



The Arc Journal

Tanzania Forest Conservation Group

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Photo by Dorthe Friis Pedersen



Ten million dollars later

Looking at the legacy of the Critical Ecosystem Partnership Fund and the Conservation and Management of the Eastern Arc Mountain Forests project

This edition of the Arc Journal looks at the legacies of two parallel conservation investments: the US\$ 7 million invested by the Critical Ecosystem Partnership Fund in the Eastern Arc and Coastal forests of Kenya and Tanzania and the US\$ 3 million invested in the development of the Eastern Arc strategy through the Conservation and Management of the Eastern Arc Mountain forests project implemented by the Forestry and Beekeeping Division and financed by UNDP / GEF. Between 2004 and 2009 these two projects have worked closely together to achieve similar goals using different approaches. This edition also includes an article about the Valuing the

Arc Project, a collaborative research project documenting the economic value of the ecological services provided by the mountain forests and an analysis of the challenges raised by increased investment in biofuels in the Coastal Forests.

This edition of the Arc Journal is dedicated to **Dr Alan Rodgers**, the man who put Tanzania's Eastern Arc Mountains and Coastal Forests on the map...and helped keep them there.

Alan died on 31st March 2009, aged 64



Obituary

Dr Alan Rodgers – Guru of East African Forest Conservation

By Nike Doggart



Photo by John Watkin

Dr Alan Rodgers was for nearly thirty years the driving force behind forest conservation in Tanzania. His achievements include the establishment of the Udzungwa Mountains National Park and the Jozani Chwaka Bay National Park. He set up the Tanzania Forest Conservation Group. He developed several UNDP / GEF projects including the Eastern Arc project that has resulted in three new nature reserves and the acceptance of the Eastern Arc as a proposed World Heritage Site. He co-authored the scientific discovery of the Sanje mangabey; and established a network of biodiversity research projects that have put Tanzania's Eastern Arc and Coastal Forests firmly on the global conservation map. Alan was also an inspiration to a generation of East African forest conservationists including amongst others John Salehe, George Jambiya, Felician Kilahama, Charles Meshack, Peter Sumbi and Gertrude Lyatuu, as well as many of you now reading this Arc Journal.

Alan was born in Liverpool in the United Kingdom in 1944 and moved to East Africa as a child. He studied at the Universities of Aberdeen and Nairobi. In 1966 he began his career working as a Game Research Officer in the Selous Game Reserve, where he coordinated an area of land larger than Belgium. In the eleven years he was there he established the Miombo Research Centre at Kingupira, caught many poachers, and often spent weeks living out in the bush with a team of game scouts and porters. A portrait of him during this period (by Peter Matthiessen in *Sand River*) described him as a "bluff, husky generous man who dispensed beer as well as his own documents and also a fascinating discourse on the ecology of the Selous."

In 1976 Alan was appointed Senior Lecturer and Wildlife Coordinator in the Zoology Department of

the University of Dar es Salaam. During his early years at the University, Alan completed his own thesis (on the Ecology of Grazing Herbivores in the Miombo Woodlands of South East Tanzania) and set up the Masters Degree Programme in Wildlife Management. His superb teaching characterised by his passion for wildlife, profound scientific knowledge and a wicked sense of humour, inspired a generation of wildlife research students.

With an economy in turmoil, life was not easy in the late 70s and early 80s in Tanzania, but Alan used his considerable ingenuity firstly to get his students into the field and secondly to use their research to further their shared conservation aims. In Kimboza, for example, student research helped pave the way for the establishment of a permanent forest post; in the Ngorongoro Crater, students conducted constant ecological monitoring in order that rhino poaching by corrupt officials would not go unnoticed.

In 1978, anthropologist Katherine Homewood came to the University. Alan asked her what she was interested in doing on her weekends. When she answered 'forest surveys', a new era in forest conservation was born.

It was during a field trip to the Udzungwa Mountains with Katherine Homewood that Alan made one of his most significant discoveries. While Katherine was lying in her tent suffering from malaria she thought she heard a *whoop gobble* - the characteristic call of a mangabey (a type of monkey) and, coincidentally, the species group on which she had written her PhD. Although at the time she believed the noise must have been a feverish delusion, Alan followed it up and spotted a mangabey in the forest canopy. He and Katherine then



learned that children in Sanje village were indeed keeping a pet mangabey. Although the children had trimmed its long fringe it was clear that this was an undocumented species – one that is endemic to the Udzungwa Mountains. It became known as the Sanje mangabey. Asked by the British Museum of Natural History to shoot and kill one as a type specimen, Alan

declined, and the captive mangabey lived out its days at Von Nagy's wildlife sanctuary in Arusha. The discovery of the Sanje mangabey provided the impetus for a host of other expeditions which in turn revealed a new genus of partridge, a giant elephant shrew and another genus of mangabey.

In 1982 Alan co-founded the Tanzania Forest Conservation Group (TFCG) with colleagues, Professors Kim Howell and John Hall. This has become the leading organisation of its kind in Tanzania, working with over 100 villages around 100,000 hectares of forest and employing over 40 staff. Until his death, he continued to play an active role in the organisation, formally as Vice-Chair and informally as an advisor and counsellor.

Through TFCG, Alan succeeded in pushing forward important work in Tanzania in the 80s, including working with botanists such as Leonard Mwasumbi, John Hall and Kaj Vollesen to collect thousands of botanical specimens; documenting the forests' biodiversity; and making the first reliable map of closed cover forest in Tanzania using aerial photographs and early satellite imagery.

Alan leveraged his position at the University to lobby for better protection of the Eastern Arc Mountains and Coastal Forests. He secured funding for the East Usambara IUCN project - the bedrock of much of the conservation work in the East Usambaras over the past decade. The project led to the foundation of the country's first Nature Reserve at Amani, which in turn has been a model for the network of Nature Reserves emerging now.

Alan had a vision for the forests and worked tirelessly to turn that vision into a reality. One of his greatest achievements was to push through the establishment of the Udzungwa Mountains National Park, the first national park to be established for its overall biodiversity and ecological services rather than being primarily for the conservation of large mammals. Today that park extends over 1990 square kilometres, includes some of the most important forest in the Eastern Arc Mountains, which is itself the most important type of forest in Africa for biodiversity and endemism. Alan was instrumental in presenting the biological and hydrological evidence to the National Parks Authority, persuading local and central government to approve the park, and convincing the World Wide Fund for Nature (WWF) to finance its establishment and initial operation.

Alan had a talent for spotting clever and dedicated people, and helped many of today's East African conservationists to pursue their careers.



Alan with elephant jaw bones confiscated in the Selous.



Alan (holding bowl) in 1978 near to the Wami.

He encouraged many students and researchers to focus their efforts on Tanzania's forests. As just a few examples, he provided invaluable support to Jon Lovett's assessment of the values of Tanzania's catchment forests, Thomas Struhsaker's work on Udzungwa's primates, and Neil Burgess's and Phil Clarke's work on the Coastal Forests of East Africa. Much of that research has contributed to the region being recognised as a priority for conservation investment by international organisations such as the United Nations Development Program / Global Environment Facility (UNDP / GEF), the Critical Ecosystem Partnership Fund and WWF.

Reflecting on his time at the University of Dar es Salaam, Alan said: "This is where the years of work may have had its greatest catalytic effect. Tanzania has become more aware of the great biological value of her forest resources. Tanzania can be proud to be thought of as a forest nation in Africa (in quality if not in quantity!). A generation of forestry and wildlife students were made more aware of natural forest values. The need for forest conservation planning was discussed at all possible levels and will continue to be discussed in future."

