. The questions of who are the local people, what is their impact on the local ecosystems, and how conservation planning might affect them, must be considered carefully before implementing drastic plans.

In the Amani Nature Reserve (ANR) in the East Usambara Mountains (EUM) in Tanzania there is a new area of protected forest called the Derema forest corridor (also called the Derema Forest Reserve), intended to increase the connectivity of the fragmented forests of the EUM (Newmark, 1992). Cultivation in Derema ceased in 2001, but the establishment of a forest reserve remained fuzzy for some years, until finally in 2008 it was considered official by the government and NGO officials, but still remains unofficial in the eyes of the farmers, for various reasons to be discussed here. People who were farming in the Derema forest have lost all or part of their farms after a long process of negotiation between them, the NGOs, and government officials to assess payment of compensation. Previous research has shown that there are conflicting views between the farmers, who say they have endured economic loss, and the NGO workers and government officials, who want to protect the forest in an undisturbed state (Vihemäki, 2007, Engh, 2010). This research continues from previous research (Vihemäki, 2009), (Rantala et al., 2013) and expands on it, using the research questions outlined below.

1.1 Research Objectives

This research presents an analysis of the situation using the following research objectives:

1. Examine the reasoning behind creating the Derema forest corridor: cardamom cultivation, and discuss the impacts of the most common land uses as drivers of deforestation in the EUM.

This objective is addressed in sections 5.1 and 6.1 primarily. The answer draws from recent literature on agroforestry systems similar to what local farmers use, interviews with researchers who have long-term experience in the EUM, and the views of local farmers interviewed.

2. Collect data on and analyze the socio-economic consequences for the farmers who lost land in the Derema forest corridor.

This objective is addressed in Sections 5.2 and 6.2-3, drawing from raw data from interviews with over 80 local farmers who lost land in five villages. It also incorporates literature on participatory management, community-based natural resource management, and official documents written by the NGOs and other officials who facilitated the compensation process.

3. Study the plans for ecological restoration of the Derema corridor to increase connectivity in the forest fragments in the East Usambara Mountains, and how they are being implemented.

I did not find specific plans for restoration of Derema. I incorporated information gathered from interviews with local, state and NGO officials to address this objective in terms of restoration as it is being carried out in general in the EUM in Sections 5.3 and 6.4.

This paper attempts to draw together perspectives from the social and natural sciences to find common ground and a way forward in the sustainable management of natural resources in the EUM. My aim was to use social science research methods to find

perspectives on the ground, while drawing from natural science resources in order to form as broad and nuanced a picture as possible of the Derema case, and how it fits in a larger pattern of conservation and control in Africa.

1.2 Structure of the Thesis

Section 2 will provide background for resource use in Tanzania and in the study area, the East Usambara Mountains, and give history for the Derema forest corridor, which is the focal point of the thesis. Section 3 will lay out the theoretical framework used for this study. The methodology and data collection will be described in section 4, followed by a presentation of the results of the data collection in section 5. The final section, 6, will discuss the findings and analysis from section 5.

2. Background/context

2.1 Deforestation in world tropical forests

Forest policy in the world has changed in recent decades, to reflect changing values of them beyond lumber alone, encompassing also non-timber products, biodiversity, carbon sequestration, and recreational values (Petersen and Sandhövel, 2001). Policy reform has been affected by globalization and market liberalization in the last 10-15 years in four important ways. One, structural adjustment reforms have weakened research and reduced funding to maintain forests on a state level. Two, trade liberalization has strengthened private and often foreign interests in timber industries. Three, most importantly perhaps for this thesis, the importance of NGOs, community-based organizations and joint forest management (defined in the next section for Tanzania) has grown to adhere to a defined “sustainable” management in policies having to do with property rights and timber concessions. Finally, state regulatory capacity is ultimately limited to address deforestation on the ground level (Petersen and Sandhövel, 2001).

There are a few different theses that attempt to explain the causes of deforestation, most of them found lacking in Angelsen and Kaimowitz’s (1999) work. These theses have led to policy reforms in various countries, and the important ones for Tanzania are highlighted here. The population thesis, that population growth drives deforestation, was only found to have “weak support” in their study (Angelsen and Kaimowitz, 1999). This does not mean that population growth has no effect on deforestation, however in many cases population has not been the primary driver of deforestation, more often it is weak policy incentives to manage the forest sustainably (Petersen and Sandhövel, 2001). Another important thesis is the poverty thesis, which states that people who are in desperate situations will deforest more. There has been a stronger link to people making money in off-farm employment, and those jobs often have to do with logging in rural areas (Angelsen and Kaimowitz, 1999).

2.2 Deforestation in Tanzania

Around 80% of the total population in Tanzania is living in rural areas, mostly practicing small-scale agriculture. They are dependent on their immediate environment for land for farming for themselves or cash crops, and other forest products for food, medicine, building materials and other uses (Vedeld et al., 2012). Charcoal making in the rural areas also supplies a growing demand in urban areas. The need for firewood and the making of charcoal outweighs the availability of the resource, a problem that is said to become more urgent every year (Newmark, 2002).

Tanzania's main forest types are miombo woodlands, montane forests, and coastal forests. Forest area in Tanzania covers 33 million hectares, 57% of which is not under any type of official protection (Blomley and Ramadhani, 2006). The rural population (and to an extent the urban population as well) is dependent on wood collected from these forests, and access to them is becoming more and more strict. Deforestation rates in Tanzania are ambiguous, ranging between 130,000 ha/year (World Bank, 1992), 300,000 ha/year (MTNRE, 1989), to over 700,000 ha/year (Ahlback, 1988), making it difficult to assess the extent of the problem. Measurement of forest use rates is complicated and costly, and reports can be influenced by past reported rates of deforestation, which have been exaggerated since before the 20th century throughout Africa (Kwashirai, 2012).

In Tanzania there is evidence that in pre-colonial times people revered certain animals and considered certain groves sacred, which benefitted wildlife and natural resources (Kideghesho, 2010). These practices and beliefs are still evident in Tanzania, though they are decreasing as populations change, external influences and internal changes affect localities (field interview with elder member of the community in Shibomeza village, near Amani Nature Reserve 2012), (Kweka, 2004). During the colonial period of the Germans and later the British, protected areas were established by the Europeans for the privilege to hunt and to control resources (Kideghesho, 2010). In many ways this colonial legacy is still evident, in land laws.

After Tanzania's independence in 1961, state authority over all land in Tanzania was established, and all previously settler-owned plantations were taken over by the government of Tanzania (Nelson et al., 2012). This also applied to parks and other protected areas, which gave the state direct control over vast areas of land, larger than the state had before independence (Nelson et al., 2012). The Arusha Declaration (1967) came with the socialist aspirations of the first president, Julius Nyerere, emphasizing nationalization and "villagization" of rural areas, causing the forced displacement of 5 million people to new villages between 1973 and 1976 (Lindemann and Putzel, 2008). This had the strongest effect on people producing cash crops, since the goal was to create a socialist equalizing between different classes of people. It also had the negative effect of taking people's customary land tenure rights, which were not compensated upon relocation (Nelson et al., 2012) The Arusha Declaration also introduced Ujamaa, the Swahili word for "familyhood", involving the creation of communal farming groups in villages. Doing this gave more power to collective groups over local elites, and its effects and ordering processes are still evident today.

When President Nyerere was losing influence and stepped down in the 1980s, his socialist policies were gradually weakened and more economically liberalized policies grew. Their main effects were on land tenure, encouraging private investments and property rights, and giving political elites the power to take control of lands and enrich themselves through co-ownership of private companies (Nelson et al., 2012). Since the late 1990s, reforms have been passed that are intended to change this imbalance of power, resulting in the National Land Forum, which included the Land Act and the Village Land Act. The Village Land Act gives villagers customary rights of occupancy, and rights to compensation when their land is taken from them (Village Land Act 1999). The Act also provides villagers rights to participate in decision-making about their land.



Figure 1: The Eastern Arc Mountains in Tanzania and Kenya (Eastern Arc Mountains Conservation Endowment Fund, 2001).

Mechanisms for participation in natural resource management for rural people include two different types of Participatory Forest Management (PFM), which are becoming more common as a way to share costs and benefits in communities adjacent to forest resources. Two main types of PFM are Joint Forest Management (JFM) and Community Based Forest Management (CBFM). Forests managed under JFM have a stricter access policy, normally only allowing research and tourism but not harvesting of wood or any other forest products, except in some cases some medicines or other small plants may be harvested. In forests managed through CBFM, benefits are shared in the community near the forest. In Vyamana's (2009) study of JFM and CBFM in villages in the Eastern Arc

Mountain range, both types of PFM are improving forest conservation, however neither are living up to their potential in terms of access to benefits for local people (Vyamana, 2009).

Deforestation in the Eastern Arc Mountains (see Figures 1 and 2) is driven primarily by small-scale agricultural expansion and large-scale agricultural expansion (Newmark, 2002). Both types of expansion are driven by open-access problems, which are difficult to define laws for and unenforced policies for permits to cut down trees (Petersen and Sandhövel, 2001). Insufficient staffing of officers impedes proper monitoring of forest use, allowing further expansion into forests. Petersen and Sandhövel (2011) suggest that to address these problems, one approach is to “assist villages in establishing clear rights to the benefits of natural resources (instead of formal state property which is practically open access due to remoteness and lack of regulation capacity) in the context of the new land policies, which in turn would create incentives for them to protect and conserve resources” (p 44). Other approaches include improving monitoring and fines, and to get rid of incentives like allowing user rights just by clearing land (Petersen and Sandhövel, 2001).

2.3 The East Usambara Mountains (EUM) Amani Nature Reserve (ANR)

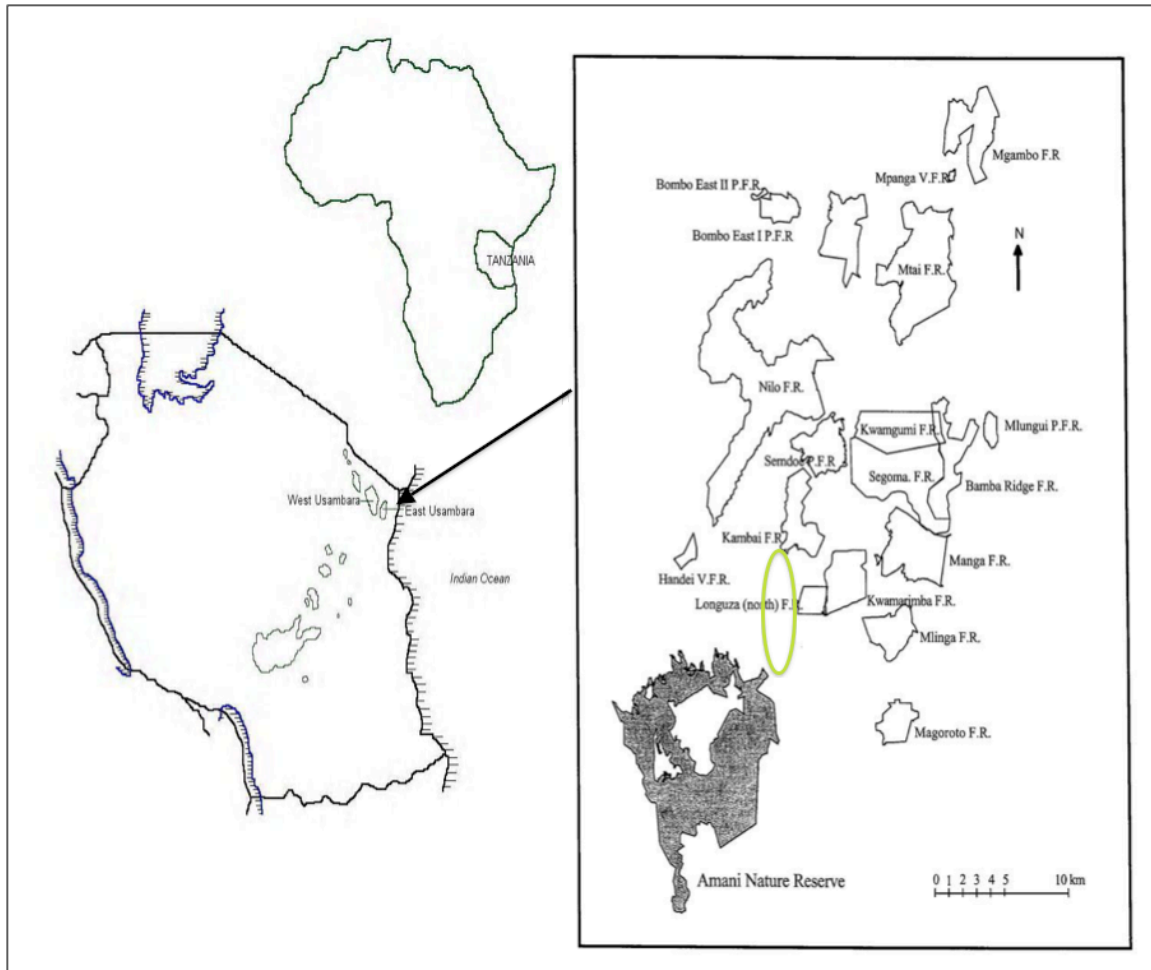


Figure 2: Map of the Eastern Arc Mountains in Tanzania on the left, the East Usambara Mountains shown in the North. On the right, The Amani Nature Reserve, located in the EUM, also showing northern forest reserves. The Derema forest approximate area is outlined in green (see Figure 3 for exact location) (From Engh 2010).

The EUM covers around 1300 km² or 130,000 ha in area. Located in the Tanga region of northeastern Tanzania, it is an area of remnant sub-montane and lowland rainforest formed through the condensation of the moist air coming from the Indian Ocean (Conte, 2004). The forests in the East Usambara Mountains (EUM) play an important role in water catchment and purification for the Tanga region. Precipitation for the region ranges between 1,200 mm annually in the lowlands to 2,200 mm annually in the highlands, with two rainy seasons in the fall and spring. The forests play an important

role in water catchment for the Tanga region. The climate in the EUM is mild for Tanzania, and the forests here and in the Eastern Arc Mountains as a whole have been cited as being important for carbon sequestration, and therefore climate regulation (Newmark, 2002).

The EUM are host to a high degree of biodiversity and endemism, making it one of the 25 global “hotspots” of biological diversity (WWF, 2009). The EUM are part of a longer range of mountains called the Eastern Arc Mountains, which start in southeast Kenya and curve south and southwest to Morogoro (see Figure 2). In the EUM as a whole, 40% of the plant species and 2% of all genera are endemic (Lovett & Wasser 1993, cited in CI and ICPIE 2005). In the EUM in particular, where the Amani Nature Reserve and other reserves are present, plant and animal endemism is also high, with 18% of plants and the rest of genera ranging from 84% and 5% endemic (Kessy, 1998). This high level of endemism is caused by the relative isolation of the high altitudes, causing species to evolve over millions of years (Kessy, 1998). *Homo sapiens* entered the picture tens of thousands of years ago, participating in a long history of interaction with the forests in the EUM (Conte, 2004).

The people who live in the EUM area are primarily part of an ethnic group called the Washambaa, who have oral histories dating back two millennia (Conte, 2004). People from other parts of Africa have immigrated here over the last 100 years, but in the last 40 years the population has increased substantially of people who have come following opportunities at the tea plantations or plant spice crops such as cardamom, cloves, cinnamon and black pepper. There were powerful logging interests in the area, such as from the Sikh Saw Mills (an Indian company supported by the Finnish government), but those activities have stopped since the 1980s. The main tea plantation is the East Usambara Tea Company (EUTCO), which has over the years provided jobs and schools to the villages. People have come to the area for illegal gold mining, which has become a threat to the preserve and the safety of the local people. Illegal logging is still a significant problem (interview with forest officer from ANR, 2012).

The Amani Nature Reserve (ANR) in the EUM (Figures 2 and 3) is a Central Government Forest Reserve under the Director of the Forestry and Beekeeping Division. Its gazettelement took place in 1997, supported financially by the Government of Finland with some additional support the Forest and Park Service. ANR is 8,380 ha in area and has been designated as a biodiversity hotspot with many endemic and nearly endemic species. In a biodiversity study of the ANR, which reflects the biodiversity found in all of the EUM, was finished in 2001. In it scientists reported 11 endemic species of reptiles and amphibians, 110 total species of birds, and at least 3450 species of vascular plants (Doody et al., 2001). There are also at least 24 species of small rodents, 16 species of bats, and some larger mammals, including 4 species of monkey, bushbuck, galago, porcupine, and bush pig (Doody et al., 2001). Biodiversity in the EUM is most concentrated in the 800-1200 m elevation (Newmark, 2002).

ANR is separated into various zones that reflect the human impact on it in the past, present use and future trajectory. The largest is the “biodiversity preservation” zone (87%), the “restoration” zone (5%) and the “local use” zone (3.5%). There is also a botanical garden that covers 4.5%, and is highly visible upon entering the reserve. Surrounding the reserve is a buffer zone that includes parts of the surrounding villages. The first zone has the strictest protection, where only research and some collection of medicinal plants is allowed, and holds the highest level of biodiversity in the reserve. The second zone comprises some of the more disturbed areas, and through allowing regeneration and selective management and planting, 8% of this zone has been added to the biodiversity preservation zone since 1998. The third is described below, and has to do with village access to the reserve’s resources, mainly firewood but also edible and medicinal plants. The botanical garden was planted by the Germans and has therefore been there since long before the nature reserve was established.

