### **EQUATOR** INITIATIVE



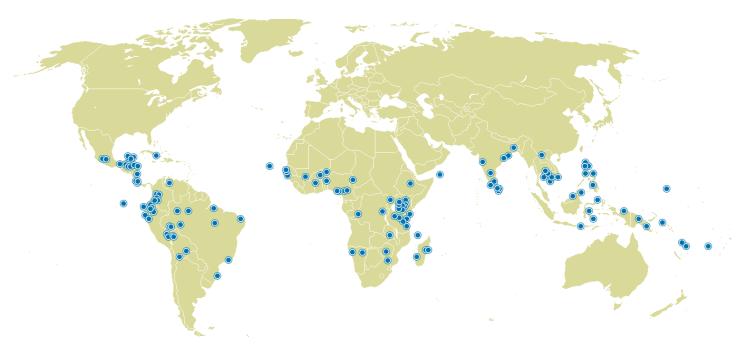


Equator Initiative Case Studies
Local sustainable development solutions for people, nature, and resilient communities

### UNDP EQUATOR INITIATIVE CASE STUDY SERIES

Local and indigenous communities across the world are advancing innovative sustainable development solutions that work for people and for nature. Few publications or case studies tell the full story of how such initiatives evolve, the breadth of their impacts, or how they change over time. Fewer still have undertaken to tell these stories with community practitioners themselves guiding the narrative.

To mark its 10-year anniversary, the Equator Initiative aims to fill this gap. The following case study is one in a growing series that details the work of Equator Prize winners – vetted and peer-reviewed best practices in community-based environmental conservation and sustainable livelihoods. These cases are intended to inspire the policy dialogue needed to take local success to scale, to improve the global knowledge base on local environment and development solutions, and to serve as models for replication. Case studies are best viewed and understood with reference to 'The Power of Local Action: Lessons from 10 Years of the Equator Prize', a compendium of lessons learned and policy guidance that draws from the case material.



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### **AMANI NATURE RESERVE**

### **Tanzania**

### **PROJECT SUMMARY**

The Amani Nature Reserve was created to protect the unique, biologically important sub-montane forest ecosystem of Tanzania's East Usambara Mountains. The biosphere reserve covers an area of about 83,600 hectares, and is home to a number of human settlements as well as unique and endemic biodiversity. These communities have been actively engaged in the management of the reserve since its establishment in 1997: two community representatives currently sit on the Amani Nature Reserve Advisory Board.

The high dependency of local people on the natural resources found in the area was the main obstacle to Amani's goal of conserving this unique fragment of rainforest. The reserve's management board has therefore developed a strategy focusing on developing alternative, non-consumptive uses of the natural resources in the area and income-generating activities, such as ecotourism, beekeeping, and fish and butterfly farming.

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### **KEY FACTS**

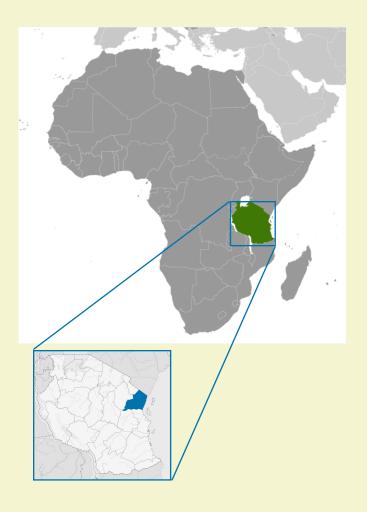
**EQUATOR PRIZE WINNER: 2006** 

FOUNDED: 1997

LOCATION: East Usambara Mountains

BENEFICIARIES: Over 400 community members employed

BIODIVERSITY: 83,600-ha Amani Nature Reserve



## **Background** and Context



Amani Nature Reserve was legally gazetted by the Tanzanian government in May 1997, with the aim of conserving the rich biodiversity of the East Usambara Mountains. The East Usambaras, part of the Eastern Arc Mountain Range, have been classified as a global centre of plant diversity, boasting the second highest diversity of plant species in Africa, and were designated a Man and Biosphere Reserve by UNESCO in 2000. The biosphere reserve, which covers an area of about 83,600 hectares, consists of sub-montane rain forest and low-land wooded grassland. It is characterized by high concentrations of endemic flora (including many medicinal plants) and is home to thirteen endangered bird species. The rain forests also supply water for more than 300,000 people in the city of Tanga, while local people in the mountains depend on the forests for a variety of livelihood activities.