In January 1984, Alan moved to the Wildlife Institute of India in Dehradun where he worked for seven years as the FAO Specialist in Wildlife Conservation Planning and Habitat Management. His energy and inspiration produced another flurry of scientific papers together with his monumental work *A Biogeographical Classification of India*, which is now the most cited and used document in the field of wildlife conservation in India. Rodgers was the key architect in developing 'wildlife science' in India, and this fired up the Institute to train a vast array of competent biologists who are now contributing to the cause of conservation

across the globe. He also put together the Action Plan for Protected Areas Networks in a country with a far greater human population pressure than in East Africa. In addition, Alan helped pioneer a novel technique for preventing tiger attacks in the Sunderbans: by encouraging people walking in forests to wear 'face' masks on the back of their heads as tigers are less likely to attack if they think you can see them.

During his time in India, he continued to correspond with East African conservationists and scientists and in 1991 he returned to Tanzania to set up the UNDP / GEF Institutional Support for the Protection of East African Biodiversity. This was a \$10 million programme focusing on building awareness of - and institutional capacity to address - biodiversity issues. Following on from that and working with John Salehe, Robert Nabanyumya and Gertrude Lyatuu, in 1996 Alan became regional coordinator of the UNDP / GEF 'Cross-Border biodiversity project' as well as providing technical support on biodiversity projects in thirteen countries in east and southern Africa and helping to establish the Southern African Botanical Network (SABONET). Despite the considerable bureaucracy, Alan's infectious enthusiasm held strong and he sought every opportunity to get people out into the field to achieve real conservation gains.

Alan had a great talent for communicating. In addition to publishing over 100 scientific papers, he was an articulate speaker and compelling story teller. Balancing a beer on his sizeable *tumbo*, and with a scratch of his grizzled beard, he could captivate an audience with a mischievous anecdote. He was as comfortable talking to villagers as he was to heads of state, and his booming voice was usually the one to cut to the chase, expose the elephant hiding in the corner, and restore focus on the real business of conserving Tanzania's forests. His knowledge ran deep and wide, and he produced scientific papers on subjects as diverse as snow leopards, tigers, elephants, termites, gum copal, satellite imagery and the ivory trade. Peter Matthiessen described him as "the greatest living authority on the ecology of the miombo" but he was equally knowledgeable about Coastal Forests, primate ecology, and vegetation mapping as he was about the impenetrable workings of the United Nations.

During the 1995 national elections, Alan - together with a team of dedicated Tanzanian conservationists - developed a *Political Manifesto on the Environment*, and presented it to presidential

candidates. This was followed by a national workshop entitled 'Putting Environment on the National Agenda', which drew together the (then) President of Tanzania, Benjamin Mkapa and the small but growing number of environmental NGOs. This manifesto has been the foundation of subsequent environmental management efforts in the country.

In more recent years, as a senior UN consultant, Alan would often stay at the *New Africa Hotel* in Dar es Salaam where he would hold court to the stream of visitors who came to tap into his vast knowledge. He loved to tell stories of some of his youthful pranks including the time he was arrested for climbing the Askari Monument. Or of the time he was refused entry to the *Alcove* - at that time Dar's smartest restaurant - for not wearing a tie: Rodgers returned a few minutes later dutifully wearing a tie - but no shirt or trousers!

Retirement in 2006 saw Alan working harder than ever, continuing to provide support to UNDP / GEF and returning to his research roots with the International Centre for Research on AgroForestry (ICRAF). Ever ready to adopt good new ideas, Alan's last months were spent actively persuading and supporting his colleagues to get ready to operationalise recommendations from the Reducing Emissions from Deforestation and Forest Degradation mechanism (REDD). In January of this year, in nostalgic mood, and with pen in hand and flip chart before him he returned to his vocation as a teacher and gave a great number of Tanzania's leading foresters a down-to-earth introduction to REDD. Visibly moved, his pride in the cadre of Tanzanian foresters motivated to take on the challenge of conserving the forests, was obvious. Outside the meeting room, the towering edifice of the new Ministry of Natural Resources and Tourism building dwarfed the decaying wooden huts where he had begun his career: a tangible testimony to the changes that he himself had made happen.

Alan's energy was not limited to conservation. He was also a fine rugby player (a founding member of Nairobi's 'mean machine' team), an enthusiastic actor, a keen fisherman, and a generous and jolly host. He could be mischievous and did not suffer fools, ruthlessly editing documents and wielding his red pen to eliminate redundant prose and unsubstantiated claims.

In his last few months, Alan talked about some future priorities, including securing

the complete gazettement of Magomberera and of the Namatimbili forest. Of the latter he said: "Namatimbili is three times bigger than Pugu and much is described as Pristine!! Now that is exciting. We cannot let this go." He also warned of obstacles ahead: "We now have to face the challenge of Kidunda dam on the north-east corner of Selous (on Ruvu) and the probability of a dam on Steiglers Gorge in the middle of Selous!"

Let's hope that we are ready to take on those challenges and to continue to champion the survival of East Africa's extraordinary forests.

Alan had a quality that set him apart from the herd of people attracted to East Africa's magnificent wildlife and forests, and from those who have sought to become one of the Big Men of the region's conservation movement. Unlike many, Alan did not seek personal recognition nor self-aggrandisement. For him, it was all about conservation. To fulfil that aim he was always generous with his time and knowledge, fighting unceasingly for the conservation cause, even to the detriment of his health and wallet. It is to his credit that today there is a coherent and effective conservation movement in East Africa, and that so much of the Eastern Arc and Coastal Forests are now protected. There are still enormous pressures from a growing population hungry for natural resources, but the situation would be far more bleak today were it not for Alan Rodgers. He will be sorely missed.

He is survived by his first wife Bobbi Jacob and their daughter Aerin; his second wife Nicky Tortike and their two sons, Alexander and Christopher; and his partner Mercy Njoroge. His 3 children are now following his passion for East Africa and conservation.



Alan (far left) in Jozani Forest, Zanzibar in 2004 discussing the new national park which he had helped to establish



Assessing CEPF's legacy in the Eastern Arc Mountains and Coastal Forests of Kenya and Tanzania

Nike Doggart, TFCG and John Watkin, CEPF

Between 2004 and 2009 the Critical Ecosystem Partnership Fund invested US\$ 7 million in conservation-related projects led by Civil Society Organisations in the Eastern Arc Mountain and Coastal Forests of Kenya and Tanzania. CEPF is a joint initiative of l'Agence Française de Développement, Conservation International, the Global Environment Facility, the Government of Japan, the MacArthur Foundation and the World Bank. A fundamental goal is to ensure civil society is engaged in biodiversity conservation. Between 25th and 26th February 2009 almost 100 participants gathered in Dar es Salaam to assess CEPF's legacy and to chart a way forward for conservation initiatives in the region. The workshop was organised by the Tanzania Forest Conservation Group on behalf of the CEPF Coordination Unit.

The meeting was opened by the Minister for Natural Resources and Tourism, the Honourable Shamsa Mwangunga. In her opening address, the Minister acknowledged the contribution that CEPF has made towards helping communities to adopt more sustainable livelihoods; improving forest connectivity and to dramatically increasing our knowledge of the region's biodiversity. She recognised CEPF's commitment to supporting the national forest programme and in bringing together the Forest Departments of Kenya and Tanzania. Finally she challenged participants to create a joint vision of how best we consolidate the progress that we have made and move forwards.

In a response from the representative of the Director of the Kenya Forest Service, Mr Samson Njihia praised Tanzania for the reforms that have



Photo by Andrew Perkin

taken place in the forestry sector and thanked CEPF for bringing the Kenyan and Tanzanian Forestry Departments together. He requested the Honourable Minister to meet with her Kenyan counterpart and to try her hardest to secure more funds for the forestry sector.