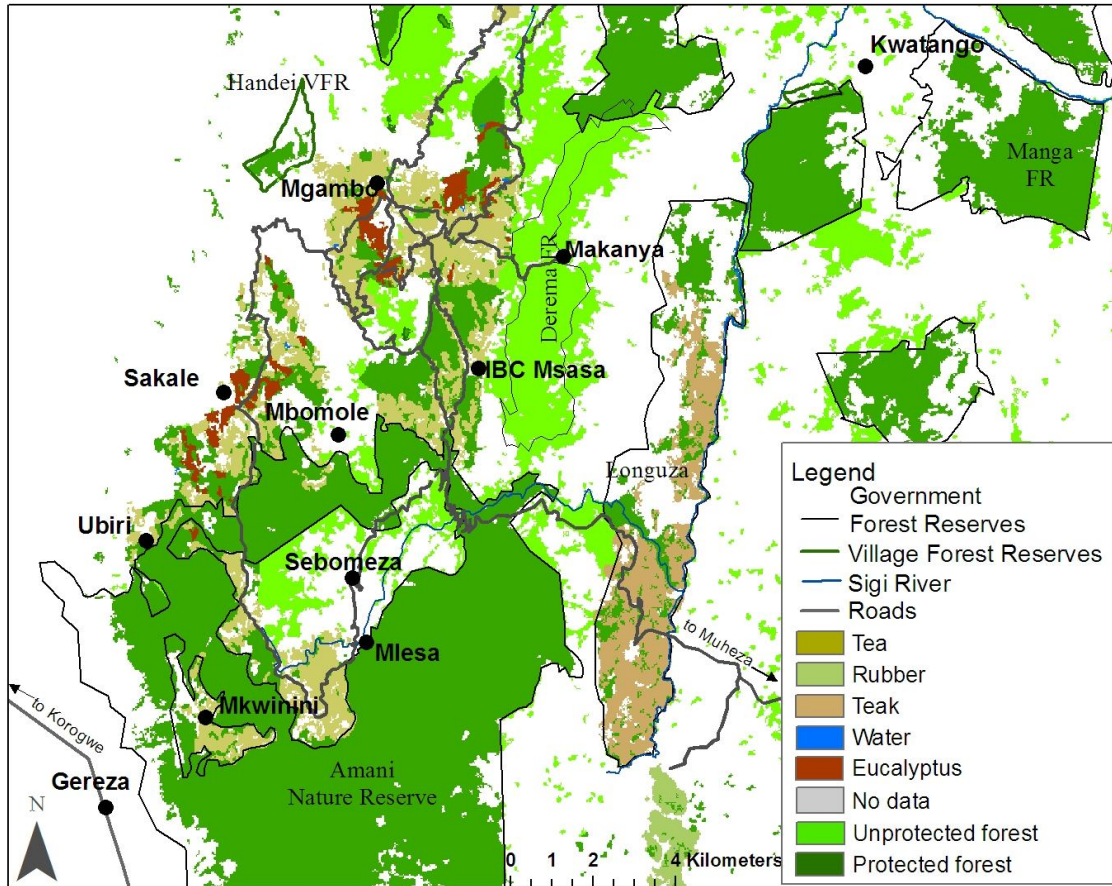


Figure 3: Amani Nature Reserve, other forest reserves in the East Usambara Mountains, and the Derema forest corridor, labeled as “Derema FR” on this map. Produced by Dr. Jaclyn Hall at the University of Florida, taken from Vihemaki (2009).

There are 19 villages surrounding ANR that share 20% of the reserve’s income from tourism, guiding, and research fees. As of the fieldwork conducted in fall 2012, the entrance fee for foreign tourists was 10 USD/day, and for Tanzanian citizens it was 1500 TAS/day. The guiding fee was 15 USD/day for foreign tourists, and 5000 TAS/day for Tanzanian citizens. The research fee was 10 USD/day for foreign researchers and 3000 TAS/day for Tanzanians. A list of these fees, plus a variety of other fees can be viewed in Figure 4. In addition to sharing the revenue from the reserve, people can collect what they can carry from the “local use” zone two days per week. This is part of the goals in the ANR New Management Plan from 2009, which is to include local people in use and benefits from the reserve, though in a limited sense.

FEES PAYABLE TO ENJOY BEAUTY, CULTURE, NATURE SERVICE and SCENERY OF AMANI.

S/N	RECREATION FEES	TANZANIANS	NON CITIZEN USD	
			Expatriates (USD)	Non Residents (USD)
1	Entry fee >18 yrs	1500 Tsh/head/once	10 USD/head/once	10 USD/head/once
2	Entry fee 5-18 yrs	500 Tsh/head/once	5 USD/head/once	5 USD/head/once
3	Entry fee <5 yrs	Free	Free	Free
4	Official guide	5000 Tsh/head/day	15 USD/day/head	15 USD/day/head
5	Camping Owned tent	3000 Tsh/head/day	35 USD/day/head	35 USD/day/head
6	Camping Provided tent	3000 Tsh/head/day	40 USD/day/head	40 USD/day/head
7	Filming fee	100,000 Tsh/week	1000 USD/week	1000 USD/week
8	photographing	10,000 Tsh/day	50 USD/head/day	50 USD/head/day
9	Permitted research	3000 Tsh/day	10 USD/day/head/day	10 USD/day/head/day
VEHICLE PERMIT		TZ REGISTERED	FOREIGN REGISTERED	FOREIGN REGISTERED
	Vehicle permit up to 2 tonnes	10,000 Tsh/day	50 USD/car/once	50 USD/car/day
	Vehicle permit > 2 tonnes	20,000 Tsh/day	200 USD/car/day	200 USD/car/day

Figure 4: Board listing various fees for the Amani Nature Reserve. Photo taken by the author fall 2012.

The people in this area depend on farming for a living, with some exceptions of people working at the reserve or tea estate. Some integrated conservation and development projects (ICDPs) such as butterfly farming and beekeeping have brought some income in the past, but they are dependent on foreign funding sources and so are difficult to sustain long-term (Engh, 2010). People use the forest for timber, firewood, and other forest products, such as medicine and wild vegetables, but the access to these is decreasing in the area as a whole, due to the number of protected forests (Vihemaki, 2007). This forest use has been deemed unsustainable, and more forest reserves have been suggested to enhance connectivity between the larger reserves such as ANR and Nilo Forest Reserve to the north (Newmark, 1992), the first of which (now established) is the Derema forest corridor.

2.4 History of the Derema Corridor

A corridor is a pathway primarily to promote movement between two larger habitats, and normally it is ideal for it to consist of similar habitat as the two habitats it is connecting. It could be a forest corridor connecting two larger forests, surrounded by a matrix of crop fields or an urban landscape. Corridors for wildlife have been used as a conservation tool since the 1970s, coming out of island biogeography theory (Bennett, 2003). There has been much debate on the usefulness of corridors (Beier and Noss 1998, Hobbs 1992), but most agree that they are useful tools as long as the criteria for creating it is considered carefully. The purpose of most wildlife corridors in Tanzania is to allow movement of large mammals such as elephants from one protected area to another (Caro et al., 2009)

The Derema corridor (Figures 3, 5 and 6) is 968 ha starting in the northeast of ANR, going north/northeast until it ends nearby protected forests approximately 7 km away. Its gazettement took place in 2002 after its border was marked in 2001. The border is marked by stone beacons at the ground level, which are in turn marked by two trees on either side to determine the directionality of the border from each beacon. In each of the five villages surrounding the corridor, the Village Environmental Committee (VEC) is supposed know where the beacons are, however they can be hard to locate these days since they have in some cases been overgrown.

It has been under a number of known uses and designations for over one hundred years. There has been a tea plantation, coffee plantation, logging, and pit-sawing since the 1890s to the 1970s (Vihemäki, 2009). Derema corridor is named for the area where the Derema Tea Estate operated in the 1930s, and the village was also called Derema nearby it. There was an area of 3,900 ha protected forest there, called the Derema Forest Reserve, during the British colonial era, belonging to the Derema Tea Estate (Iverson 1991 in Vihemäki 2009). Later it was owned by the Karimjee company, who ran the tea estate until the 1980s or 90s. Logging in the Derema forest began in the 1960s, headed by the International Business Combine (IBC) and changing the name of the village there

to IBC Msasa, where I conducted interviews. IBC was bought by Sikh Sawmills (SSM) and logging continued until 1984 (Vihemäki, 2009).

Cardamom farming started in Amani in the early 1950s, and in the Derema corridor from the 1960s. Planting cardamom and other crops are ways for farmers to gain land tenure, even without land deeds (Josefsson and Åberg, 2005), which is how farmers from the five villages surrounding the corridor gained their legal right to own land there. Growing cardamom and other crops continued until the establishment of the wildlife corridor in 2010 (Vihemäki, 2009). In spite of these many past land uses, today the Derema corridor is a mix of primary forest and secondary forest where once there were small agroforestry plots.

Derema forest was considered one of the last tracts of unprotected continuous forest in the reserve area prior to gazettement (Newmark, 1992). However it was also argued that Derema forest was around 80% under cultivation until its gazettement as a reserve in 2001 (Newmark, 2002). It was argued that cardamom farming causes changes in the forest structure that makes it less hospitable for certain species (Newmark et al., 2010), making it necessary to stop the farming and establish a corridor in its place. Transects and mist nets for bird capture were set up by Dr. Newmark in Derema, and from his results he recommended the corridor width to be 1 km to have a buffer of 200 m around a 600 m “core” for understory bird populations (Newmark, 2002). However, other scientists argue that while cardamom farming can be harmful as a monoculture, as part of an agroforestry system it can decrease the pressure on forests and contribute to conservation around buffer zones (Huang et al., 2002), (Reyes, 2008). Although cardamom farming changes the amount of cover in the forest, in the corridor many farmers retained indigenous trees because cardamom is a shade tree, and they plant a mix of spice trees such as cinnamon and cloves, trees such as *Grevillea* for the black pepper vine to climb, bananas, avocados, pineapple, jackfruit, and others (field interviews 2012).



Figure 5: View of the Derema forest corridor near a sub-village of IBC Msasa, tea fields in the foreground.

According to a study done of all wildlife corridors in Tanzania by Tim Caro et al (2009), most are in a critical condition and will probably disappear within 5 years at the current rates of habitat conversion by agriculture and other uses. The Derema corridor is listed as one of these corridors, and it is defined as “critical” as well (Caro et al., 2009). The threats to the Derema corridor and the Amani Nature Reserve (ANR) are outlined as logging for firewood and cardamom farming, and cardamom farming in particular is a higher source of income for many people in the area. The issue of cardamom and other farming is contentious, as researchers, officials, and local people do not agree on its effect on wildlife and the structure of the ecosystem. Cardamom farming in the area is part of a mixed agroforestry method, in which it is grown under other some large trees along with cloves, cinnamon, bananas, and black pepper, among other crops. In some

areas of the Derema corridor there is still evidence of farming, logging, and harvesting medicine and wild vegetables, but now most of Derema is covered in dense secondary growth (field observations 2012).

Since then the forest that is now part of Derema forest corridor was used for mixed agroforestry, by the five villages surrounding it: IBC Msasa, Kisiwani, Kwemdimu, Kambai, and Kwezitu (see Figure 7 for village locations). The people who farmed there grew cinnamon, cloves, black pepper, bananas and other fruit trees, but 90% of the crops, with the highest compensation amount, were cardamom. According to records (Sumbi, 2010), (URT, 2006), the farms were maintained by 1128 individual farmers, each with an average of 1 to 2 acres, and a few with 5 acres. As far back as the 1970s there have been proposals urging the creation of a forest reserve, and from the 1990s the arguments shifted to describing the need to enhance connectivity between the Amani Nature Reserve and the northern government-owned reserves (Newmark, 1992). The proposals to make Derema into a forest reserve for ecological connectivity started in the 1990s, and was ultimately included in the East Usambara Conservation Area Management Programme (EUCAMP) funding program between 1999 and 2002 (see Table 1). Derema was ranked as the highest priority among several other corridors for connectivity by Dr. Newmark, and other researchers have added to his list (Johansson and Sandy, 1996 in Newmark, 2002).

Other papers have done extensive and detailed accounts of the history of the gazettement process of the Derema corridor, also called the Derema Forest Reserve (Vihemäki, 2009, Rantala, 2013). For the purposes of this paper I will provide a summary of the most important points (Table 1) and then move on to the most current events from my fieldwork in Section 5.

Table 1. Main events in the establishment of the Derema Corridor. Sources: Iversen 1991; Tye 1993; EUCAMP 1999, 2000; Jambiya and Sosovele 2000; Sjöholm et al. 2001; Pohjonen 2002; URT 2006; taken from Vihemaki and Rantala 2011 with the protected area approach; confirmed by the EUCAMP Steering Committee.

1974	Derema first considered a reserve.
Early 1990s	East Usambara Catchment Forest Project starts. Derema again proposed as a Forest Reserve and later as a Wildlife Corridor.
1999	Gazetting of Derema Corridor included in the work plan of the last phase of EUCFP/EUCAMP (1999-2002).
July 2000	Social Impact Assessment (SIA) carried out in the five villages to be affected by the Corridor.
November 2000	Stakeholders' workshop on SIA results conducted in Muheza town
March-June 2001	Boundary survey and demarcation, including slashing of crops along the boundary.
July 2001	Mid-term review of EUCAMP recommends an alternative, community based conservation approach.
August 2001	Another stakeholders' workshop in Muheza decides to go ahead with the protected area approach; confirmed by the EUCAMP Steering Committee.
March 2002	Compensation payments for boundary crops to 172 farmers.
May-June 2002	Valuation of crops inside the corridor.
December 2002	EUCAMP closure. Compensation still pending.
2004	World Bank (WB) support sought, field mission.
2005	Part of remaining compensation paid to farmers.
2006	Derema Resettlement Action Plan (RAP) prepared for WB funding.
February-May 2008	Final compensation paid to farmers with WB funding.
January 2010	RAP implementation ends. Farmers yet to receive substitute farmland.

From this table it is important to note the long period between gazettelement (2001) and the first part of the payments to farmers (2005), with the final payments another 3 years later in 2008. This will be addressed in a later section. Another fact to note is the number of agencies involved, which will also be addressed. For now it is important to clarify the timeline of the process.

The funds for the first payments, that were for farmers with land in the boundary of Derema, came from EUCAMP funded by FINNIDA (Finnish International Development Agency). During the process, EUCAMP formed an agreement with the government of Tanzania that they would pay for 20% of the compensations, while the state of Tanzania would pay for the final 80%. When the first payments were being calculated, the new Land Act of 1999 had not been enacted, which required a higher level of compensation. Instead the calculations had been based on the Land Acquisition Act of 1967. Under the new Land Act (1999), the calculated cost of 9.31 million TAS total rose to a much higher rate.

According to the Derema Resettlement Action Plan (URT, 2006), there was not enough money to pay the rest from the Tanzanian government, but it is not clear why they made the agreement if this was the case. Between the first boundary payments, where 172 farmers were given 28,800 TAS per plant of cardamom (in total they were paid 113 million TAS), and the first payments made to all farmers for crops inside the boundary in 2005, farmers waited and eventually started mobilizing to demand their compensation money. On the government's side they realized that there was insufficient funds to complete the payments, due to the new Land Act (URT, 2006), and applied to the World Bank to complete the payments. They secured enough funds to pay farmers between around 5000 TAS per cardamom plant for a mature plant of high quality (designated M1 in URT, 2006), and less than 200 TAS per seedling on the low end. The difference in the amount from the expected boundary payments (28,800 TAS per plant) to the following compensation payments came as a shock to the farmers, which will be discussed in more detail below.

3. Theoretical Framework and Literature review

3.1 From Fortress Conservation to Participatory Decision-making and Management

The “Fortress Conservation Approach” describes the practice of preserving natural areas in parks or reserves, separately from human influence (Vedeld, 2002). Any human-induced change is called “management” and is only allowed by “experts” who carry out management to support ecosystem function, health, and biodiversity. Often these areas are policed by conservation officers who patrol the reserve or park to ensure that local people are not illegally harvesting or poaching (Vedeld, 2002).

From the colonial period in Tanzania, areas of land were protected to support colonial interests, such as hunting in the Serengeti and forest reserves set aside by tea or coffee plantations for strategic use. This was the earliest form of “fortress conservation” and it is still in practice today, though rather than being explicitly for foreign interests the reasoning is blanketed in terms of preserving nature for national pride and international importance. Natural scientists write with a sense of urgency, arguing that these natural areas will quickly disappear if they are not protected. This is not to say that protected areas have no value, but the question of who is benefitting from them needs to be addressed. The sense of urgency over the disappearance of natural resources in Africa have been made since the colonial period, primarily about the disappearance of forests. These claims feed into a strong view of environmental change in Africa that have been linked to policy interventions in forest conservation, to save the disappearing resource (Fairhead and Leach, 2000). Through an examination of the winners and loser in many cases of fortress conservation, it can be seen that conservation of resources and biodiversity is not the only goal in the creation of protected areas. In the past and in some cases still today, protected areas in Africa have been made for hunting grounds for foreigners, excluding local people. For Tanzanian government officials, preserving the environment is certainly a concern, but there is also a strong incentive in conserving the parks for tourism, which accounts for a 16.6% of Tanzania’s GDP and 25% of its export

economy (Sachedina, 2006). In that sense, protected areas continue to be created for foreigners.

“Fortress Conservation” has been criticized for excluding people who live near the protected areas in decision-making, management, and economic benefits. In most countries it is still seen as the best option to save species and resources from extinction and degradation. Local people are defined by the interests in control, for example as the poachers, over-users, or degraders of natural areas. Because of conflicts caused by strict enclosures of natural areas, a shift to more participatory arrangement occurred (discussed below), however the fortress approach is still dominant.

The shift from the “Fortress Approach” to a “Participatory Approach” began in 1980-85 (Vedeld, 2002). It was clear that for local people and the environment, the “Fortress Approach” had fallen short of its goals. There were actors from different backgrounds pushing the participatory approach for different reasons, some with a neoclassical economic background, and some from NGOs, trying to ensure that the ecosystem in question was being protected while giving local people and opportunity to have a benefit. In recent years there has been a resurgence of the “fortress approach” called the “back to the barriers” movement, especially concerning ecosystems with a high level of biodiversity and relative rarity, such as the 25 global biodiversity hotspots (Hutton et al., 2005). The critique offered for the argument that biodiversity must be protected as a moral imperative is that it should not overshadow local people’s interests (Hutton et al., 2005). Critics of the “back to the barriers” movement view the argument for conserving biodiversity as a top-down approach that does not engage people where their needs are to find more creative solutions.

The ecosystem approach is another framework set out by the International Union for the Conservation of Nature (IUCN), whose principles include decentralizing management of ecosystems, recognizing that long-term planning, and placing the ecosystem in a relevant economic context (Shepherd, 2004). It also recognizes that the attributes of each situation on the ground level, so management planning should be context-specific (Shepherd,

2004). There is also an emphasis on equitable distribution of decision-making and benefit-sharing in protecting ecosystems. Rather than planning conservation in separate blocks, there is a shift in this approach towards a more holistic landscape view, in a “protected area systems approach” (Dudley, 2008).