### Conserving the last remnants of a rainforest

East Usambara ecosystems were significantly damaged from the 1950s onwards by large-scale deforestation carried out by foreigncontrolled logging companies. A sawmill factory was established in Tanga for processing East Usambara timber into plywood and sawn wood, and expanded its operations in the 1970s with funding from the Finnish government's development agency. Finland performed a volte-face in the 1990s with their investment in the East Usambara Catchment Forest Project (EUCFP), having substantially reduced forest cover in the mountain range. The EUCFP, conversely, aimed to protect the area's water catchment areas, conserve its endemic species, and sustain its ecosystem services for local communities. The creation of a national forest reserve was identified as the best strategy for conservation, and between 1991 and 1998 a total of USD 6.1 million was spent on achieving this. The IUCN Environmental Law Centre played an advisory role, defining the legal parameters of the reserve, while the surveying and mapping process was completed in 1994, leading to the creation of Amani Nature Reserve in 1997. This comprised six previous forest reserves - namely Kwamkoro, Kwamsambia, Mnyuzi Scarp, Amani Zigi, Amani East and Amani West – totaling 8,380 hectares. This includes 1,065 ha of forests owned by private tea companies under the management of the East Usambara Tea Company. It also includes the Amani Botanical Garden, established in 1902 under German colonial rule and still one of the largest botanical gardens in Africa. The reserve has been developed as a tourist destination, with two rest house areas and designated nature trails, and has also attracted national and international researchers.

The Amani Nature Reserve is made up of two main forest types. Semi-deciduous forests in the lowlands, which experience lower rainfall, cover approximately a third of the reserve's area, while submontane evergreen forests in the mountains with high levels of rainfall constitute one half of the reserve. Poorly stocked lowland forests, affected by logging, fire or encroachment, cover about 6% of the area, while another 6% of sub-montane forest has been invaded by exotic species including *Maesopsis eminii*, *Cedrella odorata*, and palm trees. Some of these invasive species were introduced via the Amani Botanical Garden, which was established to preserve examples of East African flora. Amani Nature Reserve's non-forest biotopes are scarce, consisting mainly of dry bushland (2%), grassland, rocky barren areas, and ponds and rivers (all less than 1%).

#### Governance structure

The reserve is owned by the central government of Tanzania, through the Forestry and Beekeeping Division of the Ministry of Natural Resources and Tourism, while the daily management of the reserve is delegated to a Conservator. The Conservator is expected to discuss important issues with the Advisory Board, which in principle meets twice a year or as needed. Its tasks include approving the budget and the work plan for the reserve. The board consists of representatives of different stakeholders, including local communities, regional and district authorities, and other organizations such as the Tea Company and the Tanzanian Forest Research Institute.

Involvement of local communities has been integral to the success of the Amani Nature Reserve since its foundation. A Participatory Rural Appraisal approach was employed to draw up access arrangements with the buffer zone villages. The Tanzanian government had previously used similar strategies to engage local people in forest management, establishing Village Forest Reserves and Joint Forest Management areas within government reserves, in which forest resources were co-managed by villages and the government's Forestry and Beekeeping Division. Village Resource Management Plans have also been drawn up with local communities to promote more sustainable land-use management in the buffer zones of the reserve, reducing human pressure on the forest. Two individuals from the local community are represented on the Amani Nature Reserve Advisory Board – one from each of the two bordering districts, Korogwe and Muheza. Local representatives are elected by their respective villages.

### Meeting the livelihood needs of the park's residents

The nature reserve's 149-kilometre boundary encompasses several villages and scattered smallholdings. Farming, both for consumption and for cash crops, is the primary livelihood activity of local people in the Amani Nature Reserve buffer zones, with an average farm size of 2.7 hectares. The main food crops cultivated are maize, cassava, bananas, and beans, and the main cash crops are maize, sugarcane, cardamom, cinnamon, cloves, and black pepper. Most of the village land is under customary tenure, but land is also purchased and bor-

rowed. Unsustainable farming methods have led to soil degradation and reduced agricultural productivity; the use of terracing, or manure for fertiliser, was not common during the 1990s. The resulting lack of arable land for local farmers is the root cause of pressures on the forest ecosystem, exacerbated by a lack of alternative sources of income.