Dr Felician Kilahama, the Director of Forestry and Beekeeping, emphasised that the workshop was not so much a final assessment, as a first assessment of what is needed. He threw out a challenge to the global community to work harder to help conserve Tanzania's magnificent forests and congratulated CEPF for the work that has been achieved and for the close cooperation with the Forestry and Beekeeping Division.

During the workshop the participants agreed that CEPF has made significant steps towards achieving the goals that it set out to achieve. Some of the successes that CEPF has contributed to include:



The Honourable Shamsa Mwangunga receives a personalised plaque from World Bank Senior Biodiversity Specialist, Kathy MacKinnon accompanied by Dr. Felician Kilahama, Director of Forestry and Beekeeping (centre) and John Watkin of CEPF. Photo by Andrew Perkin

1. 158,626 hectares were upgraded within the conservation estate with the gazettement of the Kilombero and Uluguru nature reserves by Tanzania's Forestry and Beekeeping Division.
2. The Udzungwa Mountains Ecological Monitoring Centre has been selected as one of the Tropical Ecology Assessment Monitoring (TEAM) field sites, a global network of tropical field stations, providing an early warning system on the status of biodiversity that can effectively guide conservation action.
3. Key corridors between the Udzungwa Mountains National Park and the Uzungwa Scarp Forest Reserve and the Selous Game Reserve have been identified.
4. Training has been provided to over 11,000 community members and 300 government staff on issues related to sustainable livelihoods and conservation.
5. 145 community micro grants have been given to community based organizations (51 grants in Kenya and 94 in Tanzania) totalling \$251,529 for actions that improved livelihoods and benefited natural resources. Through this grant scheme, community conservation was enhanced and this has strengthened the network of community-based organizations and improved governance.
6. Compensation payments to the 1,200 farmers affected by the gazettement of the Derema Corridor in East Usambaras have been paid in full and the gazettement process is well under way.
7. A Coordination Unit was created that represents a unique entity within the conservation community in Tanzania and Kenya. Importantly in terms of impact, this unit will continue as an interface with government and donors beyond the CEPF investment.
8. Stakeholder workshops to develop collective landscape plans for the Taita Hills, Kenya and the Udzungwa Mountains, Tanzania resulted in broad support among stakeholders for these plans.
9. Increasing connectivity between the forest fragments in the Taita Hills forests based upon the results of the landscape modelling work which ultimately led to the translocation of ten individual Taita thrush *Turdus helleri* from Mbololo to Chawia forest reserve supported by the National Geographic Society.
10. Surveys of 37 lesser-known forests have resulted in improved understanding of the biodiversity and the threats to these sites (21 of the lesser-known forests of the Eastern Arc Mountains and 16 coastal forests).
11. Threat status of 800 plants and 157 butterflies has been documented.
12. Developing a new teachers' resource manual for primary schools in Tanzania



Photo by Dorthe Frits Pedersen



that is also expected to be ratified by the Ministry of Education. This together with other tools and materials developed contributed to environmental communication vital for awareness, education and capacity building.

13. Discovery of at least 29 new vertebrate species including the Kipunji mangabey (*Rungwecebus kipunji*) and grey-faced elephant shrew (*Rhynchocyon udzungwensis*).
14. Increased global, national and local awareness on the conservation of the forests through a BBC World documentary; the establishment of a coastal forest website; world environment day events involving thousands of people including local artists living in communities close to the forests; and the distribution of printed materials on forest values, natural resource policies and linkages with climate change.
15. 26 students have been supported at Masters and Doctoral level in conservation-related studies which significantly contributed to capacity building of upcoming scientists and researchers, generating much-needed biological knowledge and creating linkages with the local academic and research institutions from which these students were drawn.
16. Leveraging \$3,728,338.29 in additional financial contributions toward conservation efforts in this region.

Participants were also taken on a virtual tour of projects in the Taita and Udzungwa Mountains through a documentary produced by Swedish

film maker Lars Johansson and commissioned by the Tanzania Forest Conservation Group for the workshop.

In light of what has been achieved with CEPF's support, participants identified six priorities for future conservation investment.

These are:

- Improving and scaling up support for initiatives that improve the livelihoods of people living close to the forests;
- Restoring forest connectivity in critical areas including completing the processes that have been started at Derema, Mngeta, Magombera and Taita;
- Communication, awareness raising and education;
- Securing sustainable finance through initiatives such as payments for environmental services, linkages with the private sector and easements;
- Capacity building, particularly for community based organisations;
- Monitoring building on the system developed by BirdLife and linking that system with other national and international monitoring schemes.

Some potential sources for funding were identified and include: CEPF consolidation funding, the Eastern Arc Mountains Conservation Endowment Fund, GEF, bilateral donors and the private sector.

The meeting was also attended by visitors from other hotspots including the Cape Floristic Region (South Africa), Caucasus (Armenia, Azerbaijan, Georgia, Russia and Turkey), Eastern Himalayas (Bhutan, India, Nepal) and the Western Ghats (India). In describing their impressions of the area, the visitors highlighted the exceptional levels of cooperation and partnership evident in the region.

Although CEPF's initial investment in the Eastern Arc Mountains and Coastal Forests of Kenya and Tanzania has come to an end, there is a possibility that the region will receive an additional grant from CEPF to consolidate the achievements that have been made so far.

For more information about CEPF's investment in the Eastern Arc Mountain and Coastal forests, please visit www.cepf.net or cepf.tfcg.org



The Eastern Arc Strategy – a way forward for conservation in the Eastern Arc Mountains

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EASTERN ARC CONSERVATION VISION

We envisage that the unique biodiversity values of the Eastern Arc Mountain forest ecosystems of Tanzania are conserved, sustainably managed and providing equitably shared benefits and services for local, national and international stakeholders

As regular readers of the Arc Journal will know, the Eastern Arc Mountains are an area of exceptional importance for the conservation of biological diversity and also provide many important ecosystem services for Tanzania. These services are primarily in terms of water provision (for drinking, industry, hydropower generation and irrigation), carbon storage in the trees and in

forest soils, soil conservation, timber and non-timber forest products, nature-based tourism, and pollination of agricultural crops. Furthermore the area is of critical importance in providing forest products both for local use and also for business. The importance of the biodiversity conservation of the Eastern Arc Mountain Forests is globally known in terms of richness of species both flora and fauna, conservation of endemic, rare and threatened species and conservation of the ecosystem itself.

These values are important for the world and for Tanzania and conservation is an important land management goal in the Eastern Arc Mountains that include more than 150 reserves owned and managed by government, parts of 5 Regions and 14 Districts, and hundreds of villages supporting tens of thousands of people.

How was the Eastern Arc strategy developed?

In order to better plan the conservation of this critical region of Tanzania, the Forestry and Beekeeping Division has been developing a holistic conservation strategy since 2004. Multiple stakeholder meetings have been held with village, Ward and District level representatives in all 16 Districts and five Regions. Technical meetings have also been held with various different sectors of government. Thousands of people, including representatives of villages and Ward leaders from across the Eastern Arc were involved with this process. These meetings have identified the key conservation issues in the Eastern Arc, and the strategies required to address them.



Photo by Michele Menegon

What are the Eastern Arc conservation targets?