The principles of the ecosystem approach have been organized into five steps for implementation, each step encompassing a range of actions (Shepherd, 2004). The first is to find out who are the main stakeholders, what is the ecosystem of interest, and how do they interact. The second is to study the characteristics of the ecosystem, and start monitoring and developing tools to manage it. The third is to discover the main economic uses in place now and potentially in the future. The fourth is how the ecosystem affects and interacts with nearby ecosystems, and the fifth is to study the long-term implications of any actions and plans developed (Shepherd, 2004). Overall, by working with stakeholders, government officials, and other actors on multiple levels with an adaptive management strategy can be developed with a focus on the rights of local users and the needs of the ecosystem. Furthermore, the plan should have a focus on process rather than achieving a short-term goal and moving on, as it often happens in conservation plans (Shepherd, 2004)

3.2 Institutions and Property Rights

Institutions are conventions, norms, and laws that are created and followed by societies in order to facilitate interactions, bring meaning to aspects of life that are not inherently understood. Institutions affect environmental policy and people’s reaction to the policies, and how they may seek to support it or change it. (Vatn, 2005). Local institutions that have to do with how often and how much people harvest from the forest, when to clear land for planting and how much land is needed to grow what people need, are all examples of local environmental institutions that vary from location to location. Understanding the local institutions that affect and are practiced by a community helps facilitate conservation goals and equalize benefits to the community.

The various kinds of property rights that exist in an area are important for both understanding the situation on the ground and their use as tools for changing policies. Hardin's (1968) classic paper on the "tragedy of the commons" affected and still affects environmental policies today, by arguing that for any commonly held resource, such as grazing land (and later applied to forests and water), every user will try to benefit individually from the resource as much as they can, and since all users will do this, the resource will quickly become depleted. In newer arguments, however, the tragedy of the commons has been redefined as a tragedy of open access. "Open access" defines an area with no agreed upon common use institutions. When common use institutions are strong, a so-called "tragedy" is not likely to occur (Vatn, 2005), (Ostrom et al., 2002).

Traditional beliefs and rituals are institutions that affect people's interaction with their environment, though in many places including the East Usambaras, these are changing because of immigrants to the area, the spread of Islam and Christianity, and modern culture influencing the younger generation (Kweka, 2004). It can influence and improve environmental policy to study old and new institutions of belief systems in a community and how they influence how that community interacts with their environment. These institutions are often heterogeneous within a community.

3.3 Political Ecology: Conservation and Control

In the process of choosing ecosystems to protect, mobilizing people to protect them, and challenging the actions of political systems that make critical decisions about natural resources, the study field of political ecology has developed (Robbins, 2012). Political ecologists use political, social, historical, and anthropological analysis to frame the problems and possible solutions to environmental problems in the world. Political ecology can be a force for challenging political decisions that disproportionately affect marginalized groups of people, and it can expose political decisions that endanger a healthy environment and human communities. It can also be a field of research that

contributes to understanding of how people cope with environmental change, and bring to light “traditional” knowledge that can be examined and determined if it can contribute to a more sustainable culture (Robbins, 2012). Political ecology provides a useful lens through which many environmental decisions can be examined.

In contrast, apolitical ecology tends to focus on overpopulation and “tragedy of the commons” narratives that often oversimplify environmental problems (Robbins, 2012). Local people are portrayed as striving only for individual gain, and so their use of a resource inevitably is unsustainable. The government, in collaboration with certain environmental NGOs and scientists, become the authorities who coerce or forcibly remove local people in order to “save” an ecosystem. They start from the assumption that they “know better”, though recently there has been a shift toward participatory management, mentioned above, though it has been shown little success in Africa due to a lack of commitment (Kideghesho, 2010).

Political ecology is a vast field, with many tools that can be used to examine environmental issues. At its core is a dedication to studying as many perspectives and narratives involved in framing an issue. The conservation and control thesis, described in Paul Robbins’ (2012) and Roderick Neumann’s (1998) writing, is a fitting framework for examining cases of fortress conservation in Africa. Robbins (2012) defines the conservation and control thesis:

Control of resources and landscapes has been wrested from local producers or producer groups (by class, gender, or ethnicity) through the implementation of efforts to preserve “sustainability,” “community,” or “nature.” In the process, officials and global interests seeking to preserve the “environment” have disabled local systems of livelihood, production, and socio-political organization (p 178).

This is also linked with the “participatory approach” introduced above, because the community-based and participatory approaches have been generated through the discussions about the actors who are and who should be involved in conservation initiatives.

In Rademacher's (2011) ethnography on river restoration in Kathmandu, she identifies three types of narratives used in framing the causes and possible solutions in environmental and social problems. One is the official narrative, found in the documents funded by international donors and local government, often using recommendations from prominent researchers. Another is the local narrative, developed by the people living in or near the ecosystem in question, and by the social scientists who interview them and analyze their feedback. The third is the cultural restorationist narrative, which has to do with views on what are "traditional" practices for an area that were compatible with conservation, and must be preserved or restored because they are dying out. These narratives overlap at times and disagree at other times, and navigating them is critical for understanding the various perspectives and finding a way forward (Rademacher, 2011). In this paper the three narratives will be woven into the analysis of the Derema case, particularly in research objective 1, which has to do with defining the problem.

3.4 Landscape Ecology and Habitat Corridor Theory

Landscape ecology is a field of natural science that takes a holistic view of natural systems and tries to predict population changes through models. Rather than focusing on one ecosystem, local populations in landscapes of different ecosystems and their interactions is studied, and the studies contribute to discussions on how to improve management and conservation on the landscape scale (Collinge, 2009). Landscape ecological theory focuses on populations of one species and the processes in the landscape, unlike island biogeography, which has a focus on the number of species. The combination of effects for the different species in a landscape may make it possible to predict biodiversity for a variety of species, since some need multiple ecosystem types and some are specialists, though all depend on the structures in the landscape (Collinge, 2009). Many non-human species populations have evolved and changed through interaction with human landscape use through time, and those interactions are often not well studied or understood (Collinge, 2009).

A precursor to landscape ecology is island biogeography theory (Figure 6), which aims at explaining species existence on fragments using distance and size as the main variables, like islands in the ocean: a small island will have smaller populations and smaller species diversity than a large island, and will thus have a higher extinction rate for the populations (Chen, 2009) The distance between the islands makes a difference in colonization (Wilson & Willis, 1975 cited in Collinge, 2009). Ecosystem fragments, like patches of forests, are studied using transects and other techniques to measure species diversity. Ideally ecosystem fragments should be increased in size, but barring that, connectivity between ecosystem patches must be increased (Collinge, 2009). Habitat corridors are the primary method to accomplish this.

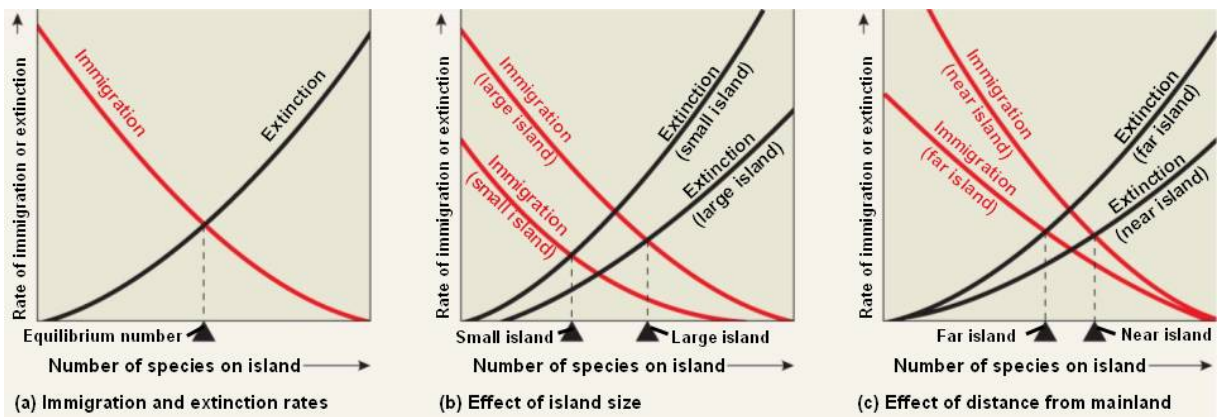


Figure 6: Graphical representations of island biogeography theory, showing extinction and immigration rates of species on small and large islands, with both the effect of island size and island distance in (b) and (c) (Chen, 2009).

A “habitat corridor” is defined in Landscape Ecology as “linear strips of protected habitat; in biological conservation, they are proposed as a way to moderate the negative effects of habitat isolation on animal movement and species persistence (Collinge 2009, p. 59). As mentioned above, in MacArthur and Wilson’s (1967) island biogeography theory, species richness decreases in small islands due to high extinction rates, and increasing isolation affects colonization negatively. This theory may also be applied to terrestrial systems, where habitat patches are viewed as islands for animals that prefer their habitat qualities. Habitat corridors can help species navigate between different

patches (Bennett, 2003), and might thus decrease local extinctions. A key question before implementing a corridor for conservation purposes would be if the endangered groups in question might use the corridor or not. Generally, corridors are most useful for protecting populations of large mammals (Fred Midtgaard, pers comm). In the case of Derema, the main focus groups are birds and insects (Newmark, 1992; Newmark, 2002).

Fragmentation of ecosystems is caused by a variety of factors, including natural disasters like earthquakes and floods, but mostly human-caused changes, such as mining, agriculture, and other kinds of development. Ecological corridors can affect larger habitats in a variety of positive and negative ways, the most obvious of which is movement. Improved movement between two ecosystem patches can bring the positive effect of allowing species more freedom of movement, strengthening the gene pool and increasing the population. Movement can also bring negative effects, as it allows disease to spread more quickly. Ecologists have both encouraged and criticized the use of corridors as a conservation tool, saying that it is important to examine all the variables in a given situation before recommending a corridor (Bennett, 2003).

4. Methodology

4.1 Data Collection and Research

The main goal of my project was to interview a cross-section of the different groups of actors in the Derema forest corridor gazettement process. I aimed to balance the point of view “from the ground”, i.e. the farmers in the five villages who were directly affected by the Derema FR, and the point of view from the people in government, non-governmental organizations (NGOs), biologists and other researchers, and use participant observation to form my own understanding of events. My interviews with Amani NR employees, and a few interviews I had with people in the government district level branch of the Forestry and Beekeeping Division (FBD) or Tanzania Forest Conservation Group (TFCG) who work in Amani, were compared to the more distant government and NGO officials in the Ministry of Natural Resources and Tourism (MNRT), World Wildlife Fund (WWF) for Nature in Tanzania, and TFCG in Dar es Salaam. Below I will briefly describe my methods for selection of interviewees.

Aside from the raw data collection, I used a variety of texts in the social sciences and natural sciences to analyze the data, and to examine my research question number four about the successes and failures of wildlife corridors. This paper examines what helps a wildlife corridor fulfill its purposes and what are some common challenges faced by others. Biological functionality as well as social functionality will be addressed. This can be an issue because many papers on wildlife corridors only address their biological functions, and not enough is written on the social impact of corridors.

4.1.1 Villages

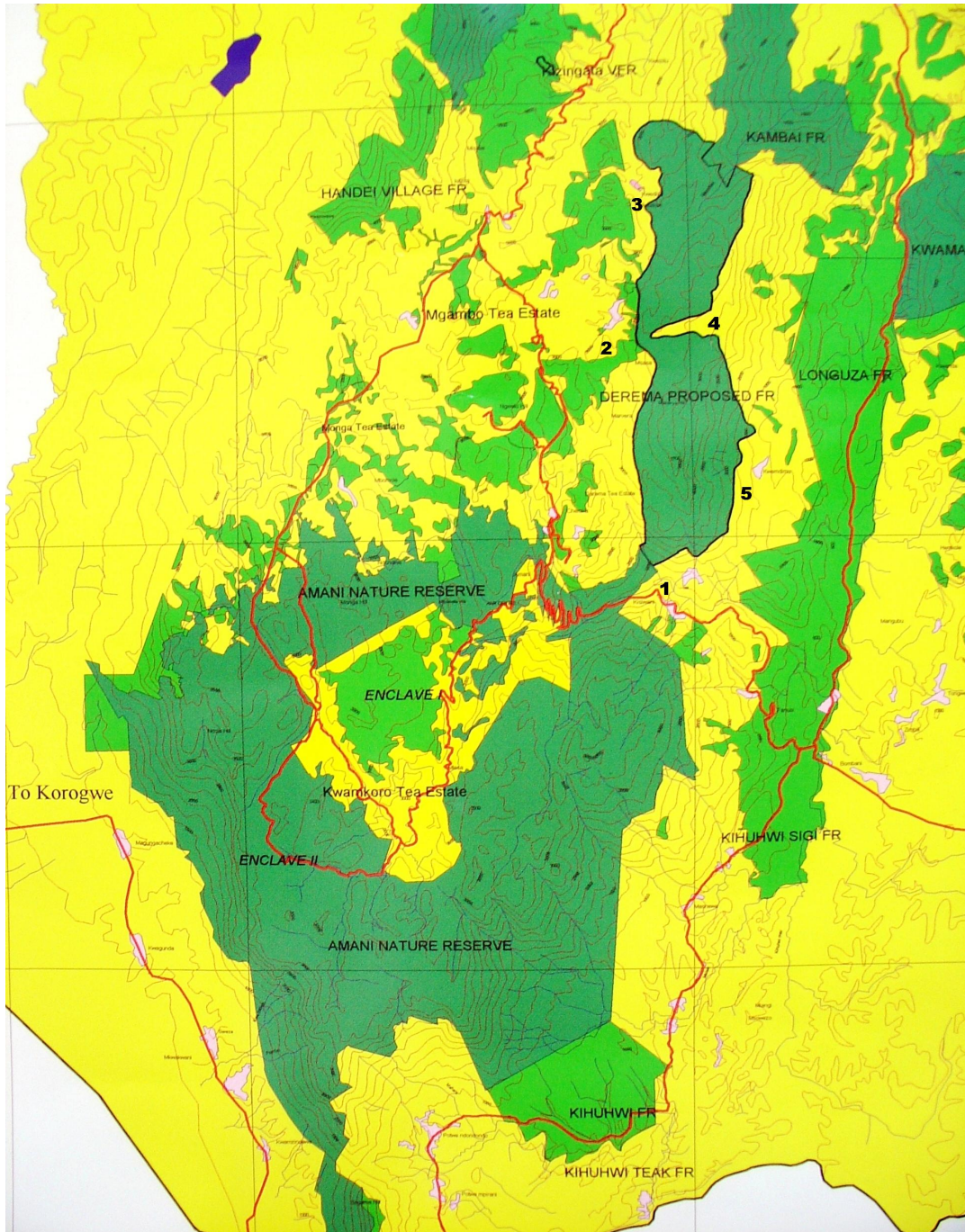


Figure 7: Location of the five villages surrounding the Derema forest corridor, outlined in black (map is from 2000, before gazettement, which is why it says “Derema Proposed FR”). 1: Kisiwani, 2: IBC Msasa, 3: Kwezitu 4: Kwemdimu 5: Kambai. Taken from the Derema Resettlement Action Plan (URT, 2006).

I interviewed farmers affected by the Derema FR in proportion to the number of affected farmers in each village. Using a table from Vihemaki (2009) I split the number of interviews per village. The total number of farmers was 1128, so I chose to do between 75 and 90 farmers to give me a proportion of between 6.6% and 7.9% of the total. According to Bryman (2008) a study needs over 5% of a population to achieve data that will show significant findings from the analysis. 82 individual farmers in all were interviewed, representing 7.2% of the total number of farmers. I also did five thematic focus-group interviews with village committees in three of the villages.

The number of farmers who lost land in the Derema Corridor is different in each of the five villages surrounding the Derema Corridor. See Table 2 for the number of Derema farmers in each village. The number of affected farmers for Kambai village was different in this field visit in 2012 than in the table, due to people migrating or death, but according to a Kambai farmer there were probably farmers who tried to capitalize on the compensation opportunity and pretended to be one of the affected farmers. This incongruency could also apply to the other lists I received, however Kambai in particular, the most isolated of the villages, was the most susceptible to this type of fraud. According to records in the Muheza District office, the number of farmers who lost land to the Derema forest corridor was 1128, which matched with official documents I had from before going into the field. 10 years later the number is different, since some have moved and some are deceased, but the records of those numbers were not kept.

The original five villages affected by the Derema FR were Kambai, Kwezitu, Kwemdimu, Kisiwani and IBC Msasa. I interviewed farmers from all of these villages except for Kwezitu; instead I went to Antakae, which is a sub village of Kwezitu; both villages have Derema farmers living there. I did a random selection by selecting between 12 and 24 farmers out of a list of 50 names in the village given to me by the Village Chairman or woman. I selected more than the optimum number I had in mind, since farmers can be absent or otherwise unavailable. Most of the farmers were male, since culturally the women more often were collecting water, firewood, taking care of children, and other duties, and men were the primary farmers and owned land. Most of the women

farmers I interviewed owned their own land through inheritance but did not purchase it on their own as men were able to do. Many women farmers who came to me spoke on behalf of their husband, who was either busy or had passed away, and gave answers that were not as accurate since they did not know as much about the farm, and their husband usually kept the records mentally rather than on paper. Even with this drawback, I ended with a large enough selection I was able to procure an overview of the villages.

Table 2: The five villages affected by the Derema forest gazettement

	Total population of the five villages surrounding the Derema corridor:*	Number of farmers who lost land in each village:**	Number of Derema farmers interviewed (Fall 2012)
Kambai	1211	39 (11***)	5
IBC Msasa	1192	570	26
Antakae	1219	216	16
Kwemdimu	1502	244	24
Kisiwani	1532	59	11
TOTAL	6,656	1128	82

*From Muheza District Office, 2012. **From Vihemäki 2009. ***Number as of fall 2012.

4.1.2 Government

The government officials I interviewed were in Muheza District Office and in Dar Es Salaam. In the Muheza district office I interviewed The District Forest Officer (DFO) at the time (fall 2012), who had some knowledge about the ongoing process of the land compensation but was not the DFO when the Corridor was first planned and implemented. I also interviewed the former representative of the Forestry and Beekeeping Division, who is now the District Catchment Forest Manager in the Tanzania Forest Service, a new level in the government. Tanzania had, up until recently, levels of

jurisdiction separated into national, region, ward, district, village, and finally 10 households. In the last few years they have added the “zone” level in between national and regional. The Tanzania Forestry Service (TFS) oversees the different zones, and they are working under the Forestry and Beekeeping Division. I also visited with the District Agricultural Officer in Muheza, for information on crop prices and livelihood strategies for small-scale subsistence farmers.