The wellbeing of these local communities is seen as paramount to the success of the nature reserve, with a revenue sharing system and a variety of alternative livelihood projects in place to benefit these villages. Amani Nature Reserve is demarcated into specific zones with different con¬servation statuses: the biodiversity preserva¬tion zone makes up 77% of the area, while the local use zone comprises 6% of the area. A buffer zone has also been established around the border to "promote sustainable land and natural resource use practices... and to decrease the dependency of the local communities on the natural resources of the Amani Nature Reserve and to contribute to the social and economic development of the com-munities by involving them in the management of the Amani Nature Reserve" (Amani Nature Reserve General Management Plan, 1998). This partnership between local communities and the government is formalized in local use regulations and a revenue-sharing agreement. Community members are permitted to collect firewood from the local use zone twice per week, and to collect medicinal plants with special permission. In return for these restrictions on access, the buffer zone villages receive 20% of entrance fees and research fees paid to the nature reserve.



## Key Activities and Innovations



The high dependency of local people on the natural resources found in the area was the main catalyst for the project. The reserve adopted a strategy focusing on developing alternative income-generating activities, such as ecotourism, beekeeping, fish and butterfly farming, horticulture, and tree nurseries. Some of these livelihood programs have attempted to combine indigenous knowledge with modern production systems to increase output.

### Improving sustainable livelihood options

Ecotourism: Ecotourism has been the main source of revenue for communities within the nature reserve, with funds also being reinvested in conservation activities. The nature reserve offers hiking routes through the forest, night walks, campsites, visits to butterfly farms, and bird watching. The last activity has proved particularly popular, with many bird watchers visiting Amani hoping to spot some of the 340 species recorded in the East Usambaras. These include endemic and endangered birds such as the Usambara Eagle Owl (*Bubo vosseleri*), Usambara Weaver (*Ploceus nicolli*), Amani Sunbird (*Anthreptes pallidigaster*), and the Long-billed Tailorbird (*Orthotomus moreaui*).

Amani Butterfly Project: A key alternative livelihood activity is butterfly farming. Amani has established links with European pharmaceutical corporations that purchase butterfly pupae, providing a substantial source of income for local farmers. Similarly in apiculture, indigenous knowledge has been combined with modern beekeeping systems to allow for both individual and group apiaries for the production of honey. Traditional systems of collecting crabs from streams and wetlands have been combined with fish farming practices, for both commercial and local use. These activities have been introduced with varying degrees of success to relieve local pressures on the forest ecosystem, without degrading the biodiversity of the reserve.

Mushroom farming; fuel-efficient stoves: Where previously groups of women had collected vegetables from key biodiversity areas within the reserve, training has been given in managing gardens outside biodiversity areas, including the practice of mushroom farming. Similarly, where the local population previously relied heavily on fuel wood from the reserve, with women bearing the bulk of the workload burden, fuel-efficient stoves have been provided to all villages and communities surrounding the Amani Nature Reserve.

Agroforestry and reforestation: Amani is engaged in agroforestry activities in the reserve buffer zone, to sustainably manage forest products and to reduce local dependency on biodiversity within the reserve. Village Natural Resource Management Plans are developed with local communities and villages to underpin these resource-use decisions. In all reforestation and agroforestry activities, tree species are agreed upon and selected in consultation with local communities. This has also focused on planting native species, and combating the spread of invasive, exotic species.

Soil conservation: Improved land use and soil conservation practices are also promoted. In the reserve buffer zones there is a substantial amount of fallow land that is no longer productive for cardamom, sugarcane, bananas, or maize. This same land, however, is productive for black pepper and clove farming: both are growing markets domestically. Local communities are supported in transitioning to black pepper and clove farming, which in addition to raising local incomes has had a positive effect on soil conservation and combating soil erosion.

Management training and other capacity building is offered to local community representatives, who are also represented on the Advisory Board. Local community members are also engaged in Amani's activities and management through meetings, workshops, posting lists, and day-to-day communications.