Nine conservation targets have been defined in the Eastern Arc region – as follows:

*Target 1: by 2017, 100% of remaining *upper montane forest is effectively conserved*

*Based on baseline data from the period 1999 – 2003 the total amount of upper montane forest is around 23,085 ha (or 230.8 sq km)

*Target 2: by 2017, 100% of remaining *montane forest is effectively conserved and connectivity among major forest patches**is enhanced*

*Based on baseline data from 1999-2003 the total area of montane forest is around 200,053 ha (or 2,001 sq km)

**Ulugurus (Bunduki gap, Kitumbaku Hills), East Usambaras (Derema, Nilo-Kambai/Segoma), Udzungwas (Uzungwa Scarp to Matundu/Iyonde)

Target 3: by 2017, at least 80% of remaining sub-montane forest is effectively conserved*

*Based on baseline data from 1999 – 2003 the total area of sub-montane forest is around 102,668 ha (or 1,027 sq km) *Baseline data on the extent of montane grasslands of the Eastern Arc are not compiled.

Target 4: By 2017, representative samples of the montane grassland in the Eastern Arc mountains are effectively conserved.*

*Baseline data on the montane grasslands of the Eastern Arc are not compiled

Target 5: By 2017, representative samples of montane wetlands in the Eastern Arc mountains are effectively conserved.*

*Baseline data on the montane wetlands of the Eastern Arc are not compiled

Target 6: By 2017, the streams, rivers and wetlands of the Eastern Arc Mountain have stable hydrology (within the natural range) and water quality is within acceptable standards***

* baseline flow data are compiled within a consultancy report by University of Dar es Salaam

** few data are available on water quality trends in the Eastern Arc Mountains

Target 7: By 2017, all endemic species are effectively conserved.*

*Currently estimated as around 100 vertebrate species and at least 1,500 endemic plants.

Target 8: By 2017, wide ranging threatened species populations are either increasing or fluctuating within normal variation within the Eastern Arc region.*

* Elephant and Lion

Target 9: By 2017, the trade in Eastern Arc species is effectively controlled*

*Trade includes several species of chameleons, African violets, large beetles and cycads. It also targets specific species – such as Livingstone's turaco (*Tauraco livingstonii*), African sandalwood (*Osyris lanceolata*), khat (*Catha edulis*) and African cherry (*Prunus africana*).

What are the key threats impacting the Eastern Arc?

Threats are those issues, often human caused, that are impacting on the conservation targets identified above for the Eastern Arc Mountains. The prioritised list of threats in terms of their area (extent), importance (severity) and required actions (urgency) is presented below. This was developed through the various stakeholder workshops held over the three years of the strategy development process.

Threat	Extent	Severity	Urgency	Total
Uncontrolled fire	10	9	10	29
Conversion of natural habitats to agriculture	9	10	9	28
Illegal logging	7	7	6	20
Unsustainable collection of firewood and building materials	8	6	7	21
Inappropriate mining practices	1	8	8	17
Illegal grazing	4	4	5	13
Unsustainable hunting/poaching	6	5	4	15
Unsustainable collection for the pet trade	3	1	3	7
Unsustainable collection of medicinal plants	5	3	2	10
Invasive species	2	2	1	5

Key to the overall ranking of threat

Very High	
High	
Medium	
Low	



What needs to be done to tackle the threats?

A number of conservation interventions (termed strategies) have been identified in the Eastern Arc Mountains Conservation Strategy. These strategies have been designed to address the main threats that are impacting on the key conservation values of the Eastern Arc, as presented above.

*Gold Mining in the East Usambara Mountains has caused considerable damage to natural forest along streams.
Photo by: Nike Doggart*

The implementation strategies that have been identified to address the priority threats are as follows:

Main threat	Strategies identified	Comments
Uncontrolled Fire	Raise awareness of fire control	Fire destroys forests. Solving the fire problem requires concerted action at village, District, Regional and National levels.
Agricultural expansion and illegal grazing	Gazette upper catchment areas	Most forest is in reserves. Concerted action is needed by FBD to gazette proposed national Forest Reserves, by Districts to gazette proposed local authority Forest Reserves, and by villages to declare new Village Forest Reserves.
	Multisectoral collaboration	Weak sectoral coordination allows people into forests. A high level committee between Ministries aimed at concerted and coordinated action across the Eastern Arc.
	Land use planning at the village level	Some forest remains on village land and could be managed as Village Forest Reserves. However, most villages are not yet formally surveyed and do not have agreed land use plans where forest areas are set aside for sustainable use or conservation.
Illegal logging	Promoting the effectiveness of Participatory Forest Management (PFM)	PFM is a major strategy for conservation management in the Eastern Arc, involving local people in management of the forests. Although operational, it needs to be improved to deliver further benefits for people and for forest conservation, for example in controlling illegal logging.
	Promoting alternative economic activities	Logging is illegal in the Eastern Arc Mountain forests. However, illegal logging generates important revenue in some communities. Hence there is a need to provide alternative economic activities for communities to reduce the demand for logging income.
Unsustainable collection of firewood and building materials	Expand village land, community based, and private fuel wood plantations	Fire wood and building poles are a major use of natural forests in the Eastern Arc. Setting aside land for fast growing trees that are suitable for firewood and building materials could help take pressure off the remaining natural forests to supply these resources.
Illegal mining	Strengthen management capacity and raise awareness	Mining takes place in some Forest Reserves where it causes much damage. Mechanisms are needed to solve conflicts between miners and foresters.
Illegal hunting and poaching	Promote hunting control with PFM Agreements	PFM is a major conservation management strategy in the Eastern Arc mountains. If the prevention of illegal hunting could be included in the PFM agreements, it might be possible to better control hunting of rare animals.
Invasive alien species	Reduce expansion of invasive species	Non-native plants are invading Eastern Arc forests and grasslands, especially where there is a lot of human disturbance. Knowing the scale of the problem and starting to address it is increasingly important.
Unsustainable collection for pet trade	Situation Analysis and Education and Awareness	Endemic animals are collected from the Eastern Arc forest and sold to Europe, USA and the Far East as household pets. There are export quotas, but these seem often to be exceeded. Knowing if the pet trade has an impact on key species is becoming an important issue.

Main threat	Strategies identified	Comments
Reducing water quality and quantity	Water flow and quality	The Eastern Arc has national importance for providing water. Information on water flows and water quality is often old and unreliable. Refurbishing and maintaining the hydrological monitoring network, and gathering monitoring data is critical.
Insufficient awareness	Information, education and awareness	Conservation awareness is low in many parts of the Eastern Arc. It is important that people can make conservation decisions based on improved awareness of the values of the Eastern Arc and available management options.
Insufficient finance	Sustainable finance	Funding provided for management of the Eastern Arc is small and often comes from time-limited projects. A source of sustainable funding for management is critical if long-term forest conservation is to be improved.
Adverse climate change	Climate change mitigation	Climate changes are predicted to impact on Eastern Africa and may have dramatic negative consequences for the region. Most of the solutions lie beyond Tanzania's borders, but Tanzania needs to undertake conservation activities with due consideration of the potential climate change impacts.

How will the Eastern Arc strategy be implemented?

The implementation of this strategy is the responsibility of all those who helped in its development. This includes various Ministries, Departments within Ministries, communities, local government, local and international NGOs, and various research agencies. Each agency has a role to play, but this strategy calls upon the following to address the strategy in the following ways. The matrix below summarises the roles and responsibilities for the main stakeholders who can help implement the strategy.



Chief Kingalu and Dr Felician Kilahama (Centre) with journalists. Implementing the strategy is the responsibility of all stakeholders.

Stakeholder	Role	Resources required	Main outcome
District Councils	Incorporate fire reduction, tree planting, reserve management and improved agriculture elements of the Eastern Arc strategy into their District Development Plans	Normal district operational budgets and staff allocations, assisted by development partners where possible	Improved focus of Districts on issues of the highest conservation importance in the Eastern Arc mountains
Communities	Assist implementation of elements relating to forest and agricultural management of the Eastern Arc, specifically on PFM, fire reduction, village reserves and land use planning, alternative livelihoods, and reduction of illegal activities	Community time inputs, supported by Government and development partners funding	Improved forest conservation and livelihood opportunities at the local level.