In Dar es Salaam I interviewed Luciana Mshana, who was the Nature Reserve Coordinator in the MNRT at the time of the final compensation payments to farmers, and had direct experience with the Derema farmers and the gazettement process.

4.1.3 Researchers and Professors

I interviewed two natural scientists, Dr. William Newmark, and Dr. Norbert Cordeiro, who had many years of experience each in the East Usambara Mountains and the Eastern Arc Mountains as a whole. They gave me a perspective that helped me triangulate between the government and the village perspectives that were often at odds. Their input was critical for my results, because they not only described their involvement in the project but they also gave me recommendations of who to talk to in the NGOs and in the government. Moreover, their long-term experience with the area gave me access to encyclopedic information.

There were wildlife conservation professors at the University of Dar es Salaam who had experience working in ANR, and some who had experience directly with the Derema forest corridor planning process, and most had little or no experience in that area. I chose a professor in each category, Dr. Nyundo and Dr. Senzota, and interviewed them based on their knowledge and expertise in ANR and other issues surrounding Wildlife Conservation in Tanzania.

4.1.4 Amani Nature Reserve Staff

People working at Amani had some of the most direct experience and expertise with the forest and surrounding villages, so they provided some of the best information on the nature reserve and their relationship to villages surrounding the reserve. They also gave me insight into the financial, social and research-oriented aspects of ANR. I interviewed two of the foresters who work at ANR full time, a forestry technician who has done extensive research on birds and other wildlife in the EUM, and the new conservator who started working there during my field work.

4.1.5 NGO Officials

I interviewed employees from the two most relevant NGOs, WWF Tanzania and the Tanzania Forest Conservation Group (TFCG), who were closely involved with the Derema Corridor gazettement process for the final compensation payments. They were both contracted with the Tanzanian government and the WB to complete the compensation process from 2005 to 2008, when the payments were finished. I interviewed most some officials in Dar es Salaam and one in Amani Nature Reserve. They were generous with their time and resources, and provided me with maps and documents of Derema.

4.2 Challenges

The five villages I planned to visit were not easily accessible from the Conservation Centre at Amani where I stayed. I rode on the back of a motorcycle with my interpreter to three of the villages over bad roads, which were made worse in the semi-frequent rains. I was there during the short rains, October to December, so it was typical to have a few days of rain, sometimes for the whole day, each week. The distance to each village was between 30 minutes to over an hour. Two of the villages, Kambai and Kwemdimu, had roads so poor that we arranged an in-between meeting point for interviews. These

challenges made it difficult to connect with as many village committees and individual farmers as I had hoped, however I was able to collect sufficient data. I was able to get focus group interviews with village committees in the most highly affected village populations, Antakae, IBC Msasa, and one of the least affected, Kambai.

My interviews in the District Office in Muheza and in Dar es Salaam also presented some logistical challenges. Travelling to the District Office in Muheza was also time consuming and had to be planned well in advance. The officials I interviewed were not always people who had been directly involved with the Derema gazettement, however in all cases they were informed about Derema. It was also helpful to learn about their role in the government, and how the process of creating and maintaining a protected area is carried out in Tanzania. I was not able to access certain documents in Muheza, such as maps and agricultural records, due to frequent power outages and subsequently busier schedules of the District Office workers, but I was able to obtain them later when I went to Dar es Salaam.

In Dar es Salaam I interviewed two representatives in the Ministry of Natural Resources, and gained access to maps of the Amani Nature Reserve and the Derema forest. Maps were difficult to access in the Amani Conservation Centre, except for maps in hard copy. The computer in the Conservation Centre is old and slow because it is full of files, creating an inefficient work environment.

4.3 Qualitative Methods

I used qualitative, semi-structured interviews for the individual farmers who were affected by the establishment of the Derema forest corridor. Some questions provided quantitative data, such as age, gender, household size, farm size before and after the Derema FR, and compensation payments received. Other questions were geared towards providing a picture of the farmer's opinion of the reserve and conservation in general, how their livelihood was impacted, and what strategies were they using to provide for

themselves and their families (See Appendix 1). I wanted to use qualitative methods to give a more free form to the interview, to gain more breadth of information that quantitative methods can be too narrow to reach (Bryman, 2008). Using qualitative interviews also allowed me to ask more questions that were not on my interview guide, if a respondent's answer prompted me to go into more detail about something they said.

Focus group interviews were another qualitative method I used in the villages. I used them with village committees, and with the Derema farmer's organization, called Wakulima Vijiji Vitano Msitu wa Derema (Farmers of the Five Villages of the Derema Forest). Focus groups are useful because unlike one-on-one interviews, participants can challenge each other's answers so there is a higher possibility of getting accurate information. For example, since I wanted to find out more about the effect of cardamom farming in the forest, which is considered the primary threat to Derema, the discussions between the farmers' organization and environmental committees in the villages gave me more insight than one-on-one interviews. Focus group interviews also enable the researcher to discover what one person's opinion on something was, and why they held that opinion, and compare it to others' opinions at the same time (Bryman, 2008).

4.4 Interview Structure

For the Derema farmers I chose to do one-on-one qualitative interviews, consisting mostly of open-ended questions with some closed questions such as gender, age, income, and compensation payments. I also did some focus-group interviews with village committees and the Derema farmer's advocacy group, Wakulima Vijiji Vitano Msitu wa Derema (Farmers of the Five Villages of the Derema Forest) who had the most details about the Derema FR gazettement process from the farmer's point of view. The purpose of using open-ended questions gives the interviewee more freedom to give input. The aim is to learn the person's perspective of the case, and not be restricted by my own assumptions as an outside researcher. In this way I collected data that is a mix of my

decisions as a researcher and the interviewee's interpretation of the situation. My interview questions changed somewhat as I learned more about the situation.

It was important to me to conduct concise interviews that did not take up a lot of their time, especially the farmers. Therefore, my individual interviews ranged from 30 minutes to one hour, while the group interviews and interviews with officials and NGO workers tended to be longer, between an hour and two hours. It was also beneficial to my research to keep things concise, as I intended to go into depth over breadth.

I used one interpreter/guide at Amani Nature Reserve, Alloyce Mkongewa. For my research, using one guide was helpful because we were able to develop a rhythm and understanding in the interviews. Alloyce was knowledgeable about the culture of the area, because he grew up in a village near the reserve. He had experience with biological research as well, with one of the most influential and prominent researchers in Amani, Dr. William Newmark. Alloyce was the only guide who could ride a motorcycle, and all the villages were too far from the Conservation Centre to be feasible in my limited time to walk to. My research benefitted from his help and knowledge of the area, but we were able to balance between his recommendations and my decisions without my research becoming too heavily influenced by him or by what I thought as an inexperienced outsider.

5. Results and Analysis

5.1 Impact of Cardamom Farming and the Tea Estates in the EUM

The full answer to the research objective of how cardamom cultivation impacts the forest requires more scientific study outside the bounds of this thesis. I was not able to conduct a quantitative study on agroforestry in the EUM, though I will draw from interviews with farmers and researchers for their perspectives on how cardamom affects the forest ecosystem in the EUM. Results from Reyes (2008) and Huang (2002) will also be presented here and in the discussion in section 6.

In the Derema forest, 90% of the crops farmers grew were cardamom. Farmers usually cultivated cardamom in tandem with other crops, such as black pepper, bananas, cocoyams, and others. Before planting they clear the undergrowth and some trees, opening up the forest to let in light but managing it to the right level of shade. Many of the farmers said that cardamom farming has little impact on the forest, because cardamom plants need trees for shade, and they can grow cardamom for a long time on one piece of land (Figure 10). Reyes (2008) conducted a study on how to increase production of cardamom and other spices grown in the EUM on less land, using test plots. Cardamom farming, when intensified to the degree seen in India, can have a degrading effect on forest structure and biodiversity, as Murugan et al. (2011) argue. The goal is not to catch up to India in intensification, but to help farmers increase yields without moving further into the forest (Reyes, 2008). Reyes (2008) found that around Derema, farmers grow cardamom in one plot for an average of 23 years, whereas farmers around Amani Nature Reserve grow cardamom for an average of 15 years.

Results from interviews with farmers who grew cardamom in the Derema forest, and in some cases still cultivated it now, reflected the average of 23 years above. When the cardamom eventually depleted the soil, they would move to a new or old plot and the old plot would recover eventually back to forest. In this way, combined with community land-use planning, cardamom farming can be sustainable in the farmers' perspective

(field interviews 2012). There is not enough evidence to support its sustainability, however growing cardamom as a part of an intercropped agroforested system can support higher levels of biodiversity in buffer zones in comparison with cultivation of other crops such as sugar cane or tea, which increase erosion. (Reyes, 2008)



Figure 8: Cardamom plants in the foreground and banana trees to the right and background. Photo taken by the author fall 2012.

Small-scale agriculture (including cardamom cultivation in agroforestry), and cutting trees for fuel wood and building is cited as the main causes of deforestation in the EUM (Newmark, 2002), (URT, 2006), and the main threat to the Derema forest (Sumbi, 2010). These activities are said to be exacerbated by a population growth in the last 60 years, at a rate of 4 % per year (Newmark, 2002). Other drivers of forest destruction and degradation are expansions from the tea estates, illegal logging, and illegal gold mining (Conte, 2004). In Table 3, the distribution of various land uses in the EUM is shown. It

is important to question what type of small-scale agriculture, because the affect on the forest and overall biodiversity is different between agroforestry and growing food crops like maize and beans, and sugar cane, which will be discussed in Section 6.1.

Table 3: Land use in the East Usambara Mountains (Hyytiäinen 1995 cited in Newmark 2002). *Includes forest in forest reserves, ANR, and tea estate reserves, and unprotected forest.

Land Use	Area (ha)	Percent of Total Area
Forest	42,121*	50.4
Small-scale agriculture	31,716	37.9
Large-scale agriculture	4193	5.0
Woodlands	4113	4.9
Settlements	620	0.7
Barren land	393	0.5
Grassland	345	0.4
Ponds and rivers	101	0.1
TOTAL	83,602	100.0

This table is useful in showing how much areas are used for, but it is unclear in a few ways. One way is that it is unclear who owns what percentage of the 42,121 ha of forest, which has a bearing on its use, and whether it is threatened. Some is taken up by the ANR (8,380 ha), and some of the other forest reserves such as Longuza Forest Reserve and Kambai Village Forest Reserve, but there are also approximately 11,000 ha of forest owned by the largest tea estate, EUTCO (interview with General Manager at EUTCO). Another way it is unclear is what impact large-scale agriculture has compared to small-scale agriculture on soil erosion, carbon sequestration, and biodiversity, which is likely higher than the 4193 ha seems to show. Furthermore, it is not defined what makes “woodlands” different from “forest”, although woodlands in East Africa are usually understood as more or less tree covered areas with trees shorter than 20 m and usually in the lowlands. The table seems to include the foothills and plains around the mountain as well, which have not been historically forested.

The General Manager (GM) at the East Usambara Tea Company (EUTCO) was interviewed about some of these issues. EUTCO states on their website that they own a total of 14,164 ha of land in EUM, 2,000 ha of which is planted with tea and 450 ha is planted with eucalyptus (EUTCO, 2006). The GM stated that the eucalyptus is now 600 ha. A large part of Derema forest also belongs to EUTCO, according to the GM. The remaining land, approximately 11,000 ha of forest, was given over to Amani Nature Reserve and the Government of Tanzania for management “to set an example towards conservation, where private and government bodies can work together” (interview with GM, 2012). The 11,000 ha are not included in the amount of land that encompasses the ANR, however they and the DFB have a role in managing it (ANR Conservator, 2012).



Figure 9: Tea fields in the EUM. Taken by the author fall 2012.

Most farmers stated that if they could receive land from the tea estates, it would not be good compensation for them. They said that if they received land from the tea estates, it would not have trees, and they would only be able to grow food crops, and thereby not make as much income as they could from cardamom (field interviews 2012). When they grew cardamom, they said most trees were left standing, but they would clear the underbrush and some of the smaller trees. In my visits to the Derema corridor, the plots they still cultivated outside the boundary were more open than the forest corridor itself, but they were as open as the primary forest I visited later that were part of the ANR, and hosted as much birdlife.

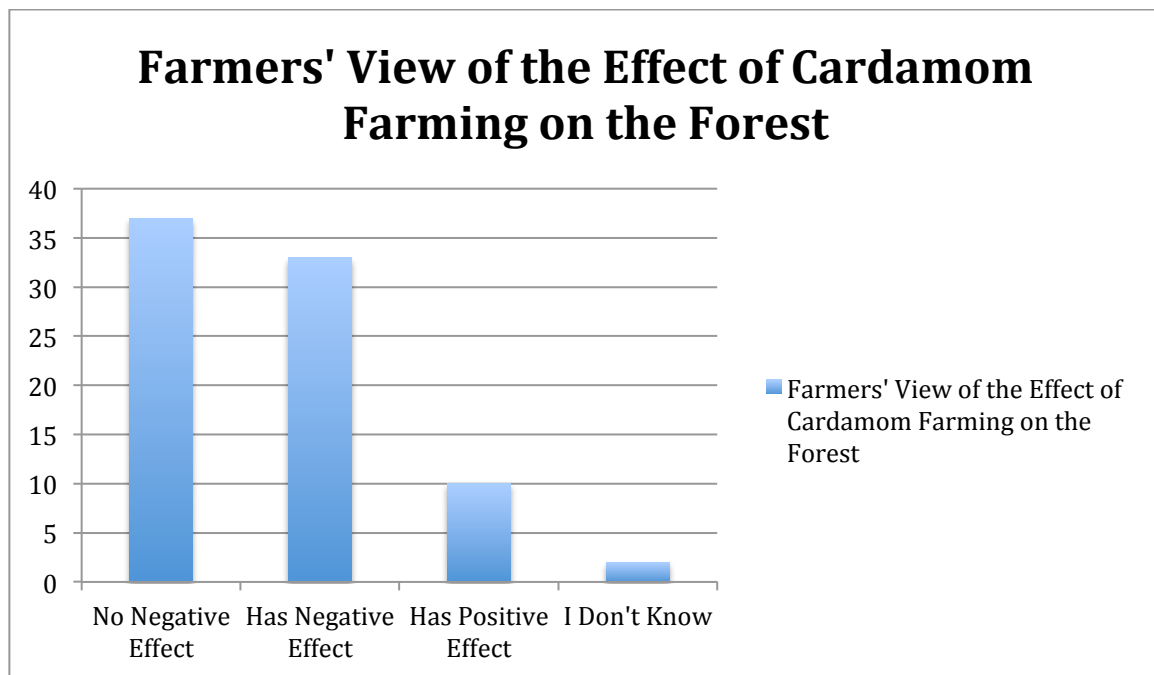


Figure 10: Views of the farmers from the five villages of how cardamom farming affects overall forest structure. Y-axis is the number of farmers. N = 82.

47 out of 82 farmers interviewed (57%) of farmers interviewed thought that growing cardamom in the forest either had no effect or a positive effect on overall forest structure. These farmers said that growing cardamom “saved” the forest, because otherwise it would be cut down to grow crops that need more sun than cardamom. They also said that the plots they used last many years, between 15 and 30 years. When the soil became

depleted, they would let it fallow, and later these plots would be used again, and not encroach further into the forest. 33 out of 82 farmers interviewed (40%) of farmers thought cardamom had a negative effect on the forest. They said this was because they had to clear the underbrush and some small trees to plant the cardamom (field interviews 2012).

In the literature, and from the perspective of NGO officials and those employed at ANR, the cultivation of cardamom in the Derema forest corridor is viewed as the first stage in the process of forest degradation that has an adverse effect on forest species. Two prominent researchers, Dr. Cordeiro and Dr. Newmark, both with long-term experience in the EUM and the Eastern Arc Mountains as a whole, share the view that deforestation and degradation is a problem in the area, but diverge in how the problem should be addressed. Dr. Cordeiro, one of the researchers who have done extensive work in the EUM and the Eastern Arc Mountains, spoke of his and his colleagues' ongoing research on bird species threatened by forest fragmentation in the EUM. Since 2006, they have been using 380 fixed points and 20 established transects in the EUM to monitor the populations of regionally or globally threatened bird species such as the Usambara thrush, dappled mountain robin, redcapped warbler, and others. "Our data actually contrasts with his [Newmark] purported declines--over the six years we've been monitoring species we haven't seen the same declines that he has. So he's using a different model approach" (interview with Dr. Cordeiro, fall 2012).

Newmark's data collection in the EUM has been ongoing for over 25 years, and his publications are widely cited in the documents and academic literature about the EUM and the Derema case (See Newmark, 1992; Newmark, 2002; Newmark et al., 2010). In a few of his publications about Derema and other proposed wildlife corridors, he highlights birds as the target species for conservation, and overall connectivity (Newmark, 1992), (Newmark, 2002). He has cited "all vertebrates, and as a result of climate change, many plants" as the target species of Derema forest for protection (questionnaire by the author filled out by Newmark, fall of 2012).

Newmark and Cordeiro’s responses were not in complete agreement, however they did agree that cardamom cultivation, as it had been done in the Derema corridor, had an adverse affect on biodiversity. “They're [the farmers] not interested in knowing that they're removing the undergrowth to plant this crop [cardamom] [...] I would question someone who says it doesn't affect biodiversity” (interview with Norbert Cordeiro 2012). And Newmark agrees, saying, “Cardamom farming affects the corridor [Derema] through habitat loss and disturbance” (questionnaire filled out by William Newmark 2012).

5.2 Socio-economic consequences for Derema farmers

5.2.1 Compensation payments



Figure 11: Meeting of the farmers who lost land to the Derema forest corridor (Wakulima Vijiji Vitano Msitu wa Derema) in IBC Msasa village. Photo by the author, November 2012

Farmers who lost all or part of their lands to the Derema forest corridor say they continue to suffer economically, ten years after the establishment of the reserve. The amount that farmers were compensated varied based on connections they had in government and how high their financial standing was prior to the loss, according to recent research in the area (Vihemäki, 2009), (Rantala et al., 2013). It was clear that the more land and crops a farmer had before the corridor was established, the higher the compensation they received, and poor farmers received less. Compensation was proportional to the loss in most cases, but this resulted in poor farmers becoming worse off than richer farmers, and this was mostly because they could not afford new land. For all farmers interviewed, new land was essential to rebuilding their livelihood (field interviews 2012).