### **Impacts**



### **BIODIVERSITY IMPACTS**

Within the reserve there are a significant number of endemic animal and plant species. Their conservation relies on decreased human pressures on the forest ecosystems; Amani Nature Reserve has successfully reduced these pressures through promoting alternative livelihood options, sharing revenues from ecotourism, and regulating land use practices.

### Land use zonation: forest rehabilitation

Land use within the nature reserve is divided into four zones. The biodiversity preservation zone constitutes the largest part of Amani, covering 77% of the total area. 13% is classified as a nature restoration zone, where indigenous tree planting takes place to help the regeneration of forest cover lost to illegal logging. The local use zone comprises 6% of the total area, while the Amani Botanical Garden makes up the remaining 4% of the nature reserve.

The boundaries of the preservation zone are clearly demarcated, and community members have volunteered in patrolling activities to monitor human incursions. In recent years these have included logging, poaching, mining for gold, and stripping *Cinchona* tree bark for quinine production. Since the reserve was established, there has been a significant reduction in these activities, as well as reduced instances of forest fires and poaching.

Areas that were previously damaged by forest fires are being allowed to regenerate naturally, while forest areas lost to logging are replanted annually with indigenous species of trees and plants. A variety of indigenous species are used to avoid monocultures. Amani Nature Reserve has aimed to reduce the numbers of exotic species and aid the restoration of indigenous vegetation. *Psidium cattleyanum* has been targeted for eradication, and *Cedrela odorata* and *Melia azedarach* have been reduced. Regular monitoring of *Maesopis eminii* is conducted, although no activities have been taken to eradicate it.



Negotiations have been taking place since 2000 to secure the unprotected forests of the neighbouring Derema corridor as a new central government Forest Reserve. This important forest corridor connects the Amani Nature Reserve in the south with other East Usambara national Forest Reserves to the north, and its protection is vital for the sustained ecological integrity of both areas.

### Conservation of endangered species

The East Usambara Mountains are included as a "threatened community" in the IUCN Invertebrate Red Data Book. Many of the invertebrate species of the East Usambara Mountains are endemic. For instance, 41 species of millipedes have been found, 85% of which are endemic. Endemic species represent 45% of the non-marine mollusks found within the reserve, while the Gulella genus of land-snails has a rate of 75%. Of the 37 species and subspecies of butterflies restricted to montane forests known in the East Usambara, 15 are endemic. Amani Nature Reserve is also home to larger animal species. Fifteen forest-dependent amphibian and thirteen reptile species in

the East Usambara are endemic to Tanzania; similarly, some mammal species of the Amani Nature Reserve are classified as globally threatened – the Collarded Fruit Bat (*Myonycteris relicta*), Bushy-tailed Mongoose (*Bdeogale crassicauda*), Abbot's Duiker (*Cephalophus spadix*) and Zanj Elephant Shrew (*Rhyncochyon petersi*) – while one subspecies, the Tree Hyrax, (*Dendrohyrax validus vosseleri*) is possibly endemic. The most visible mammal species are the primates: Gentle Monkeys (*Cercopithecus mitis*), Colobus Monkeys (*Colobus guereza*) and Yellow Baboons (*Papio cynocephalus*).

The International Council for Bird Preservation (ICBP) has classified both the submontane and lowland forests of the East Usambara as Endemic Bird Areas. Thirteen globally endangered species of birds are found there, of which most are endemic to either the East Usambaras or other Eastern Arc forests. The Eastern Arc Mountains have been identified as one of the three most important sites in Africa for endemic birds and the most important site on the African mainland for globally threatened bird species. These endangered species include the Long-billed Apalis (*Apalis moreaui moreaui*), Usambara Eagle Owl (*Bubo vosseleri*), Amani Sunbird (*Anthreptes pallidigaster*), Usambara Mountain Weaver (*Ploceus nicolli*) and Swynnerton's Robin (*Swynnertonia swynnertoni*).

Of the flora in the reserve, 3.1% is strictly endemic to the East Usambara Mountains; when taking into account near-endemic species, or those also found in adjacent Eastern Arc Mountains, the rate is as high as 22%. 1,921 indigenous vascular plant species have been reported from the East Usambaras. These include as many as 64 endemic or near-endemic plant species. Among the most famous of the Usambaran endemic species are twenty varieties of African Violets (Saintpaulia spp.), one of which (S. ionantha) the German commissioner to Tanga brought to Europe for the first time in the year 1891. Other commonly recorded near-endemic tree and shrub species in Amani Nature Reserve are Leptonychia usambarensis, Cepha-

losphaera usambarensis, and Allanblackia stuhlmannii.