Forestry and Beekeeping Division	Implement elements of the strategy relating to reserve gazettement (protected area network), reserve management (including management plans), and developing the role of communities through PFM	Government of Tanzania funds to the Forestry and Beekeeping Division and donor assistance projects to catchment forest management and participatory forest management	Improved protected area network in the Eastern Arc Mountains, improved protected area management and more equitable system of reserve management and the sharing of costs and benefits
Eastern Arc Mountains Conservation Endowment Fund	Consider adopting Eastern Arc strategy as a guiding document for the Eastern Arc Mountains Conservation Endowment Fund investment	Eastern Arc Mountains Conservation Endowment Fund has its own funding to allocate to good projects	Improved targeting of long term funding on issues of the highest conservation concern in the Eastern Arc
International and National Conservation non-governmental organisations	Assist the Forestry and Beekeeping Division and local government to implement elements of the strategy, such as Participatory Forest Management, protected area network, applied research, advocacy on illegal mining, sustainable financing and awareness raising	NGOs own funds from various sources	Improved forest conservation, improved information on the outcomes of forest conservation work, and improved collaboration between government and communities
Private sector	Assist with development of private reserves for natural forest conservation and for growing fire wood and poles for local use. Help develop sustainable funding mechanisms	Companies own resources	Improved supply of fast growing timber and poles to reduce demand from natural forest. Funding from water and carbon service provision to conservation managers
Academics	Answer key management questions on best ways to undertake conservation. Provide baseline and trend data for habitats, species, ecological services, livelihoods, governance and economic values	Own resources and project funds they raise	Managers have better idea of how to manage the Eastern Arc and the impact of their current management interventions

What next?

The Eastern Arc strategy is now completed and will be distributed during 2009. A summary will also be produced in Swahili. These two documents will provide the key ideas for what needs to be done to achieve long term conservation in the Eastern Arc. But these documents will not have the desired impact unless they are operationalised, and that will require further effort from the Forestry and Beekeeping Division and its partners. The work of implementing the strategy is now beginning and all stakeholders are urged to play their parts in that process.



Postgraduate student grantees from a CEPF programme meet to share their results

Paul Ndang'ang'a and George Eshiamwata, BirdLife International African Partnership Secretariat

A US\$ 200,000 investment made through postgraduate research has yielded several animal discoveries and substantial new knowledge on the state of nature and use of natural resources in the biodiversity-rich Eastern Arc Mountains and Coastal Forests of Tanzania and Kenya.

This was recently brought out when most of the 26 student beneficiaries of small research grants from the CEPF investment met up in a conference to share their research findings among themselves and with 50 other delegates drawn from the region. The conference, organised by BirdLife International and hosted by the Wildlife Conservation Society of Tanzania (WCST) was held on 27th February 2009 in Dar es Salaam. It was officially opened by Mr Joseph J. Kigula (on behalf of the Director of the Forestry and Beekeeping Division, Tanzania) who acknowledged the usefulness of the research findings from this programme in conservation planning.

The three best presenters were awarded prizes in recognition of their work. These were: *Faith Toroitich* (investigating plant-inhabiting mites with a focus to the family Tetranychidae), *Grace Ngaruiya* (assessing ecology of Golden-rumped Elephant-shrew in Kenya's North Coastal Forests) and *Elikana Kalumanga* (assessing abundance and diversity of small mammals in disturbed and

undisturbed forests in the Ulugurus). Results from the three revealed one remarkable commonality: the first discovered and documented two new species of mites, the second could potentially have discovered a new species of Elephant-shrew in Boni, Dodori Forest, while the third re-discovered the Ornate shovel-snout snake *Prosymna omatissima* in the Ulugurus after 80 years since its original discovery.

There were several other key highlights to the research findings. The research findings, covering 27 sites recognised as Key Biodiversity Areas, led to increased biological knowledge for various taxa, including plants, insects, mites, gastropods, birds, mammals, reptiles and amphibians. Important information for improving connectivity between fragmented habitats was derived – e.g. documentation of significant roles played by primates in forest dynamics and distribution of plants through seed dispersal. In terms of biodiversity linkages with livelihood improvement and provision of ecosystem services, several studies were undertaken. Local use of plant resources was quantified whereas the positive effects of Joint Forest management on forest conditions and livelihoods were documented in one of the Forest Reserves in Tanzania. Indeed it was also demonstrated that the presence of a forest positively affects honey yields for adjacent



Faith Toroitich receives award from Lota Melamari, the Coordinator of WCST

local communities in Arabuko-Sokoke Forest, Kenya – one more reason to conserve forests! Carbon storage in agroforestry systems was also assessed and the willingness to pay for improved irrigation water supply investigated in Morogoro (Tanzania).

The US\$ 200,000 was provided by the Critical Ecosystem Partnership Fund (CEPF) as part of its larger five-year (2004-2008) US\$ 7 million conservation investment in the Eastern Arc Mountains and Coastal Forests of Tanzania and Kenya (EACF). This 'sub-investment' went to a Small Grants Programme for Postgraduate Student Research in the EACF that was launched in October 2006. It supported research by Kenyan and Tanzanian postgraduate students. Students were meant to undertake research in the EACF that would contribute to the conservation of threatened species, generate information that contributes to Red List Assessments, or increase connectivity of

biologically important fragmented forest patches characteristic of EACF.

A total of 68 proposals were received of which 26 (from 21 Masters and 5 PhD students) were selected for funding after a thorough and transparent review process conducted by a team of experts from the Coordination Unit. According to the recent monitoring and evaluation report on the success of the programme, "This was 56% above the originally planned target of 16 grants." The programme was administered by the EACF Coordination Unit through the BirdLife Africa Partnership Secretariat and the BirdLife Partners in Tanzania and Kenya - WCST and Nature Kenya respectively). The Coordination Unit comprises BirdLife International (African Partnership Secretariat, NatureKenya and WCST), ICIPE, WWF-EARPO, TFCG and Dr Neil Burgess, a co-opted member representing WWF-US and CMEAMF.

"Grantees have made significant achievements through this programme and are challenged not to be complacent but pursue the highest academic levels and professional careers". - John Salehe, WWF Eastern Africa Regional Programme Office.

"There is a need for capacity building since no single state has developed without the critical mass of scientists and this is crucial for developing countries." - Dr. Hazell Shokellu Thompson - BirdLife International's Regional Director for Africa.

"The student grantees here are encouraged to conduct follow up work, share the results widely with site-based stakeholders including protected area personnel and communities" – John Watkin – CEPF Grant Director.

All grantees thanked CEPF, BirdLife International, NatureKenya and WCST and all CU members for the opportunity to translate their research ideas into practice.

"The overall finding of this evaluation is that BirdLife and her Partners have designed and effectively implemented an innovative and worthy programme that has achieved its short-term goal of strengthening human and institutional capacities to undertake research and implement development projects in biodiversity and conservation. Through the research findings of the grantees recorded to-date, the programme has also demonstrated high potential for realising the long-term objective of contributing significantly to the conservation of threatened species and sites by generating biological information and enhancing connectivity capacity in the EACF hotspot" Monitoring and Evaluation report for the Small Grants for postgraduate student research programme.