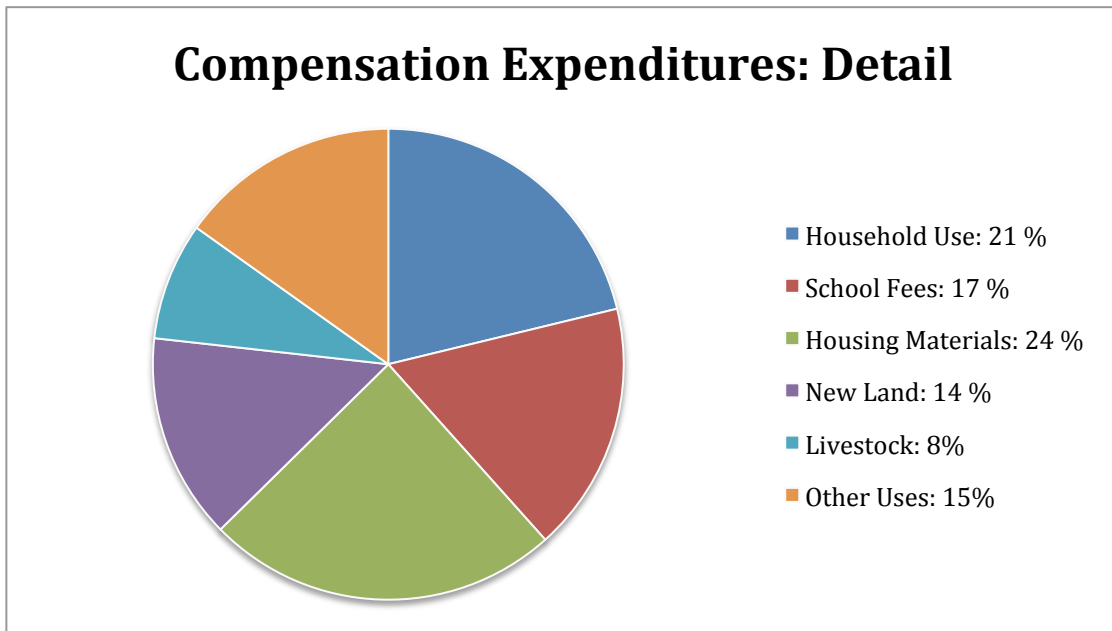


Figure 12: Farmers’ use of compensation payments in detail. “Other uses” were mostly short term, such as transport to Muheza and medical expenses.

The compensation payments to the farmers were three payments in most cases, sometimes four if their land was a part of the first boundary payments. Compensation money was calculated based on the size, quality and type of crop plant lost. A team of professional evaluators, appointed by the EUCAMP project, was in charge of the compensation calculations for the boundary payments and the final three payment amounts. A team of lawyers appointed by the Ministry of Lands in Tanzania checked the

calculations made by the evaluators, and approved it. They found many small errors and one larger, unanswered question: why did the evaluators choose to decrease the original total from 3.361 billion TAS to 1.6 billion TAS (URT, 2006). The question remained unanswered, and the payments were made by check and picked up by the farmers in Muheza. The compensation total distributed to farmers was 1.6 billion TAS (in funds received from the WB) in the end, after many changes in the calculations made by the evaluators.

Much of the funds donated for compensation payments were given through the Critical Ecosystem Partnership Fund (CEPF), and applied to by WWF and TFCG. CEPF was formed in 2000 through a partnership between “l'Agence Française de Développement, Conservation International, the Global Environment Facility, the Government of Japan, the John D. and Catherine T. MacArthur Foundation, and the World Bank” (Conservation International, 2013), has been funding various projects in the EAM. In 2003, they gave \$19 million towards conservation in the EAM, coastal forests of Tanzania and Kenya (Conservation International, 2005). For the EAM specifically, \$15 million per year from the Global Environmental Facility (GEF) and the WB is planned for re-structuring the Forestry Division in Tanzania, and \$5 million is allocated broadly to “forest conservation” (Conservation International, 2005). The amount allocated to the EUM for exceeded \$1 million for the 10 years up to 2003, and about \$50,000 in 2003 (Conservation International, 2005). According to a document from 2011, “CEPF’s funds will ensure that: a) alternative land promised as part of the compensation agreements to the 1128 farmers affected by the Derema compensation area is provided mitigating possible poverty” (Conservation International, 2011).

Interestingly, the amount given to farmers for compensation is both 1.6 billion TAS and over 3 billion TAS in one document (Sumbi 2010). Early in the document it says the farmers were given over 1.6 billion TAS, then later it give the total amount in compensation paid out to US \$2,762,000 (see Table 4, amount reached after adding all amounts with the notes “Compensation payments to affected communities”), whereupon conversion to TAS at the rate from 2005 (1128 TAS to 1 USD) is over 3 billion TAS.

Table 4: Funding for the Derema forest corridor compensation payments from the Critical Ecosystem Partnership Fund Final Project Completion report for 2005-2010 (Sumbi, 2010).

DONOR	TYPE OF FUNDING	AMOUNT	NOTES
World Bank	B	\$ 274,661	Implementation of Resettlement Action Plan (RAP)
World Bank	B	\$ 2,100,000	Compensation payment to affected communities
Government	B	\$ 85,000	Compensation payment to affected communities
FINNIDA (Now MFA)	B	\$ 107,000	Boundary clearing and compensation payment to affected communities
FINNIDA (Now MFA)	B	\$ 227,000	Compensation payment to affected communities
Global Conser. Fund	B	\$ 350,000	Compensation payment to affected communities

***Additional funding should be reported using the following categories:**

- A** *Project co-financing (Other donors contribute to the direct costs of this CEPF project)*
- B** *Complementary funding (Other donors contribute to partner organizations that are working on a project linked with this CEPF project)*
- C** *Grantee and Partner leveraging (Other donors contribute to your organization or a partner organization as a direct result of successes with this CEPF project.)*
- D** *Regional/Portfolio leveraging (Other donors make large investments in a region because of CEPF investment or successes related to this project.)*

The central problem in the compensation payment calculation, from the farmers' perspective, was the difference in the boundary payments to the final payments. 127 farmers received payments for crops slashed in the boundary of 28,800 TAS per cardamom plant, which was calculated as the income from that plant for 3 years. This payment was made regardless of plant size and age, and caused farmers and even outsiders to plant more cardamom in the corridor in hopes of being included in the compensation. The final payments, in contrast, were rated between 102 TAS for seedlings and 4320 TAS per cardamom plant (URT, 2006). All crop compensation rates can be found in the appendices of the RAP report (URT, 2006). Each crop was given a different price, such as banana trees and black pepper, but cardamom was the primary crop plant in Derema. One farmer from Kambai village said that his yield was up to 150

kg of cardamom per season, 3 seasons per year, and the price per kilogram on average from the last 4 years was about 3,800 TAS/kg, so the income of one farmer in one year could be as much as 1,710,000 TAS for cardamom alone. Average household income from spice farming is 30% of their total income (Reyes, 2008). The law of compensation in Tanzania, which is supposed to cover income for three years, was not followed for the farmers.

Higher payments made it easier for some farmers to afford travel down to Muheza town to pick up their compensation check, and some poorer farmers did not bother to pick up their second check, because the first payment was “shameful” that it was less money than the cost of travelling to Muheza (field interviews 2012). It was also difficult for the poorer farmers to have extra time or resources to become active in the farmer’s organization Wakulima Vijiji Vitano Msitu wa Derema (Farmers of the Five Villages of the Derema Forest), though all of my interviewees said that they were involved in it in some way.

Regardless of the level of compensation received, all farmers interviewed claimed losses that were too high for them to cope with, and estimates they gave for the minimum compensation they wanted usually ranged up to ten times the amount received (Table 5). This practice is described as a “discursive strategy” by Vihemaki (2009), which is a technique used by the farmers to inflate the amount of compensation, in order to receive closer to the amount of compensation that they believe they need. When asked how they came up with the amount of compensation they said they needed, most farmers said that land was much more valuable than the crops they lost, and scarce in the area. They also said that the years they lost in between 2001 and 2005 while waiting for compensation (with the exception of 172 farmers who received payments for the boundary of Derema) had high prices for cardamom, so they compounded the amount they perceived to lose from those years.

Table 5: Compensation check amounts compared to minimum estimated amount of compensation needed to cover 10 years of losses. Amount of land lost to the corridor is also included.

Village Name	Compensation received (average)		Compensation needed (average)		Land Lost (average)
	TAS	USD	TAS	USD	Acres
Kambai	140,840	89	35,000,000	22,292	4.2
IBC Msasa	1,814,250	1,155	46,708,333	29,750	9
Kisiwani	428,829	273.13	28,772,727	18,326	3.7
Kwemdimu	2,706,138	1,724	46,454,545	29,588	3.8
Antakae	1,033,600	658	45,750,000	29,140	4
Total Average	1,224,731	780	40,537,121	25,819	5.61

A number of observations can be made about the table above. The most important is to point out the average amount of compensation, 1,224,731.40 TAS, multiplied by the number of farmers 1128, equals a total of 1,381,497,019.20 TAS that was paid out to farmers in the five villages who lost land to the corridor. This amount is close to the 1.6 billion TAS amount mentioned in Sumbi (2010). In other observations from the table, Kambai and Kisiwani had the lowest averages, while IBC Msasa and Kwemdimu had the highest average compensation received. The most average land lost was in IBC Msasa, although most farmers interviewed still had land left over. For the farmers overall, this left over land they had was for food crops only, and the land they had in the corridor was for cardamom and other cash crops, mostly spices. Their lost land was the most valuable land they had, which was a factor in the high estimations they made for how much compensation they needed.

Antakae and Kambai were the least accessible from Muheza, the main town hub for the EUM. They both had a low compensation compared to average land lost, which may factor into why compensation for them was so low, and why they gave a much higher number for compensation needed in proportion to the amount received. One farmer from

Kambai said that because the first check he received was so low (1000 TAS), he refused to make the trip to pick up the second and third checks. Kambai village was listed as having 39 farmers affected by Derema corridor, but by 2012 this had been reduced to 11. Two villagers of the five interviewed were the surviving family of the original person compensated. These results will be discussed in section 6.

5.2.2 Land Compensation

The Derema forest was once owned by the Derema tea estate, as mentioned earlier in the background section. There are differing accounts of who currently owns the land, and in what legal status it was prior to gazettement. It was general (public) land, according to Peter Sumbi in the WWF, but according to the farmers, the Derema tea estate gave it to the five villages, (field interviews 2012). As for current ownership, it is under management by the FBD, with the VECs also responsible to patrol the boundaries. The GM of EUTCO said that they owned most of the Derema forest under a 99-year lease. According to customary law in Tanzania, land that is cultivated belongs to the cultivator, without a land deed (Josefsson and Åberg, 2005). If the government decides it needs the land for the public interest, such as a school, or a protected area, the public interest takes precedence over the individual but the individual will be compensated. According to an official in the Tanzanian Ministry of Natural Resources, in a gazettement process such as Derema's, there are stages it goes through to ensure local agreement. The first stages are on the village level, going through a majority rules voting system until it gets passed on to the district, regional, then national levels of approval. She emphasized that the longest and most careful part is the village level approval, before it is more or less streamlined to the top (interview with MNRT official 2012).

Accounts of the land compensation owed to farmers varied. One forester at Amani Nature Reserve said that all land was ultimately owned by the government in Tanzania, and is not obligated to give land compensation specifically under the law, which contradicts what was promised to the Derema farmers. Compensation of some sort is

required for loss of land, but the type of compensation is not specified, so it could be delivered in monetary form or in land (Josefsson and Åberg, 2005). The farmers said that they heard of land compensation, and that each of them was supposed to receive three acres regardless of the amount lost, and the land was an abandoned sisal plantation in the lowlands. To the farmers this decision did not make sense, because people who lost half an acre to the corridor and people who lost more than 20 acres were all supposed to receive three acres each. Most farmers did not want land so far away, because they could not afford regular transport there. For some richer farmers, more land was desired, but not a livelihood necessity. An official from the Ministry of Natural Resources, who worked on the Derema case, stated: “Now that the [monetary] compensation has been paid, the farmers should push for the land compensation” (pers. comm., 2012).

The process for getting land compensation is still ongoing. An official from TFCG who worked in Amani had heard in a Tanzania-wide employee meeting that the land for the farmers had been acquired (pers. comm. 2012). The District Forest Officer in Muheza, who was not involved in the original process but was continuing it now, said:

We have acquired the land, but the total acquisition procedures, and to divide this land to the local people who have been affected by this Derema corridor, is not yet well done. Because there are some procedures between the presidential fees and the Ministry of Land settlement and the population. (interview with DFO, 2012).

According to the 19% of farmers interviewed who bought land, land prices for the area near the villages around the Derema corridor ranged from 300,000 TAS per acre to over 1,000,000 TAS per acre, depending on quality and location. Some farmers who received more compensation bought land (see Chart 1), but most farmers could not afford new land or said that there was not good land to buy in the area anymore. Some farmers, who lost all of their land to Derema, were forced to do jobs for other villagers or work at one of the tea plantations.

5.2.3 Farmers' Participation

The participatory approach for forests in Tanzania has resulted in the creation of Participatory Forest Management (PFM), split into Joint Forest Management (JFM) and Community-Based Forest Management (CBFM), outlined in section 2. For Amani Nature Reserve this has manifested in locals being allowed to harvest what they can carry from the reserve twice a week, and 20% of the entrance fee (US \$10 for foreigners, 1500 TAS for Tanzanians) being distributed between 19 villages surrounding the reserve. According to documents, Derema Forest Corridor will also have similar local benefits (WWF, 2009), however so far they have not been implemented.

Many official sources highlighted local participation as important to the Derema establishment process and future. CEPF's (described above in section 5.2.1) documents mention farmer's participation in short and general terms. In the Project Outputs section, Output 4 in the CEPF Final Project Completion Report states that a "Participatory Forest Management Plan has been developed involving technical people and communities from the five villages adjacent to the Derema forest" and that "Five villages adjacent to the Derema forest corridor have been involved in developing the Joint Forest Management Plan. These are Kambai, Kisiwani, Kwemdimu, Msasa IBC and Kwezitu" (p. 7) (Sumbi, 2010). The report never clarifies what the "involvement" entails. In an interview with the author, Peter Sumbi, he mentioned a list of guidelines they must follow in a participatory approach. "We use the same existing national PFM guidelines. There is a huge involvement of local communities themselves. The land use plan, creation of new village forest reserves, there is no way you are going to achieve without the people themselves. We act as only facilitators, and they do most of the stuff themselves." (pers. comm. 2012).

The documents about the compensation payments highlighted the farmer's participation in counting and recording their crop plants, and in the management of the new reserve. According to the farmers, when the evaluators came to the villages, they counted and

determined the quality of the plants, without the participation from the farmers themselves. Farmers said that with the checks, they received a separate document with designations of their crops as plants such as “M1” and M2” without any explanation of those terms (an itemized table of some farmers’ crops provided in appendices). Farmers felt that their input was not respected, and that the meetings that were set up between them and the government and NGOs were only perfunctory because the Derema corridor gazettement had already been decided before the meetings (field interviews 2012). According to WWF Tanzania, the spread of misinformation and/or the lack of information were common problems (WWF, 2009), however they provide no suggestions for addressing the problems.

5.3 Ecological Restoration Plans for Derema

Caro et al. (2009) categorized the Derema Forest Reserve as in “critical” condition, meaning that without intervention it would be converted to farming and other uses in 5 years time. The main threat to Derema has been cited as agriculture, primarily growing cardamom and other spices such as cloves, cinnamon, and black pepper (Reyes, 2008), (Newmark, 1998). Spice farming is the most lucrative activity available to small-scale farmers in the EUM. After farming in the reserve ceased, trees of many native and exotic species were allowed to regenerate, and there is a crowded secondary growth of tree saplings dividing the farms from the reserve (field observations 2012). The boundary between the corridor and village land is easy to see now between the dense regrowth and the more open “forest farms”.

The Derema forest was regenerating, but was there a plan to restore the forest more actively? The two main answers for this was one: yes, there had been a plan for restoration but now it was not being implemented, because it had been flawed (Norbert Cordeiro, pers. comm.), and two, part of the official narrative: the plan from the beginning was to let the forest regenerate, as the growth rate in tropical forests is high (pers. comm. Peter Sumbi, Adam Kijazi, William Newmark). I was not able to find a

restoration plan, perhaps because it does not exist, but it is also plausible that TFCG and/or WWF, in collaboration with ANR, had considered a plan, and decided not to go through with it. Dr. Cordeiro stated that TFCG and WWF were given “millions and millions of (Tanzanian) shillings” for a restoration plan, “and plant trees that would be for the people, as they would have some use, and be a lot of native trees too. One of the weird trees that they had selected was *Cydrella oderata*, which was an invasive species[...]finally I think that they stopped it, but I’m not sure[...]Personally I think it was a waste of money.” (Norbert Cordeiro, pers. comm., 2012).

A regional plan for restoration has been ongoing: “TFCG and WWF Tanzania implement jointly the East Usambara Forest Landscape Restoration (EUFLR).” (Vihemäki, 2009). On their website, TFCG outlines a plan for restoration in the East Usambara region. Their plan includes the establishment of 16 village forest reserves, encouraging and supporting tree planting in the villages, and integrated conservation and development projects such as beekeeping (TFCG, 2008). These projects are not directly for the Derema forest, but there has been spillover to the farmers and their land around the corridor from TFCG projects (field interviews 2012). There is also a desire to replant the gap between Derema forest and ANR. Villagers of Makanya, a subvillage of IBC Msasa, however, currently inhabit the gap. In spite of this desire, there is a lack of funds to provide farmers with trees, and some farmers are reluctant to plant trees for fear that their land will be taken to create a forest reserve (field interviews 2012). And some farmers are enthusiastic about tree planting if it is provided for them.

According to the CEPF Final Project Completion Report (2009), WWF Finland has donated funds to Forest Landscape Restoration interventions in Derema, to be completed by WWF Tanzania and TFCG. On the WWF official website, Forest Landscape Restoration

involves a package of solutions, such as: natural regeneration, enrichment planting, selective logging, re-introduction of native species, fencing, and agroforestry; planning with key stakeholders to identify solutions and training local communities; building capacity and recognizing traditional values and knowledge (WWF, 2010).

Natural regeneration, or in-situ regeneration, was the only listed option observed on the ground in Derema (field observations 2012). In Amani there is a native tree seedling nursery, supported by the Rainforest Conservation Fund, for replanting degraded areas of the main Amani Nature Reserve.