### SOCIOECONOMIC IMPACTS

The local communities of the Amani buffer zones receive 20% of tourist revenues, or approximately USD 4,000 per year. This agreement has underpinned the nature reserve's conservation aims, and has allowed communities to reinvest the funds in local development projects. In addition to the revenue-sharing structure within the reserve, alternative livelihood activities have been adopted by several communities.

### Diversifying sources of income

Farmers living close to the forest boundary of the reserve have been supported to plant over 10,000 trees, which provide fuel wood, building materials, and NTFP income opportunities for the farmers. One successful initiative has involved marketing oil from Allanblackia plants. This is commonly seen around the Amani field station, with large fruits up to 12 inches in length which may contain 40-50 seeds. The kernels produce a hard white fat that can be extracted and used as soap or in cooking. The Amani field station has focused on analyzing soil types for growing Allanblackia, and 12,500 tree seedlings have been given to villagers in nineteen villages for planting in garden plots. The World Agroforestry Centre (ICRAF), IUCN, and the Netherlands Development Organization (SNV) have partnered with Unilever and local organizations, including Novel Development Tanzania Ltd (NDTL) and the Tanzanian Forestry Conservation Group (TFCG) to develop value chains and access to markets in Europe for Allanblackia oil processing.

Over 400 people are employed through beekeeping and butterfly farming enterprises. A cooperative of butterfly farmers has been established to farm and export butterfly pupae to butterfly houses





around the world. Butterfly pupae sell for between USD 1 and USD 2.50. On average, the butterfly farming project has increased household incomes by about 25%, providing a strong incentive for the farmers to actively protect the forests around them.

With support from the reserve's management, several farmers now earn an income from improved honey production. Amani provides local farmers with modern bee hives, which complement traditional apiculture activities. Support is provided in both apiculture and honey processing techniques. Agricultural diversification is pursued through supporting farmers in harvesting cloves, cardamom, cinnamon, sugar cane, coco yams, and black paper (cash crops), and cassava, yams, and bananas (food crops). Livestock and animal husbandry activities are also promoted. Dairy farming has been introduced to the area under a "zero grazing" policy, which provides a substantial amount of revenue (as well as needed manure, which improves land productivity.)

Crab and fish farming have been developed for commercial and local use. Aware of the detrimental effects of fishponds on wetlands and water quality, Amani only supports the establishment of artificial ponds. Where traditional communal work used to involve pole cutting for land preparation, local groups have been supported to transition the focus of communal work towards the production of ceramic bricks for constructing more durable, modern houses.

### Improved local wellbeing and watershed benefits

Nineteen villages have adopted efficient wood-burning stoves and built houses out of burned bricks. Fuel efficient stoves – capable of reducing household fuel consumption by 50 percent when compared to traditional "three stone stoves" – have successfully reduced pressure on forests. Stoves have also had local health benefits, reducing smoke inhalation and subsequent respiratory diseases.

The Amani Nature Reserve is one of the most important water catchments areas in the East Usambara mountains. The Zigi River provides a source of water for the nearby town of Tanga and adjacent local communities. Amani also provides water to the Hale and Pangani hydropower stations, via the Pangani River, while the western section of the reserve drains into the Lwengera valley.

### **POLICY IMPACTS**

As a government-run national Forest Reserve, Amani has served as a model for forest management in Tanzania, and as an example of biodiversity conservation worldwide.

Policy and legal changes in Tanzania over the past few years mean that the basis for involving local communities in forest protection, forest management and forest restoration is now in place. The Tanzanian Land Law (1999) in particular recognizes the rights of local communities to be compensated for land that they agree to set aside for conservation, an approach that has been exemplified by Amani Nature Reserve. This is also in line with the Tanzanian Forest Policy (1998) and Forest Act (2002), and can also be seen in various replicated efforts, including the Derema Forest Reserve bordering Amani to the north.