They appreciated the timing of the programme that came when they were facing difficulties in accessing postgraduate research grants. They recommended that additional funding be sought to undertake follow-up work and that the collaborative opportunity offered by this programme be utilized by forming networks. It was agreed that the results from the various research projects be compiled to contribute to biodiversity status and trends analyses reporting to global and national levels. All grantees were encouraged to disseminate their research results widely, especially through publication. To cap it all, Dr Mwangi Githiru gave some technical tips and guidance on effective presentation skills useful to the audience if they have to give talks at conferences in future.

The abstracts from this conference can be accessed via <http://cepf.tfcg.org> Summaries of several of the research projects were also included in Arc Journal 22 which is available at www.tfcg.org



New Nature Reserves in the Eastern Arc Mountains

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The Forest Act of 2002 provided for the creation of 'Forest Nature Reserves' under Tanzanian law. More commonly known as Nature Reserves, this category of reservation provides the highest level of habitat protection under the authority of the Forestry and Beekeeping Division. Nature Reserves have considerable management flexibility in terms of administration and finances, and can engage directly with external partners. Nature Reserves that have an approved General Management Plan can also make agreements that allow the use of the resources from the reserve by surrounding local communities through 'Participatory Forest Management' approaches, which gives them further flexibility as a management unit.

Tanzania declared its first Nature Reserve in the East Usambaras in 1997. The 'Amani Nature Reserve' was made up of a number of former Forest Reserves and some forests under private and village ownership. During the establishment of the Amani Nature Reserve the Forest Act did not include any provision for the establishment of a Nature Reserve and so the process was included in a special Government Notice. The performance of

the Amani Nature Reserve and experience gained through the process was later used to guide the revision of the National Forest Policy and later the National Forest Act. Building on this experience the Conservation and Management of the Eastern Arc Mountain Forests Project and the Forestry and Beekeeping Division have initiated the process of establishing other Nature Reserves

In order to make the application of the Nature Reserve status more systematic within the Eastern Arc Mountains region, and to use this status for those reserves that have the highest biological importance within this region, the Forestry and Beekeeping Division – with further support from the Global Environment Facility - held a Nature Reserves prioritization meeting at the Amani Nature Reserve in 2005. The results of this meeting suggested that the following reserves were of the highest biological values and should be considered as the next series of Nature Reserves within the Eastern Arc Mountains:

- Nilo Forest Reserve in the East Usambara Mountains (which ranked the highest in

terms of biological values compared to other Forest reserves in that mountain block according to available biological survey data)

- Uluguru North and Uluguru South Forest Reserves in the Uluguru Mountains (which are both sites of global biological importance)
- West Kilombero Scarp Forest Reserve in the Udzungwa Mountains (which abuts the Udzungwa Mountains National Park and may have higher biological values than the Park).
- Nguru South Forest Reserve in the Nguru Mountains (which recent biological surveys have shown to be of high biological importance)
- Uzungwa Scarp Forest Reserve in the Udzungwa Mountains (which has long been known as an area of high biological importance comparable with that of the Udzungwa Mountains National Park).

Those selected as priorities for immediate attention were Nilo, West Kilombero Scarp and Uluguru North and South (see Figure 1). The report can be found on www.easternarc.or.tz

Progress since 2005

Since 2005, the Forestry and Beekeeping Division, supported primarily by UNDP-GEF - but with some support from the WWF network and the Critical Ecosystem Partnership Fund - has been undertaking the work required to gazette these three selected areas as new Nature Reserves.

By 2008, all three of the sites had been gazetted as Nature Reserves, a major conservation achievement for the Eastern Arc Mountains region.

Details of the new Kilombero Nature Reserve

Kilombero Nature Reserve covers 134,115 ha and was declared on 17 August 2007 through Government Notice Number 182 JB Number 2525 and combines three former Forest Reserves in the Udzungwa Mountains of south-central Tanzania (Matundu, Iyondo and West Kilombero Scarp), which have now been revoked.

The new Nature Reserve has an altitude range of 300 – 2,600 m and habitats that include lowland forest, sub-montane, montane and upper montane forests, and large areas of montane grasslands and wetlands at higher altitudes. It contains populations of three endemic or near endemic diurnal primates, the newly described kipunji monkey *Rungwecebus kipunji*, the Iringa red colobus *Procolobus gordonorum*, the Eastern Arc endemic nocturnal primate *Galagoides orinus*, two endemic shrews (*Myosorex kahaulei* and *Congosorex phillipsorum*), two endemic birds (rufous winged sunbird *Nectarinia rufipennis* and the newly split population of Udzungwa Partridge *Xenoperdix udzungwensis*), and some near endemic amphibians and reptiles. Additional new species of birds and small mammals are reported by researchers but have not yet been described. Large numbers of plants in the forests and grasslands of the Reserve are also either

endemic to the Udzungwas or to the Eastern Arc Mountains. There are also significant and increasing populations of elephant within the Reserve, and antelopes such as Sable that form prey for populations of lion and leopard. Overall the species assemblage makes this new Nature Reserve the most important single site for conservation in the Eastern Arc Mountains, and slightly more important than the adjacent National Park.

Now that this reserve has been gazetted the priority for the Forestry and Beekeeping Division is to put the relevant infrastructure and staffing in place and to develop participatory management plans to enhance management of the area.



The Mountain galago is one of the Eastern Arc endemic species found in the Kilombero Nature Reserve. Photo by: M. Menegon



The Uluguru Nature Reserve is an important source of water for River Ruvu. *Photo by: Neil Burgess*

Details of the new Nilo Nature Reserve

Nilo Nature Reserve was declared on the 7th December 2007 through the Government Notice Number 234 with border map JB Number 2229 with registration number 30462 and is an

upgrading of status for the former Nilo Forest Reserve that had been gazetted in 1999. Nilo Nature Reserve is situated in Muheza, Korogwe and Mkinga Districts, Tanga Region and covers approximately 6,025 ha between 400 m – 1,506 m asl, encompassing lowland, riverine, submontane and montane forest. This site contains the highest levels of biodiversity of any of the reserves in the East Usambara Mountains, surpassing the importance of the existing Amani Nature Reserve.

Biodiversity surveys published in 2002 by Frontier Tanzania, indicate that the site supports nine East Usambara endemic plants, the rare birds (Usambara eagle-owl *Bubo vosseleri*, Amani sunbird *Anthrepetes pallidigaster*, Banded green sunbird *Anthrepetes rubritorques*), 4 reptiles shared with only one other site and 3 amphibians found only in the East and West Usambara Mountains. There is also high species richness in all taxonomic groups.

Details of the new Uluguru Nature Reserve

This Nature Reserve was gazetted on the 7th November 2008 through Government Notice Number 296 with registered Map Jb No 2541. It includes the former Uluguru North, Uluguru South and Bunduki I and II Forest Reserves and a strip of land in the Bunduki corridor (106.5 ha) that joins the three reserves. The total area of the Nature Reserve is 24,115.09 ha.

This new Nature Reserve supports more than 135 endemic species of plants, two endemic species of birds (Uluguru bush shrike - *Malaconotus alius* and Loveridge's sunbird - *Nectarinia loveridgei*), six endemic species of amphibians (*Hyperolius tornieri*, *Nectophrynoides laevis*, *Nectophrynoides cryptus*, *Nectophrynoides pseudotornieri*, *Scolecormorphus uluguruensis*, *Probreviceps uluguruensis*), two endemic species of reptiles (*Typhlops uluguruensis*, *Xyeledontophis uluguruensis*) and one endemic small mammal (*Myosorex geata*). Forty four Eastern Arc endemic vertebrates are also found in the Uluguru Mountains. Some species are confined to only one or other of these reserves. Many of these species are regarded as threatened with extinction (see www.redlist.org).