Farmers are encouraged to plant trees on their land in order to replace trees they cut for firewood or building, but the costs for those trees for them are not covered (field interviews 2012). One farmer from Kwemdimu village mentioned that their environmental committee was been provided trees to plant in the Derema corridor for restoration. The environmental committees in the other 4 villages did not receive trees, but were expected to patrol the boundaries of Derema near their village and report if they saw evidence of anyone cutting trees or harvesting wild plants for medicine or vegetables. This was unpaid labor, and there was little incentive for farmers to report use of the forest. At least one farmer per village said that people were still using the Derema forest for medicine and cutting trees for firewood and for building.

6. Discussion

6.1 Narratives about forest use, deforestation, and threats to biodiversity in the EUM

It is important to examine how is the problem of forest degradation in the EUM being framed, and by whom. Within the overarching discourse of how to achieve conservation of biodiversity in the EUM, there are three narratives, one more dominating than the others. The three narratives mentioned above (section 3.3) were the official narrative, the local narrative, and the cultural restorationist narrative. They will be discussed here in how they have framed the problem of deforestation and forest degradation in the EUM, and how to go about addressing the problem. The three main narratives overlap in some

ways and contradict in others, and through their interactions peoples' motivations and actions can be revealed and understood in a broader context.

The official narrative includes academic articles, official documents, and discussions in meetings at the Amani Nature Reserve and in government offices in Dar es Salaam. It drives and dominates the discourse on how conservation must be carried out in the EUM. The local narrative comes from the local farmers, their village councils, and their advocates. It has become more prominent thanks to research carried out primarily by social scientists, but it has a weak influence over decision-making processes, except for some attention given to it in official documents. The cultural restorationist narrative can be found in the publications and discussions of people who seek a balance between the people who focus on the ecology of the forest, and the people who focus on the needs of the local people. The cultural restorationist would promote and conduct research on traditional cultures in the area, seeing the breakdown of traditional cultures as part of or the whole cause of the problem of environmental degradation in the EUM. The official narrative was the most dominant, followed by the local narrative, with elements of the cultural restorationist narrative found in both and on its own (use of these narratives found in Rademacher 2011).

The official narrative for the cause of the problem of deforestation focuses on small-scale farmers in the region. The reason that these farmers tend to be the first to be moved for the enclosure of reserves is primarily because of their lack of power in social standing. Furthermore, although local people's use of the land in small-scale farming has an impact on biodiversity, their impact is relatively low and therefore makes their land more attractive for conservation. The local people are well aware of this fact, and some are reluctant to grow more trees on their land as they are afraid that it will be taken for conservation (Engh, 2010, Vihemäki, 2009). Land owned by the tea estate, consisting of tea and eucalyptus monocultures, is very high impact in use of chemicals, fertilizers, and causes erosion and biodiversity loss. It would not be as economically or politically feasible to appropriate land from the tea estates for conservation, because the expense of paying them compensation and restoring the land to forest would be considerably higher

than compensating farmers, and they have a powerful influence over the whole area. In theory, the Tanzanian government has the power to reclaim land owned under a 99-year lease, thereby negating the tea estate's influence. It depends on the will of the officials in government, and what they want to accomplish.

Also part of the official narrative, the need for the Derema forest corridor was to create a pathway for birds and other plant and animal species to promote genetic exchange, and that it was needed to stabilize the climate, bring rain and protect water resources (Newmark, 1992; Newmark, 2002). This narrative was spread by TFCG to the five villages surrounding Derema, as part of the goals of educating the farmers on the importance of the forest and the need to stop cultivating in the corridor. Almost all the farmers interviewed in this project repeated the same narrative: the forest was good for water resources, bringing rain, and protecting trees (village interviews 2012). The farmers listed benefits that were most useful to them, with only a few farmers who listed biodiversity as a reason to protect the forest. According to Vihemäki (2009), this was part of a discursive strategy by the farmers to use the language of the officials, while at the same time they would use the local narrative to defend their own use of the forest by saying cardamom was not harming the forest. It is also questionable that the Derema forest has a significant impact on the local climate and precipitation, though they are reasons for preserving it that would make sense to farmers.

The perspectives of biologists and ecologists who have done research in the EUM shape much of the official narrative that is influencing conservation decisions in the area. In the last twenty years, Dr. William Newmark has been the most influential. Newmark's work is important to examine, since it fuels much of the official narrative for creating corridors and preserves in the EUM, and it has been highly influential in government decisions about the area. His overarching thesis about the Eastern Arc Mountains emphasizes population increase resulting in forest encroachment, the assumption that humans and nature are separate, and assumptions about historical forest cover: "The Eastern Arc Mountains have lost over 17,000 km² or 76% of the original forest cover over the last 2000 years with much of this loss occurring during the last 200 years as a result of rapid

population growth and technological change during this period” (Newmark, 2002). This thesis is over-simplified and leaves out of the discussion comparisons of levels of impact by different user groups, and what are the past and present drivers of deforestation and environmental change. It also results in decisions that may improve forest conditions but punish only the poorest user groups who have the least impact on the forest.

Newmark’s main argument for having the Derema corridor is that bird species, particular birds that prefer, and in some cases need, primary forest to survive (Newmark, 1992, Newmark, 2006). This has to do with the birds’ ability to cross forest gaps, which 10 species are unable to do (Newmark, 1992). The Derema corridor is supposed to help in reversing the declines in bird populations. The other arguments for the protection of forests in general, and are also applied to the Derema corridor, are that forests in the EUM have a global level of importance in biodiversity. They are also argued to have a national and regional level of importance for water catchment and increased transpiration to create rain (URT, 2006). All of these arguments do not support the designation of Derema as a wildlife corridor strongly enough. A wildlife corridor’s primary purpose has been traditionally to facilitate movement for terrestrial animals. If Derema is part of a system of forests that has global importance, than the global community has a responsibility to not only pay for it, but also ensure that the money they give is used in the way they intended through regular monitoring.

Dr. Cordeiro, who agrees with some aspects of Newmark’s arguments, nevertheless has stated that in his research they have not seen the same declines in bird populations that Newmark has seen, as they are using a different model approach. His publications focus on the effects of forest fragmentation on specific tree and bird species in the EUM (Cordeiro and Howe, 2003, Cordeiro et al., 2009). In an interview he said: “Newmark has this theory that he needs these corridors connecting all the big fragments, in Amani, one of which is Derema corridor [...] I don't know if the corridors are necessary or not, to be honest, for wildlife. Maybe a minimum number might be necessary. Because there's a lot of wildlife that can move in between.” Whether Newmark or Cordeiro are ultimately right is not as important as what is an apparent lack of discussion and consensus between

prominent scientists. When an idea is still questionable, such as the decision to establish a wildlife corridor such as Derema, it follows that more research should be done by a wider range of scientists before major decisions of removing local people are made.

Aside from his publications, Cordeiro's work on the ground includes conversing and building relationships with locals: "We're always talking to farmers, not for our research purposes but just talk to the farmers and be part of the whole process, because our approach is not so much just doing research, our approach is to work with people, and learn from them. So I mean with the plants and the trees that we're working with, we work with them (farmers) on those, and definitely talk to farmers about that." (pers. comm Norbert Cordeiro). Newmark worked with locals as assistants in his research, but conversing with locals was not a priority for him. When asked if he had spoken with farmers who were affected by the Derema corridor, he said "I have not spoken personally with farmers who were cultivating in the Derema corridor. However there are a number of other researchers who have interviewed the farmers." His focus is on the forest and the non-human species who depend on it, and not the local population who he indicates as the main cause of deforestation and degradation in the region. As his influence has an affect on people's livelihoods, and because working with people is necessary to solving forest fragmentation in the EUM, Newmark and all influential actors in the region should work to adapt their plans to include social concerns. Conservation of the area's biodiversity cannot be successful without involving local people.

The local narrative from villagers about conservation says that it is good, as long as the compensation matches the loss. Figure 9 shows the local farmers' perspective on the effect of their farms on the forest, which almost 54% thought that there was either no negative effect on the forest or a positive effect (37 + 7 farmers out of 82 interviewed), because cardamom grows well under shade, thereby preserving more trees than other forms of agriculture. About 40% of farmers (33 farmers of 82 interviewed) thought that there was a negative effect, because they had to clear much of the understory plants, bushes and some small trees to grow the cardamom. Cardamom was first introduced in the EUM by German settlers in the 1890s, and then seedlings were distributed to farmers

in 1954 (Reyes et al., 2006). As it is a relative newcomer to the EUM, there has not been enough time to test its sustainability. In contrast, banana plants have been in the EUM for over 400 years, and have thus become naturalized in the ecosystem.

From the farmers' perspective, growing a crop to sell and consume for their livelihood was most important. Closing off forests for conservation was viewed as a hindrance to that, especially because they did not benefit from it. "There is too much of the forest under conservation here" (focus group interview with the farmers' organization leaders, 2012). However, when asked if they would accept land from the tea plantations close by for compensation, the secretary of the group said: "No, because that land is not good to us. They use fertilizers and pesticides, and aside from that the soil is depleted. We do not hope for that land."

The cultural restorationist narrative of conservation came out in conversations with elders in the community, and some others who had a more traditionalist take on sustainable land use in the EUM. It is also found in literature that describes and analyzes traditional farming methods of the Washambaa people (Kweka, 2004, Kaoneka et al., 2000). According to an elder in Shibomeza village, near ANR, people in the area no longer followed the same belief systems as in the past, which included protecting sacred groves, and taboos against killing certain species of wildlife. Some of these belief systems contribute to conservation and sustainable use of natural resources, and they have shifted due to external forces such as immigration, and national and global markets (Kweka, 2004). Many Washambaa and other locals in the EUM eat wild vegetables to supplement their diet (Vainio-Mattila, 2000), continuing a tradition of knowing their surrounding environment. However this ability is declining in populations that live farther from forests (Vainio-Mattila, 2000).

All of these narratives and how they frame the discussion of preserving forest in the EUM are important to recognize, because they have to do with assumptions we make as human beings about what is "true" in an empirical sense, when often we are dealing with socially constructed versions of reality. The terms "environment", "nature", and

“sustainability” all have different meanings to different group of people, and those meanings and interpretations affect policy change. The arguments made for the Derema forest corridor were not made in a participatory way that would have included the local and traditionalist narratives into the dominating official narrative, which made the whole process unequal and doomed to rising conflict between villagers and higher levels of government. Future research would benefit from taking these narratives into account and combining their perspectives.

The impact on the forest from cardamom cultivation depends on the level of intensification. In a study on ecological impacts of cardamom in India, where land has been farmed much more extensively and intensively, the area farmed was once a biodiversity hotspot before intensification of cardamom farming caused loss of soil nutrients, erosion, and loss of wildlife (Murugan et al., 2011). In the EUM, cardamom is starting to be grown in larger monocultures, and use of manure is increasing, but the scale is much smaller than in India. The farmers in the EUM use only manure for fertilizer, and no other chemicals. With the right cultivation methods, it has been argued that cardamom farming can have a low environmental impact while providing an opportunity for farmers to earn a (relatively) secure livelihood (Reyes, 2008, Engh, 2010).

Agroforestry is increasingly viewed as part of an integrated approach to conservation of tropical forests (Huang et al., 2002), however certain cash crops like cardamom and sugar cane have come to dominate farmers’ plots in the last 50 years in the EUM, and cardamom in particular was dominant in Derema. The question of whether to call the farmers’ activities in the Derema forest “agroforestry” is important, because it has implications for the level of impact on biodiversity and carbon storage in the forest. The farmers grew a variety of both woody and herbaceous crops, but close to 90% of their crops were cardamom (Sumbi, 2010), (field interviews with farmers, 2012).

In a few new studies, the subject of small-scale agriculture has become more nuanced, examining to effects of the intercropping methods of agroforestry, which are more commonly used in an environment of uncertainty (Reyes, 2008, Huang et al., 2002, Steffan-Dewenter et al., 2007).

According to Huang et al. (2002), agroforestry supports between 50 and 80% of biodiversity of natural forest, and contributes to conservation of forests. Some bird species and other are reliant both on the forest and adjacent farmland, one primarily for habitat and one primarily for feeding, respectively (pers. comm, Fred Midtgaard, Norbert Cordeiro). Although protecting biodiversity in the EUM is an expected outcome of creating the Derema forest corridor, wildlife did not stay exclusively in the corridor or in the reserves. A villager showed me a chameleon, later identified as *Kinyongia matschiei*, in IBC Msasa, at least one kilometer from Derema. On most of my visits to the Derema forest corridor, the sounds and sightings of birds and insects were not dramatically different between the farmer's agroforestry and the reserve (field observations 2012).

Overall, cardamom cultivation within an agroforested system showed promise to reduce pressure on forests and maintain a higher level of biodiversity than other more intensive land uses (Huang et al., 2002). In another study, Steffan-Dewenter et al. (2007) found that in their study of cacao agroforestry in Indonesia, “transformation from near-primary forest to agroforestry had little effect on overall species richness, but reduced plant biomass and carbon storage by ~75% and species richness of forest-using species by ~60%” (p 4973). More studies like Huang et al. (2002) and Steffan-Dewenter et al. (2007) will help balance the perspective of cultivation vs. primary forest, by focusing on agroforestry. Cardamom is still a relative newcomer to the EUM, and its sustainability should be tested further. Agroforestry was cited by an ANR field technician as one of the best activities that could help preserve the forest and at the same time provide a good livelihood for farmers (pers. comm. Victor Mkongewa 2012). In Reyes (2008), cardamom yields were 5-7 times higher and black pepper yields were four times higher when planted with *Grevillea*, a leguminous tree. Studies like Reyes (2008) on improving agroforestry methods would also contribute to both livelihoods and forest conservation.

In Reyes et al. (2006), cardamom is shown that it can be harmful for forests, unless it is part of an agroforested system. They conclude with recommendations for the EUM: “A combination of well-managed multiple-use agroforestry with protected natural forests,

and additionally perhaps with intensively managed forest plantations, could contribute both to better livelihoods and to better maintenance of biodiversity that depends on primary forest and is still directly threatened by cardamom cultivation” (p. 136). Organic certification could also help farmers increase their livelihoods: “In the East Usambaras, where smallholder farmers do not use mineral fertilizers or agricultural chemicals, the promotion of organic cardamom cultivation would additionally raise the value of the product on the market by up to 30–40%” (p. 136). There was no evidence on the ground that WWF or TFCG had attempted to implement this as part of a larger strategy to promote forest conservation. The local TFCG official interviewed described the beekeeping project and other ICDP projects, but these were far from widely established. Agroforestry was included in WWF’s package of solutions (p 54 this thesis), but almost none of these intentions were carried out on the ground.

Cultivation of tea in the EUM and the Eastern Arc Mountains as a whole has been ongoing for longer than cardamom cultivation, and its effects are much more visibly devastating. The question to be answered for Derema forest is “how does cardamom affect the forest?” but perhaps a larger question is “how does tea cultivation affect forests in the EUM, and is it responsible for subsequently driving local farmers to use more of the remaining forest reserves?” The impact of tea plantations goes beyond the tea fields. On an observational level, there is a stark contrast between tea plantations (Figure 9) and the agroforestry practiced by most small-scale farmers in Amani, in terms of inputs, biodiversity, and ability to regenerate to a forested state. Both have an effect on the forest, but it is important to compare the level of impact. Land that has been converted to tea fields requires fertilization to maintain a high level of growth, and eucalyptus trees require a high volume of water. Erosion is a mainly a problem for the tea plantation, and the plentiful rain of the region exacerbates the problem in turns with providing the water needed for growing.

Beyond the land under cultivation, there are other facts to consider about EUTCO. There are currently 3500 workers (interview with GM, 2012) and they plan to expand that number in addition to the land they have under cultivation (Daily News, 2012). These

workers often come from other parts of Tanzania or adjacent African countries like Rwanda and Burundi, and they harvest their fuel wood from the forests. EUTCO has also been encouraging outgrowers by giving out tea plants, thereby expanding tea cultivation in the EUM, which is not sustainable. The exact measure of the effects on the forest from EUTCO's presence is hard to quantify, but it is considerable and reaches beyond the amount of land they own.

6.2 Derema: Participatory or Top-Down Approach to Conservation?

The official narrative was that there was involvement of villagers around Derema, however in practice the process of creating the Derema corridor was top-down: the government, international donors, and NGOs primarily followed an agenda separate from the local people's interests. The Village Environmental Committees (VEC) adjacent to the corridor were expected to patrol the boundaries of Derema, which was the extent of the participatory forest management (interview with Antakae VEC, 2012), which in reality was not participatory since they were "expected" to patrol, and they were not involved in the initial decision making for the corridor's establishment, and there was no participatory land-use planning as highlighted by WWF on p 54 of this thesis (interview with Antakae VEC, 2012).

An example of the top-down nature of the process is that the documents about the process were in English passed back and forth between donors, government and NGO officials, and researchers, while communication with villagers was much less. Documents are sent between officials, donors, and researchers, making it very easy give different versions of events than the local narrative, and oversimplify responses so that control over the situation can be maintained by those in power. The Swahili version of some of these documents were available online, so they are inaccessible for most farmers. In the Derema case, WWF Tanzania and TFCG acted as facilitators between 2005 and 2010, applying for funds from the World Bank for compensation, and TFCG says they continue to work in villages to encourage and provide trees to reduce the effects of losing access to the Derema forest, encourage long-term land-use planning, and implement ICDPs (interview with TFCG official 2012). According to the farmers interviewed, almost none of these actions were happening on the ground in a significant way. While NGOs could have a useful role in facilitating conservation and development projects, in many cases including this one they remain an extension of governmental control, "serving state conservation goals at the expense of traditional communities" (Robbins 2012 p. 179). They often operate out of the capital or other cities, far away from the area of interest,

making it difficult and costly to have regular contact with local people. However, they often maintain an official façade of action through the promises made on their websites and in documents, such as WWF’s package of solutions for ecological restoration quoted in section 5.3. These official promises are left unfulfilled as long as there is a lack of accountability demanded of these organizations.

In an article by Jafari Kideghesho (2010), he lays out a critical argument for the state of conservation in Tanzania, which also applies to the Derema case. He writes that although conservation of wildlife is important, it is equally important to consider the rights of the human communities that live close to protected areas, and to be serious about working with them. The history of wildlife conservation in Tanzania precludes community involvement to an extent, because it continues the top-down approach of the past, although many projects are disguised using the language of participation. The Derema case has proven itself to be one of many of these top-down conservation projects. Kideghesho (2010) ends with four key questions that should be considered about wildlife conservation in Tanzania, two of which will be addressed below.