The inclusion of East Usambara in UNESCO's Man And Biosphere Reserve Programme was made possible in 2000 as a result of the active and leading role played by Amani Nature Reserve. The Eastern Arc Mountains Forests were nominated as a UNESCO World Heritage Site in 1997 in recognition of their outstanding universal natural value, although this nomination was withdrawn in March 2011 by the Tanzanian Government. The Amani forests have been recognized as globally important centres of biodiversity by other international organizations, however, including IUCN, the World Wildlife Fund, and the International Council for Bird Preservation.

# Sustainability and Replication



### SUSTAINABILITY

Amani Nature Reserve has established a Conservation Fund to cover their operational costs. Revenues from tourism contribute to this fund, but do not cover all of the nature reserve's program areas. This is reliant on external funding, therefore, with grants sought at various times from sources such as the UNDP-implemented Global Environment Facility Small Grants Programme, or the Critical Ecosystems Partnership Fund. Continued external support will be necessary to maintain the nature reserve's management of its forests.

Threats to Amani's ecological sustainability have also been identified. These include its separation and fragmentation from the wider East Usambara ecosystem. A strategy to guard against this is the designation of the Derema forest corridor as a central government forest reserve. Pressures on financial resources could in turn impact the amount of revenue being shared with bordering communities, which serves as the main means of compensation for restricted access to forest resources.

Poor tourism infrastructure has also been identified as a weakness of the nature reserve. The main lodge is currently only accessible via a 35 kilometre journey from the main road, while tourist accommodation facilities are relatively limited, and there is a lack of organised activities available for visitors.

Finally, the persistence of small scale mining for gold, sparked by rumours of gold found in local rivers, and outbreaks of forest fires continue to pose threats to the forests.

### REPLICATION

Amani Nature Reserve is a model for nature reserves as a form of protected area in Tanzania. The same management model has been translated to seven new nature reserves in the Eastern Arc Mountains; Nature Reserve status is the highest level of protection under the

Tanzanian Forestry and Beekeeping Division legislation, equivalent to National Park status of the Tanzania National Parks Authority.

Kilombero Nature Reserve was declared in August 2007, combining three former Forest Reserves in the Udzungwa Mountains of south-central Tanzania. Assistance to the Forestry and Beekeeping Division to declare this reserve came from the Global Environment Facility, the WWF network, and the Critical Ecosystem Partnership Fund. The reserve has an altitude range of 300-2,600m and habitats include forests, large areas of montane grasslands, and wetlands at higher altitudes. Its total species assemblage makes Kilombero the most important single site for conservation in the Eastern Arc Mountains.

Two further Nature Reserves within the Eastern Arc Mountains were established shortly afterwards. The Uluguru North and Uluguru South Forest Reserves were combined to form the Uluguru Nature Reserve, founded to protect the critically endangered Uluguru Bushshrike. The Nilo Forest Reserve in the East Usambara Mountains was also upgraded to Nature Reserve status.

More recently, Nature Reserves have been established throughout the Eastern Arc Mountains, at Shume Magamba, Chome, Rugwe, and Nkingu. Preliminary economic analysis of ecosystem services suggests that the Eastern Arc contributes a minimum of USD 620 million per annum to the Tanzanian economy, even without full consideration of the value for water, tourism and environmental services.

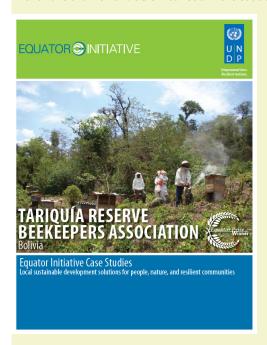
### **PARTNERS**

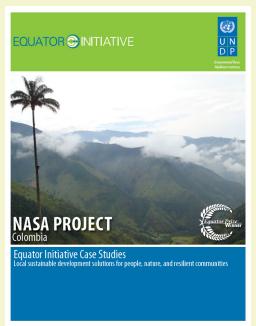
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- Tanzania Forest Conservation Group (TFCG)
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- Critical Ecosystem Partnership Fund

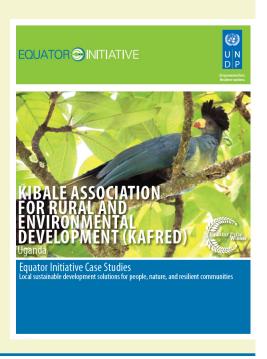
### **FURTHER REFERENCE**

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