The Uluguru Nature Reserve and other reserves within the Uluguru range are also of critical importance for the provision of water to the Ruvu River, especially during the dry season. Water flows from the Ruvu have been declining in recent years and hence better protection for

the remaining forests in the watershed of this river might help reverse this situation and thereby improve the situation for millions of people in Dar es Salaam.

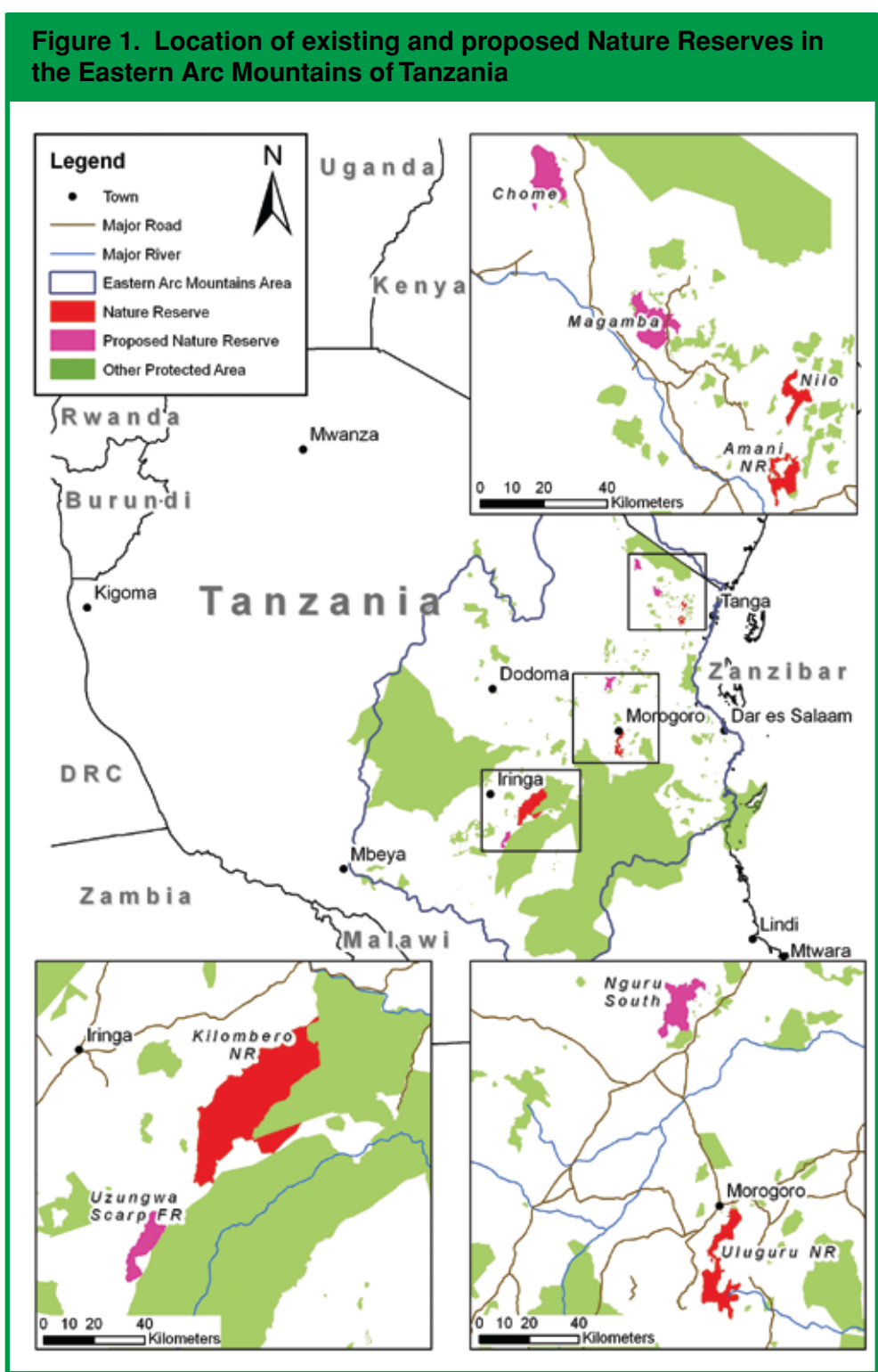
Other potential Nature Reserve sites

The Forestry and Beekeeping Division is in the initial stage of declaring Chome Forest Reserve, (Pare Mountains), Mt Rungwe Forest Reserve in south-west of the country near Mbeya and

Magamba Forest Reserve (West Usambara Mountains) as Nature Reserves. The Magamba Proposed Nature Reserve is part of the Shume-Magamba Forest Reserve that comprises the plantation forest Shume, and the Magamba natural forest. It will involve de-gazetting Shume-Magamba Forest Reserve and Gazetting Shume Forest Reserve and Magamba Nature Reserve. All of the three sites are important for biodiversity conservation and very important for providing critical ecosystem service functions. The eventual aim of FBD will be to have a network of the most biodiverse of the Forest Reserves of Tanzania elevated to the status of Nature Reserve and managed accordingly.

The establishment of Nature Reserves is being carried out over three phases. The first phase involved establishing the pilot site, Amani Nature Reserve. The second phase involved establishing Nilo, Uluguru and Kilombero Nature Reserves. Phase III will involve gazetting of Rungwe, Chome and Magamba Proposed Nature Reserves and the Fourth Phase will incorporate Uzungwa Scarp, Nguru and Minziro.

It is clear that the Forestry and Beekeeping Division has an enormous task ahead of it if it is to ensure proper conservation of the critical biodiversity and ecosystem services provided by these areas. Based on this fact, development partners, private sector, non-governmental organisations and Local Government authorities should support the ongoing move initiated by the Forestry and Beekeeping Division in order to ensure the sustainable conservation of the natural resources of Tanzania



The Eastern Arc World Heritage Site: Status of the Process

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What is 'World Heritage' : - *Cultural and natural heritage is among the priceless and irreplaceable assets, not only of each nation, but of humanity as a whole. The loss, through deterioration or disappearance, of any of these most prized assets constitutes an impoverishment of the heritage of all the peoples of the world. Parts of that heritage, because of their exceptional qualities, can be considered to be of "outstanding universal value" and as such worthy of special protection against the dangers which increasingly threaten them.*

The World Heritage Convention is managed by the United Nations Educational, Scientific and Cultural Organisation (UNESCO). It is a global convention signed by nations which encourages them to identify and propose their most important natural or cultural sites as 'World Heritage Sites' due to their 'outstanding universal value'. It then assists nations to manage these sites in ways that will maintain these values into the future, through the provision of technical expertise and the possibility to access some funding.

Tanzania already has four natural World Heritage Sites – Kilimanjaro National Park, the Selous Game Reserve, the Serengeti National Park and Ngorongoro Conservation Area. Their World Heritage Status has assisted them to become globally known and to receive funding and recognition to permit effective conservation management. Jozani National Park and Gombe

Stream National Park have also been on the tentative list of World Heritage Properties for Tanzania for a number of years, but the nomination process has not yet been completed.

The idea for the Eastern Arc Mountains World Heritage Site arose at the 'Eastern Arc Conference' – organized by TAFORI and held in Morogoro in 1998. After some delays, funding was obtained by the Forestry and Beekeeping Division from the Global Environment Facility to initiate the World Heritage application process. Since 2004, FBD has been actively promoting the concept of a natural World Heritage Site to encompass the globally unique and irreplaceable biological values that are found in the forests of the Eastern Arc Mountains. Considerable progress has been made, which we report here, and further work is required to complete this process.

What has been done?