“Who pays for and who benefits from wildlife conservation?” (Kideghesho, 2010 p 108). In Tanzania, the people who live near conservation areas are often the ones who end up paying for the high costs of conservation. Derema farmers lost land and were supposed to be compensated for crops lost for three seasons, but in this case it was one season. Even if compensation had covered three seasons, was that really sufficient to help farmers recover their losses? It did not appear so. Rather than getting land, farmers were put in a situation where they could no longer have the same long-term security of owning land. Some farmers had the means to move away for other opportunities, but most of them have no other choice but to stay. Kideghesho (2010) recommends that tourists who use protected areas to experience the wildlife should bear more of the cost, and stakeholders who are benefitting more than others need to contribute more to the costs. He also recommends that at the governmental and NGO level need to change the way donor money is distributed, for example ensuring that more of it reaches people who are directly impacted. In the Derema case, WWF Tanzania did not distribute the money

donated fairly, and it is likely that 1.4 million USD for compensation has disappeared and is now untraceable. All these facts will threaten the survival of the corridor if not addressed.

“Whose attitudes and behavior need to be changed?” (Kideghesho, 2010 p 109). The attitudes of both the government agencies and local people need to change for conservation to work, but in the Derema case and many others, only local people’s attitudes are viewed as needing change. This is especially important to consider, given the level of distrust the villagers had of the government from the beginning and continuing to now. Government officials need to prove themselves with direct action to back up their promises. Going into the Derema corridor gazettement process, many villagers were fearful that compensations would not be sufficient, as it was for the villages in the creation of the Amani Nature Reserve (Vihemäki, 2009). In that case, government and NGO officials had an opportunity to change the way their interaction with local people was conducted, instead every part of the compensation process was made on their terms. The only agreement Derema farmers made was when they thought that the level of compensation was much higher (28,800 TAS/plant) than it turned out later (5,000 TAS/plant at most, usually between 200 and 4,000 TAS/plant) (field interviews 2012). They still say that they have not formally agreed to the corridor, because the village leadership has not signed the latest documents sent to them, which they contest makes the corridor unlawful (interview with Village Chairman in IBC Msasa).

The Derema corridor case is part of a trend in conservation away from emphasizing local participation that Hutton et al. (2005) call “back to the barriers”. The participatory approach that is used in parts of Africa has been criticized for failing to meet conservation and cost-benefit sharing goals, and in many cases this is true. The reasons for this lack of success are, it is argued, because most of the cases labeled “participatory” were still largely controlled by outside actors (Hutton et al., 2005). The participatory approach was not implemented in the Derema case except in the wording of official documents, which told their own version of events separate from the local perspective,

contradicted themselves within the same document (Sumbi, 2010), and gave misleading and unclear information (URT, 2006). They showed almost nothing except how out of touch officials in Tanzania and international donors are, and they are able to do that because accountability is so lacking. Therefore, implementing participatory approaches becomes impossible.

The language of participation has been used more often in conservation projects since the 1980s, but the actions on the ground have not been proportional to the increase in participatory language. In order to make a project participatory, the number of people involved is an important consideration. As the number of people involved increases, so does the time it takes to communicate and make decisions which is acceptable to the majority of stakeholders, and costs also increase. Another reason is that there is a lack of trust commonly felt from marginalized groups towards people in power, and so makes the process difficult before anything can be discussed. The argument has been put forth repeatedly that continuous follow-up is needed from the government and NGOs to ensure that the original intent of conservation projects is happening on the ground (Vedeld, 2002), (Vihemäki, 2009), (Rantala et al., 2013). Which, again, is made difficult by their distant centers of operation, and makes an argument for encouraging and attempting bottom-up approaches in the future.

6.3 Compensation for Conservation: What would be effective?

Often farmers said the amount of compensation they wanted with a tone of resentment, and little care for accuracy, as they had seen other researchers like myself come and go and bring no change for them. This sentiment also affected the amount of land that they told me they lost, which in most cases was much higher than it could have been. The average acreage from the 82 farmers interviewed was claimed to be over 5.61 acres, which would make the corridor area they farmed 6,335 acres or 2391.9 hectares, much larger than the 968 hectares currently established for the corridor. In Table 3, the averages given by the farmers interviewed should be viewed in light of the possible over-

estimations. Two sources have conflicting points, however: In Vihemäki (2009), the average amount of acreage per farmer was a little over one, with only a few farmers claiming five or more lost to the corridor. In the RAP report (URT, 2006) it is stated that land cultivated by farmers ranged between 1 and 40 acres per person. In terms of the actual size of the Derema corridor, however, Vihemäki's (2009) results appear more accurate.

As mentioned earlier, the Village Land Act in Tanzania states that land that is removed by the government from citizens must be compensated (Josefsson and Åberg, 2005). In the Derema case, the crops belonging to each farmer were valued based on their size, quality, and yield, subtracted by costs in the production process. It was unclear as to whether the farmers had the right to receive land compensation, as there were only provisions for "compensation", in an unspecified form, in the Village Land Act, which may be a factor in why the land compensation remains an unfulfilled promise. Nevertheless, Derema farmers were promised 3 acres of land each, regardless of the amount they lost, from an abandoned sisal plantation in the lowlands that was at least two hours away by car for most villages, and most of them travel by foot. There had been some discussion of giving the farmers vehicles to share in the village to transport themselves to the land, but this was seen as unlikely to happen in reality, as too many factors such as the cost of fuel and vehicle maintenance hinder it and were not properly addressed. The District Forest Officer in Muheza mentioned that the three acres of land compensation was still pending, and the process was slow because it required the signature of the President of Tanzania, and there were issues with creating a fair distribution system. The lack of consistent answers from farmers, NGO and government officials, and researchers suggested that regardless of what was official law for compensation, those with the most power ultimately decided. This was especially clear in the fuzzy decision to change the compensation given to villagers from the available 3.3 billion TAS to 1.6 billion (URT, 2006), and the report that showed that WWF gave farmers both 3.3 billion TAS and 1.6 billion TAS, illustrated in the results section above. (Sumbi, 2010). It was also apparent in the attitude of one official in the MNRT, who

thought the farmers should fight for the land compensation, as though that was not already their due.

For many conservation cases such as this, it is difficult to hold the NGOs accountable because they write their own reports and have not been checked on until recently in a limited capacity. Donors and the government of Tanzania are responsible to ensure that the funding is distributed according to the goals and agreements set out in the original documents. If there is suspicion that funds are being mishandled, there should be an investigation like in the example of a recent case below. Ivar Jørgensen, who formerly worked as the Embassy's Counselor on Environment and Climate Change, at the Norwegian Embassy in Tanzania, reported that since 2006, NGOs such as WWF Tanzania and TFCG have been monitored more closely by external auditing firms, but they are not able to analyze all documents for all projects, only random checks. The scandal that prompted the increase in monitoring was settled during my fieldwork period October-December 2012, where 25 million NOK (\$1.3 million) given to WWF Tanzania meant for REDD + (Reducing Emissions from Deforestation and Degradation the "+" stands for projects that ensure communities near forests receive the payments) pilot projects "disappeared" (Kizito, 2012). Inger Næss, who now holds the position Ivar Jørgensen had, stated that internal controls should be improved and that the Embassy has suspended funds to WWF Tanzania (pers. comm. Inger Næss). Mr. Jørgensen stated that although the process is not perfect, improvements have been made to combat corruption, at least for donations from Norway. The money for Derema compensations came from the WB and Finland, who have not investigated the case. One could ask what is actually investigated, when documents on donor-funded projects are checked. "Most likely this only includes a formal check if reports are according to application, and some checks of whether receipts are present for purchases, and not if the job was actually done" (Fred Midtgaard, pers. comm.). It is likely that in the Derema case, the 1.4 million USD that is unaccounted for has disappeared in much the same way as this earlier case, since outside investigations have only recently, and in a limited capacity, been implemented in Tanzania.

Beyond questions of whether funds for compensation have disappeared, the compensation method itself was arguably flawed. As relatively quick and simple it is to pay compensation with money, this method has proven itself to be beneficial only in the short term, making it difficult to ensure that farmers invest in long term goals for their maintenance of sustainable livelihoods. Land is more valuable in the long term than money, and since most farmers do not have savings accounts they spent the money immediately. This also made it difficult for women, who in some cases were not aware of the payments their husbands were collecting, a few stories circulating of men spending it on alcohol and other women in Muheza (Rantala et al., 2013). Some farmers invested in land and livestock, which will provide for their livelihoods long-term, but many others could only use the money to pay for household consumption, and in a few extreme cases, for their transport to pick up their compensation check in Muheza. Some villages (such as IBC Msasa and Kwemdimu) have more support and encouragement to start Integrated Conservation and Development Projects (ICDPs) than others, such as beekeeping, butterfly farming, fish farming, zero-grazing cattle and others, but they said that the support was not very much (field interviews 2012). These projects have shown their ability give long-term livelihood support to farmers, though on a limited scale currently, but with the possibility of expansion (Engh, 2010).

How should compensation for conservation be carried out to ensure an equitable result? The case of the CAMPFIRE (Communal Areas Management Programme for Indigenous Resources) program in Zimbabwe and Zambia provides at least part of the answer. Using a Community-Based Natural Resource Management (CBNRM) method, CAMPFIRE conducted a revenue distribution system in five steps, as outlined by Brian Child (2006). The first step organizes the community with membership lists and constitutions. This clarifies who is part of the group that is affected by wildlife management, in a participatory meeting. The constitution defines what the rules will be that everyone follows during the process. Step two clarifies the source and amount of revenue that will be available to the community. In Zimbabwe this was revenue from international tourists hunting wildlife in a drought-prone areas. Once the prices for wildlife were clarified in a communal meeting, the third step was for the community to decide what to use the

revenue for. In this situation, people split the money uses into 4 categories: cash; projects and activities such as water, food relief, football clubs etc.; investments in wildlife and natural resource management; and administrative expenses. Step four was forming an annual general meeting, which would report on uses of revenue and hold the individuals elected to conduct the meetings accountable. The representatives would be re-elected every year to ensure members' authority over the leadership. The final step was distributing the money to each person, who then gave back portions of the cash to each communal project that had been agreed upon in step three (Child, 2006). In this process, 80% of the revenue was distributed to the village level, compared with 40-80% unaccounted for in top-down procedures (Child, 2006).

The mechanisms for accountability and the participatory process are what make CAMPFIRE a standout example of how to succeed in CBNRM. Each case must be tweaked based on the conditions on the ground, but the principles followed in CAMPFIRE can be broadly applied. The decision making-process for Derema, though it had participatory decision-making elements in the beginning such as some meetings between village leaders, some farmers affected and government officials in the early 2000s, finished off between 2005 and 2010 with an exclusively top-down compensation distribution. The price amounts for each plant were not discussed with farmers, and farmers had to pick up the money themselves, spending more money on the way. There should have been planning meetings with all the farmers affected from the beginning, with everything transparently laid out, and not all farmers were aware that Derema was to be for conservation before 2005 (Vihemäki, 2009).

The lack of transparency resulted in conflict, mentioned in the documents: "WWF staff who had worked in the area for many years provided the role of 'honest broker' and facilitator to the process, but at times they also came under heavy criticism and even physical attack when rumours were circulating about their role in the compensation process" (Sumbi 2010). This statement sends a clear message that miscommunication was a major problem and could have been avoided with a bottom-up approach from the beginning. Attempts to streamline information often end up in telephone-game-like

scenarios, where the more often a message is relayed to others the more it changes down the line, until when it finally gets back to the original messenger it is unrecognizable. This should be avoided by proper communication from the start.

In order to implement CAMPFIRE-style processes, certain qualities are needed. One is having high-ranked individuals who insist on a process like CAMPFIRE from beginning to end, and prevent re-centralization by government and/or NGO officials. For Derema this could be someone in Muheza, Tanga, and particularly Dar es Salaam, who is committed to a participatory decision-making process. Another is to adjust the length of time needed for discussion. The CAMPFIRE process took 3 days in all, however this would probably need extension for Derema because there were 1128 farmers involved. A third quality is the source of revenue, which was much higher from foreign tourists who came to pay high amounts to hunt wildlife. The creation of Derema was due entirely to outside funding into bank accounts. Fairer distribution could have been achieved by withdrawing the entire amount in cash, and brought to the 1128 farmers who could gather in a more easily accessed middle ground, or in the best case to each village, which would be worthwhile investments of time from officials. The compensation dispute could still be solved today by using a modified CAMPFIRE framework, and in the long term by improving governance to repair the mistrust felt towards the state on the local level.

6.4 Ecological restoration and cultural preservation

The various activities of TFCG, ANR and other actors contribute in a limited way to restoration and conservation in the EUM, however their efforts are arguably insufficient to address deforestation and degradation effectively. The ICDPs play a small role in conservation and income support, with potential for growth but also show some room for improvement (Engh, 2010). Planting trees in Derema itself has been encouraged and supported in some villages, but only in short intervals of extra funding (key informants in Kwemdimu and IBC Msasa village). Norbert Cordeiro's work is small-scale and mostly not funded, using local researchers to contribute to knowledge about the flora and fauna of the entire Eastern Arc Mountains by creating an online database and otherwise compiling information on traditional knowledge and how to restore forests, about which not much is known or has been experimented on. It is not clear why forest restoration has not been researched more, other than speculation about funds being channeled wrongly, or apathy, or the assumption that the forest will regenerate properly without outside help, the latter most likely the case for Derema. Cordeiro often comes to ANR when he has extra days from when he comes to Tanzania for other conferences so his work is difficult to do consistently (Norbert Cordeiro, pers. comm.). His dedication stood out should be supported further, particularly his focus on the traditional knowledge of the area, and making the information a repository for the future. It would serve the EUM well to have more of his type of research, that includes both the ecological and social aspects of conserving and restoring the forest.

Tourists from other countries that I met while staying at the Amani Nature Reserve's Conservation Centre complained that the entrance and guide fees were too high (Entrance fee: US \$10 per day for foreigners, 1500 TAS for Tanzanian citizens; Guide fee: US \$15 per day for foreigners, 5000 TAS per day for Tanzanians). Surprisingly, the fee has been reduced since 2010, when it was \$30 per day for entrance and \$25 for a guide per day (Engh, 2010). This is concerning, as it was reported by Engh (2010) that the higher price was insufficient to support the 19 villages surrounding ANR, who are given 20% of the

fees. The amount the villages received came in a lump sum of 333,162 TAS in 2007/08, and 153,647 TAS in 2008/09, and it usually went toward community development projects and not directly to people who might use it to reduce dependence on the forests. These amounts could not cover their need to collect from the forests, except for villages near village forest reserves (Engh, 2010) During my two month stay at ANR, the number of international tourists and researchers was around 50 and most stayed only one or two nights. With the decrease in the entrance and guide fees, this compensation is even less.

None of the fees go to villages around Derema, except for Kisiwani village, though that had been considered. Derema is difficult to access and has no trails, and it is too overgrown and steep for any but the most active of tourists. The trails used by ANR tourists are also difficult to access without paying extra for transport by motorbike or (15,000 TAS /day) or by one of ANR's vehicles (100,000 TAS/day). Walking with a guide to the second-closest trail to the Centre, called the Zigi trail, resulted in a 7-hour day of hiking steep hills, and by the end I was completely exhausted. Most tourists who came had a car with their own guide, and stuck to the Mbomole trail, which was nearby the Conservation Centre, or they stayed below near the Zigi trail for a night. These options are not really worth the difficulty in getting there and the cost, and even if reduced are too high for most tourists I spoke with. If ANR staff hope to pay for more operating costs from tourist fees, these problems must be addressed. Furthermore, compared to the excitement of the megafauna found in Tanzania's National Parks, ANR's serene beauty does not attract the level of tourism needed to generate enough funding.

The tourism fees are not enough to cover ANR's total costs of operation, which must be supplemented with government funds from the FBD and MNRT (interview with ANR Conservator and Assistant Forest Officer, 2012). ANR also receives funding from various international donors, including the Critical Ecosystem Partnership Fund (CEPF) and Eastern Arc Mountains Conservation Endowment Fund (EAMCEF) applying for which takes a significant proportion of work time for the conservator and forestry officials. The funds available to ANR were not enough to staff it according to its needs,

and much of their time was taken up by patrols to stop illegal logging and mining, and facility maintenance. There were insufficient funds for community outreach, forestry, and restoration, which may cause an increasingly detrimental affect on the relationship between ANR and the local community. As such, since funding for ANR is also for the Derema corridor, it cannot be sustained in the long term.

How can restoration and conservation efforts in the EUM be improved, given these obstacles? It is important to examine who is benefiting from natural resources in the EUM area. The farmers in the area should not be exempt from paying some for conservation, as they too stand to benefit from it, and some farmers are more well off than others, making it easier for them to contribute more. However, the Derema corridor has disproportionately affected the farmers and more equitable cost and benefit-sharing options must be considered going forward. The tea plantations, which profit from growing tea while impacting the environment and drawing more people to the area to work for them, should contribute to conservation and restoration in a more proportional way. It is not fair, nor will it serve conservation in the long run, to demand that small-scale farmers pay the highest proportion to save forests. Tourists who come to ANR and the international community who believe that these forests are important globally, are also accountable to pay for it. There is some potential for Amani Nature Reserve to encourage donations for tree planting, as a carbon offset for travellers or a way to connect to the place, as other Parks have done, however most funds should come from the powerful actors who argue strongly for nature preservation.

There are three Tanzania Forest Conservation Group (TFCG) officials who travel to villages around Amani NR to talk to local people about land-use planning, and encourage Integrated Conservation and Development Projects (ICDPs). According to one TFCG official, the key ingredient missing in most villages, was long-term community land-use planning. TFCG had been commissioned to provide this aid, but with only three TFCG officials in the area this would be an insurmountable task. This is assuming that the villages do not already plan for the future in some way, and that an outside official would be able to understand nuances in people's land use practices effectively and efficiently.

This was another symptom of the top-down approach for the whole area. In Conte (2004) he appropriately asks, “why should rural Africans conserve and foster forests with a lifespan of centuries over the course of their economic lives?” (p 159). As it happens so often in Africa, conservation of ecosystems has meant more concentrated control in the hands of the government, NGOs, and international interests, who might also need to examine their own long-term land use planning. When I asked them what was the purpose of the Derema forest corridor, a few of the farmers answered: “It’s there to make good air for Europe” (field interviews 2012). The farmers are aware of the power relationships involved in conservation, and how they have become more vulnerable in the process.

Many of the farmers interviewed for this project were not part of the Washambaa ethnic group, who have resided in the East and West Usambara Mountains longer than can be determined. The Washambaa have their own language and cultural identity, and their farming practices are a part of that identity. People who have moved there and married Washambaa or other immigrants have either absorbed Washambaa practices or have brought their own, or both. It is beyond the scope of this paper to discuss their cultural practices and how they relate to environmental sustainability in depth, but that sort of research is important for understanding how past practices can improve current resource use in the EUM. Research such as Kweka’s (2004) paper on local knowledge and sacred sites in the EUM, and Dr. Cordeiro’s work compiling local names for plants and wildlife, and studying methods for replanting, are important contributions for local sustainability and livelihood improvement in the area.

7. Conclusions and Recommendations

The Derema corridor, in spite of much controversy and work conducted by many actors, cannot be sustainable unless three main problems are addressed. One is that the local farmers who depended on income from land in the corridor, especially those that lost the highest proportion of land, need alternative land and support to implement sustainable

agricultural practices which are compatible with conservation. The proposed alternative land of the sisal plantation in the lowlands is not viable for farmers for many reasons, the most obvious of which is the distance from their homes is too great for it to be accessible and profitable. The second problem is the top-down approach that made it impossible for effective decision-making that would reflect the people's long-term needs. A truly participatory approach must include a higher level of commitment from the government and NGOs for the whole process. For example, officials should travel to each village and discuss with the entire group of farmers, not just a few representatives that will inevitably miscommunicate information from the meetings. In addition to that, transparency in communication and subsequent common acceptance of decisions by all actors is critical. Another example would be for adequate compensation to be delivered to each village, saving the farmers the cost of travel. The third problem is that fundamentally, the many good intentions that were laid out in reports did not reflect what happened on the ground, and those responsible were not held accountable, and ultimately many people suffered and are still struggling to recover.

Conservation is important, but it must be adequately paid for, and not be shouldered by local people. Top down management and planning without local participation causes conflicts, threaten local people's livelihood, weakens social ties and their trust in the state, and ultimately threatens the ecosystems that people depend upon and need to protect. The farmers who live around Derema will continue to demand their rights, but it should not be their responsibility to spend their own limited capital fighting for something that they did not cause, which does not recognize their socioeconomic needs and which will threaten their future as well as that of the corridor. The powerful actors in government, academia, and NGOs, nationally and internationally, are responsible to local people. Local people are as important to consider as protecting and conserving natural resources, and as national and international economic concerns. All three are interdependent and should never be treated separately or unequally.

8. References

- AHLBACK, A. J. 1988. *Forestry for Development in Tanzania*. Swedish University of Agricultural Science.
- ANGELSEN, A. & KAIMOWITZ, D. 1999. Rethinking the causes of deforestation: lessons from economic models. *The World Bank Research Observer*, 14, 73-98.
- ANR NEW MANAGEMENT PLAN 2009. Joint forest management plan for Amani Nature Reserve. In: MNRT, FBD & ANR (eds.). Tanzania.
- BENNETT, A. F. 2003. *Linkages in the Landscape: The Role of Corridors and Connectivity in Wildlife Conservation*, Melbourne, Australia, The World Conservation Union.
- BLOMLEY, T. & RAMADHANI, H. 2006. Going to scale with Participatory Forest Management: early lessons from Tanzania. *International Forestry Review*, 8.
- BRYMAN, A. 2008. *Social Research Methods*, New York, Oxford University Press.
- CARO, T., JONES, T. & DAVENPORT, T. R. B. 2009. Realities of documenting wildlife corridors in tropical countries. *Biological Conservation*, 142, 2807-2811.
- CHEN, P. 2009. *Biology 1152 Principles of Biological Science* [Online]. Available: <http://bio1152.nicerweb.com/Locked/media/ch54/island.html>.
- CHILD, B. 2006. Revenue distribution for empowerment and democratisation. *Participatory Learning and Action*, 55, 20-29.
- COLLINGE, S. K. 2009. *Ecology of Fragmented Landscapes*, Baltimore, The Johns Hopkins University Press.
- CONSERVATION INTERNATIONAL 2005. Ecosystem Profile: Eastern Arc Mountains & Coastal Forests of Tanzania and Kenya.
- CONSERVATION INTERNATIONAL. 2011. *Eastern Arc Mountains and Coastal Forests of Tanzania and Kenya Region: Program for Consolidation* [Online]. Available: [http://www.cepf.net/Documents/EACF Program for Consolidation Jan 2011.pdf](http://www.cepf.net/Documents/EACF_Program_for_Consolidation_Jan_2011.pdf) [Accessed May 6 2013].
- CONSERVATION INTERNATIONAL. 2013. *Critical Ecosystem Partnership Fund: Frequently Asked Questions* [Online]. Available: http://www.cepf.net/about_cepf/faq/Pages/default.aspx [Accessed May 6 2013].
- CONTE, C. A. 2004. *Highland Sanctuary: Environmental History in Tanzania's Usambara Mountains*, Athens, Ohio, USA, Ohio University Press.
- CORDEIRO, N. J. & HOWE, H. F. 2003. Forest fragmentation severs mutualism between seed dispersers and an endemic African tree. *Proceedings of the National Academy of Sciences of the United States of America*, 100.
- CORDEIRO, N. J., NDANGALASI, H. J., MCENTEE, J. P. & HOWE, H. F. 2009. Disperser limitation and recruitment of an endemic African tree in a fragmented landscape. *Ecology*, 90, 1030-1041.
- DAILY NEWS. 2012. *EUTCO keen to boost tea production* [Online]. Available: <http://www.dailynews.co.tz/index.php/biz/9473-eutco-keen-to-boost-tea-production> [Accessed May 18 2013].
- DOODY, K., KILENGA, R., NTEMI, A., BARRIO-FROJAN, C., SIURUA, H., SCHOLTZ, O. & LOADER, S. 2001. Amani Nature Reserve: A biodiversity

- survey. East Usambara Conservation Area Management Programme Technical Paper No. 52. In: TANZANIA, F., DIVISION, F. A. B. & CONSULTING, M. (eds.). Dar es Salaam, Tanzania; Vantaa, Finland.
- DUDLEY, N. 2008. *Guidelines for Applying Protected Area Management Categories*. EASTERN ARC MOUNTAINS CONSERVATION ENDOWMENT FUND. 2001. *Sketchmap of the Eastern Arc Mountains* [Online]. Available: <http://www.easternarc.or.tz/home>.
- ENGH, V. 2010. *Intergrated Conservation and Development Projects and efforts around Amani Nature Reserve, Tanzania, and their effects on livelihoods and forest conservation*. Master of Science, Norwegian University of Life Sciences.
- EUTCO. 2006. *About Us* [Online]. Available: <http://www.euteaco.com/home/aboutus.php> [Accessed May 19 2013].
- FAIRHEAD, J. & LEACH, M. 2000. Reproducing Locality: A Critical Exploration of the Relationship between Natural Science, Social Science, and Policy in West African Ecological Problems. In: BROCH-DUE, V. & SCHROEDER, R. A. (eds.) *Producing Nature and Poverty in Africa*. Sweden: Nordiska Afrikainstitutet.
- HARDIN, G. 1968. The Tragedy fo the Commons. *Science*, 162.
- HUANG, W., LUUKKANEN, O., S, J., KAARAKKA, V., RÄISÄNEN, S. & VIHEMÄKI, H. 2002. Agroforestry for biodiversity conservation of nature reserves: functional group identification and analysis. *Agroforestry Systems*, 55, 65-72.
- HUTTON, J., ADAMS, W. M. & MUROMBEDZI, J. C. 2005. Back to the Barriers? Changing Narratives in Biodiversity Conservation. *Forum for Development Studies*, 2.
- JOSEFSSON, E. & ÅBERG, P. 2005. *An Evaluation of the Land Laws in Tanzania*. Luleå University of Technology.
- KAONEKA, A. R. S., NGAGA, Y. M. & MONELA, G. C. 2000. Case Study: Forests in the Usambara Mountains: historical perspective and future prospects. In: PRICE, M. & BUTT, N. (eds.) *Forests in Sustainable Mountain Development: A State of Knowledge Report for 2000: IUFRO Research Series 5*. UK, USA.
- KESSY, J. F. 1998. *Conservation and Utilization of Natural Resources in the East Usambara Forest Reserves: Conventional Views and Local Perspectives*. Wageningen Agricultural University.
- KIDEGHESHO, J. R. 2010. Wildlife Conservation in Tanzania: Whose Interests Matter? In: GERETA, E. J. & RØSKRAFT, E. (eds.) *Conservation of Natural Resources: Some African and Asian Examples*.
- KIZITO, M. 2012. *Corruption allegations hit WWF programmes in Tanzania* [Online]. Thompson Reuters Foundation. Available: <http://www.trust.org/item/?map=corruption-allegations-hit-wwf-programmes-in-tanzania> [Accessed May 13 2013].
- KWASHIRAI, V. C. 2012. Environmental History of Africa. *Encyclopedia fo Life Support Systems*. Sussex: University of Sussex.
- KWEKA, D. 2004. The role of local knowledge and institutions in the conservation of forest resources in the East Usambara. UNESCO-Man and Biosphere (MAB) Young Scientist Programme.

- LINDEMANN, S. & PUTZEL, J. 2008. State Resilience in Tanzania - draft analytical Narrative.
- MTNRE 1989. Tanzania Forestry Action Plan 1990/91-2007/08 Update. *In*: MINISTRY OF TOURISM, N. R. A. E. (ed.). Dar es Salaam.
- MURUGAN, M., SHETTY, P. K., RAVI, R., SUBBIAH, A. & HIREMATH, M. B. 2011. Environmental impacts of intensive cardamom (small) cultivation in Indian Cardamom Hills: The need for sustainable and efficient practices. *Recent Research in Science and Technology*, 3, 09-15.
- NELSON, F., SULLE, E. & LEKAITA, E. 2012. Land Grabbing and Political Transformation in Tanzania. *Global Land Grabbing II*. Cornell University, Ithaca NY.
- NEWMARK, W. D. 1992. Recommendations for Wildlife Corridors and the Extension of Forest Reserves in the East Usambara Mountains, Tanzania. Helsinki: East Usambara Catchment Forest Project.
- NEWMARK, W. D. 1998. Forest Area, Fragmentation, and Loss in the Eastern Arc Mountains: Implications for the Conservation of Biological Diversity. *Journal of East African Natural History*, 87, 29-36.
- NEWMARK, W. D. 2002. *Conserving biodiversity in East African forests : a study of the Eastern Arc Mountains*, Berlin ; New York, Springer.
- NEWMARK, W. D. 2006. A 16-Year Study of Forest Disturbance and Understory Bird Community Structure and Composition in Tanzania. *Conservation Biology*, 20, 122-134.
- NEWMARK, W. D., MKONGEWA, V. J. & SOBEK, A. D. 2010. Ranging behavior and habitat selection of terrestrial insectivorous birds in north-east Tanzania: implications for corridor design in the Eastern Arc Mountains. *Animal Conservation*, 13, 474-482.
- OSTROM, E., DEITZ, T., DOLAK, N., STERN, P., STONICH, S. & E., W. 2002. *The Drama of the Commons*, Washington DC, National Academy Press.
- PETERSEN, L. & SANDHÖVEL, A. 2001. Forestry policy reform and the role of incentives in Tanzania. *Forest Policy and Economics*, 2, 39-55.
- RADEMACHER, A. M. 2011. *Reigning the River: Urban Ecologies and Political Transformation in Kathmandu*, London, Duke University Press.
- RANTALA, S., VIHEMÄKI, H., SWALLOW, B. & JAMBIYA, G. 2013. Who gains and who loses from compensated displacement from protected areas? The case of the Derema Corridor, Tanzania. *Conservation and Society*, 11.
- REYES, T. 2008. *Agroforestry systems for sustainable livelihoods and improved land management in the East Usambara Mountains, Tanzania*. University of Helsinki.
- REYES, T., LUUKKANEN, O. & QUIROZ, R. 2006. Small Cardamom--Precious for People, Harmful for Mountain Forests. *Mountain Research and Development*, 26, 131-137.
- ROBBINS, P. 2012. *Political Ecology*, Oxford, Wiley-Blackwell.
- SACHEDINA, H. 2006. Conservation, Land Rights and Livelihoods in the Tarangire Ecosystem of Tanzania: Increasing incentives for non-conservation compatible land use change through conservation policy. *Pastoralism and Poverty Reduction in East Africa: A Policy Research Conference*. Nairobi, Kenya.

- SHEPHERD, G. 2004. *The Ecosystem Approach: Five Steps to Implementation*, Cambridge, UK, International Union for Conservation of Nature.
- STEFFAN-DEWENTER, I., KESSLER, M., BARKMANN, J., BOS, M. M., BUCHORI, D., ERASMI, S., FAUST, H., GEROLD, G., GLENK, K., GRADSTEIN, S. R., GUHARDJA, E., HARTEVELD, M., HERTEL, D., MIGGE-KLEIAN, S., MOGEA, J., PITOPANG, R., SCHAEFER, M., SCHWARZE, S., SPORN, S. G., STEINGREBE, A., TJITROSOEDIRJO, S. S., TJITROSOEMITO, S., TWELE, A., WEBER, R., WOLTMAN, L., ZELLER, M. & TSCHARNTKE, T. 2007. Tradeoffs between income, biodiversity, and ecosystem functioning during tropical rainforest conversion and agroforestry intensification. *The National Academy of Sciences of the USA*, 104, 4973-4978.
- SUMBI, P. 2010. Critical Ecosystem Partnership Fund Final Project Completion Report. World Wildlife Fund for Nature International-Tanzania Programme Office.
- TANZANIA 1999. Village Land Act. In: PARLIAMENT, T. (ed.) 5. Dar es Salaam.
- TFCG. 2008. *East Usambara Forest Landscape Restoration Project* [Online]. Available: http://www.tfcg.org/docs/project_usambara_e.htm [Accessed April 17 2013].
- UNITED REPUBLIC OF TANZANIA (URT) 2006. Resettlement Action Plan for Farm Plots Displaced for Biodiversity Conservation in the Derema Forest Corridor. In: MINISTRY OF NATURAL RESOURCES AND TOURISM & FORESTRY AND BEEKEEPING DIVISION (eds.). Tanzania.
- VAINIO-MATTILA, K. 2000. Wild vegetables used by the Sambia in the Usambara Mountains, NE Tanzania. *Finnish Zoological and Botanical Publishing Board*, 37, 57-67.
- VATN, A. 2005. *Institutions and the Environment*, UK, Edward Elgar Publishing Limited.
- VEDELD, P. 2002. The Process of Institution Building to Facilitate Local Biodiversity Management. Norway: Noragric.
- VEDELD, P., JUMANE, A., WAPALILA, G. & SONGORWA, A. 2012. Protected areas, poverty and conflicts: A livelihood case study of Mikumi National Park, Tanzania. *Forest Policy and Economics*, 12.
- VIHEMAKI, H. (ed.) 2007. *Contextualizing Natural Resource Management in the South*, Helsinki: Institute of Development Studies, University of Helsinki.
- VIHEMÄKI, H. 2009. *Participation or further exclusion? Contestations over forest conservation and control in the East Usambara Mountains*. University of Helsinki.
- VYAMANA, V. G. 2009. Participatory forest management in the Eastern Arc Mountains of Tanzania: who benefits? *International Forestry Review* 11, 239-253.
- WORLD BANK 1992. World Development Report 1992: Development and the Environment.
- WWF 2009. East Usambara WWF proposal 2009 FINAL.
- WWF. 2010. *Forest Landscape Restoration* [Online]. Available: http://wwf.panda.org/what_we_do/how_we_work/conservation/forests/forestlandscapes/forestlandscaperestoration/ [Accessed February 28 2013].

9. Appendix 1

Interview Guide for Households affected by Derema corridor

1. Name of village:
2. Name of interviewee:
3. Gender:
4. Age:
5. Household size:
6. How long have you lived in this village? (If moved from other area, why did you move?)
7. Size of cultivated area, in acres, before Derema corridor, and after:
8. What crops did you grow in the land lost to the corridor, and what do you grow in your current land?
9. What was the main crop grown in the land you lost? How many plants were there?
10. Estimate the value of the acres lost to the corridor, based on income:
11. How much were you paid for the land you lost to the corridor?
12. In what form were you paid (i.e. did someone deliver a check or cash, etc.)
13. What year were you paid?
14. Do you know where (what country) the donor money came from to pay compensation?
15. Is there any agricultural extension services here, farmer's organization, etc? Have they helped you increase yields/Have you changed your farming methods that have helped you increase yields?
16. Do you receive benefits from the Amani Nature Reserve as a whole?
17. What forest products do you use, and do you gather them from the ANR and/or the Derema corridor? Did you gather them from the Derema corridor?
18. In your understanding, what is the purpose of the Derema corridor? (i.e., how was it explained to them)

19. How does cardamom farming affect the forest ecosystem in your view?
20. Have you been promised any land as compensation from the Tanzanian government?
How much and where?

10. Appendix 2

Interview Guide for Derema Forest Reserve planners

1. Name of the stakeholder/project: Website:
2. When was the corridor established? (Date)
3. What is the main purpose of the Derema forest corridor?
4. What is/are the source(s) of funds for the corridor, to establish it and ongoing funding now? What is your contact with WWF and TFCG?
5. Since establishment of the corridor, please describe, in your understanding, the compensation process for the displaced farmers. Do you have data sheets of this process?
6. What is the restoration plan for the corridor? Can I get a copy of the documents?
7. Has the plan for the corridor been going as you expected, or have there been challenges? What was the main challenge?
8. How often does ANR communicate with the farmers affected by the new forest corridor?
9. Is there a community-based forestry initiative for the surrounding villages for Derema, or just for the ANR? Are there plans to make Derema more open, i.e. have more participation between villagers and ANR?
10. Are there plans to extend the Amani Nature Reserve further in the near future?
11. In your view, what economic activities (villagers and local industries included) are having the most impact on wildlife in this region?

11. Appendix 3

Approximate currency conversions from the time of fieldwork: October-December 2012

1.00 USD = 1570 Tanzanian shillings (TAS)

1.00 USD = 5.6 NOK