In 2005 meetings were held within FBD and a core group of staff went on a study tour to learn about the World Heritage process in Tanzania. The same core group, including the authors on this paper, have continued to work on the World Heritage application for the Eastern Arc since that time. The Director of Antiquities who is the responsible authority for World Heritage issues in Tanzania has also been involved in supporting the process. During 2006 FBD developed the papers required

by UNESCO World Heritage Committee to have the Eastern Arc Mountains added to the 'tentative list' of World Heritage sites. This was accepted by UNESCO World Heritage Centre in Paris and in a letter to FBD dated the 16th January 2006 they confirmed that the Eastern Arc is now on the Tentative List of World Heritage Sites (criteria vii, viii, ix and x). See <http://whc.unesco.org/en/statesparties/tz>. It is anticipated that the nomination dossier will mainly focus on criteria ix and x.

During 2007 FBD prepared papers asking UNESCO for assistance to develop the Nomination Dossier and Management Plan for the Eastern Arc World Heritage Site. This application was accepted by the UNESCO World Heritage Centre in September 2007 and funding was provisionally approved. The relevant forms and a suggested timetable for the further work required were also provided at the same time. UNESCO released the first tranche of funds (20,000 USD) in January 2009.

During 2008, FBD also undertook an extensive programme of meetings with relevant government authorities in the Eastern Arc region, to seek their approval to nominate the Eastern Arc as a World Heritage Site. Key achievements have been:

- Four of the five regions covering the Eastern Arc Mountains (Kilimanjaro, Morogoro, Iringa, Dodoma) have endorsed the World Heritage Site idea.
- All District Councils (16) have endorsed the idea of an Eastern Arc World Heritage site within their boundaries: Mwangi and Same (Kilimanjaro Region), Lushoto, Muheza, Handeni, Kilindi, Mkinga and Korogwe (Tanga Region), Kilosa, Mvomero, Morogoro Rural, Morogoro Municipal, Kilosa, Mahenge and Kilombero (Morogoro Region) and Kilolo, Mufindi, (Iringa Region).



United Nations
Educational, Scientific and
Cultural Organization

In addition, Forestry and Beekeeping Division has provided some additional resources to the World Heritage process, which have allowed the process of

sensitisation and the approval through the relevant government bodies to continue.

Work planned to complete the World Heritage Application

FBD needs to undertake the following tasks to complete the World Heritage application for the Eastern Arc Mountains. Firstly, the Tanga Regional authority needs to endorse that part of the Eastern Arc Mountains within that region should be included in the Eastern Arc World Heritage Site. Secondly, there is a need to spearhead and supervise the process of completing the nomination dossier and to ensure prompt submission to UNESCO. The dossier needs to include details of the spatial extent of the site and the constituent Forest Reserves and Nature Reserves that make up the site. At a minimum this would comprise the existing and proposed Nature Reserves (Nilo and Amani Nature Reserves in East Usambara, the Kilombero Nature Reserve and Uzungwa Scarp proposed Nature Reserve in the Udzungwa, Uluguru Nature Reserve on the Ulugurus, Nguru South Forest Reserve on the Ngurus, Magamba proposed Nature Reserve on the West Usambara and Chome proposed Nature Reserve in Pare Mountains). The dossier will also need to include information that supports the Outstanding Universal values of the area (synthesis, criteria used and its universality, integrity) and it should also outline the Management and Conservation aspects of the site, including the management approach to be adopted.

Once UNESCO receives the dossier they will send it out for technical review and the Tanzanian Government will receive comments that they have to address. Assuming that UNESCO is satisfied by the replies then they will recommend the site being inscribed on the list of World Heritage properties at the next relevant meeting.

Typically the process of preparing the dossier, submitting it, receiving and addressing comments and having the property inscribed on the World Heritage takes a minimum of one and a half to two years.

FBD is committed to accomplish this process and has set aside some resources (although not adequate) for the task. However, it welcomes the assistance of interested agencies to make the World Heritage application process proceed smoothly and the site to be well managed once it is eventually declared.

16 species new to science discovered in the South Nguru Mountains

Michele Menegon, Trento Museum of Natural History and Nike Doggart, Tanzania Forest Conservation Group



Photo by: M. Menegon

Recent surveys in the South Nguru Mountains have recorded an extraordinary diversity of animals including at least 16 new reptile and amphibian species. The surveys were carried out by the Tanzania Forest Conservation Group, the Trento Museum of Natural History and Frontier Tanzania. Despite their proximity to the Morogoro – Dodoma highway the South Nguru Mountains had been neglected by biologists until surveys financed by TFCG and the Critical Ecosystem Partnership Fund were carried out between 2004 and 2006.

The surveys recorded 92 species of amphibian and reptile, of which 15 represent new records for this area, and 16 are species that are new to science. All of the new species are likely to be strictly endemic to the Nguru Mountains and some appear to be restricted to just a single forest.



New species of *Callulina* from South Nguru Mountains.
Photo by: M. Menegon

These results, documenting the high species richness and the outstanding number of putative endemics of the forests, strongly highlight the biological importance of the South Nguru Mountains and place them among the most important sites for the conservation of herpetofauna in Africa.



New species of *Nectophrynoides* from South Nguru Mountains. Photo by: M. Menegon

Pressure on the forests, particularly the lowland forests, remains high. The CEPF forest cover change analysis found that approximately 5.48 % of the forest was lost between 1990 – 2000 and rates of loss are much higher in the surrounding woodlands. Clearance of forest for agriculture, fire, timber harvesting and cardamom cultivation are all threats to the forest condition and forest area in the South Nguru Mountains.

Through a conservation planning process facilitated by TFCG between 2004 and 2006, a landscape plan was developed by local and national stakeholders. Since 2006, with support from the European Union, TFCG and CARE –Tanzania have been supporting the implementation of the landscape plan particularly in terms of establishing joint forest management and improving agriculture. Nguru South Forest Reserve has also been shortlisted for being upgraded to a nature reserve and has been proposed for inclusion in the Eastern Arc World Heritage Site (see articles in this edition of the Arc Journal).



VALUING THE ARC

Linking Science with Stakeholders to sustain Natural Capital

Shadrack Mwakalila, Neil Burgess, Taylor Ricketts, Nasser Olwero, Ruth Swetnam, Boniface Mbilinyi, Rob Marchant, Felix Mtal, Sue White, Pantaleo Munishi, Rogers Malimbwi, Celina Smith, George Jambiya, Andrew Marshall, Seif Madoffe, Brendan Fisher, George Kajembe, Sian Morse-Jones, Kassim Kulindwa, Rhys Green, Kerry Turner, Jonathan Green and Andrew Balmford

Ecosystem Services and ‘Natural Capital’

Readers of the Arc Journal will know that the Eastern Arc Mountains and the coastal forest region of Tanzania together represent a globally important biodiversity hotspot. In addition, this region is economically significant, both for the natural products provided to the wider economy of Tanzania but also as the primary resource for local people living around the forests. Previously the Arc Journal has outlined how critical the Eastern Arc Mountains are in the provision of water to hydroelectrical power generation plants, and also as drinking water to the coastal cities of eastern Tanzania. Aside from this essential resource provision to the citizens of Tanzania there is growing global concern about the impacts of forest removal on speeding up climate change and the importance of the carbon that is stored in natural vegetation, especially trees. Cutting trees removes this storage capacity as well as eventually releasing Carbon to the atmosphere in the form of CO₂ – a gas which is one of the major causes of global warming.

Collectively – issues such as the storage of carbon in trees, the regulation of water supplies, provision of non-timber forest products to local people, and the ecotourism opportunities provided by rare and endemic animals and plants – are known as ‘ecosystem services’. These services are provided by natural habitats, forming a base of ‘natural capital’ that supports our livelihoods and economy. Ecosystem services produced by this natural capital have economic values to people,

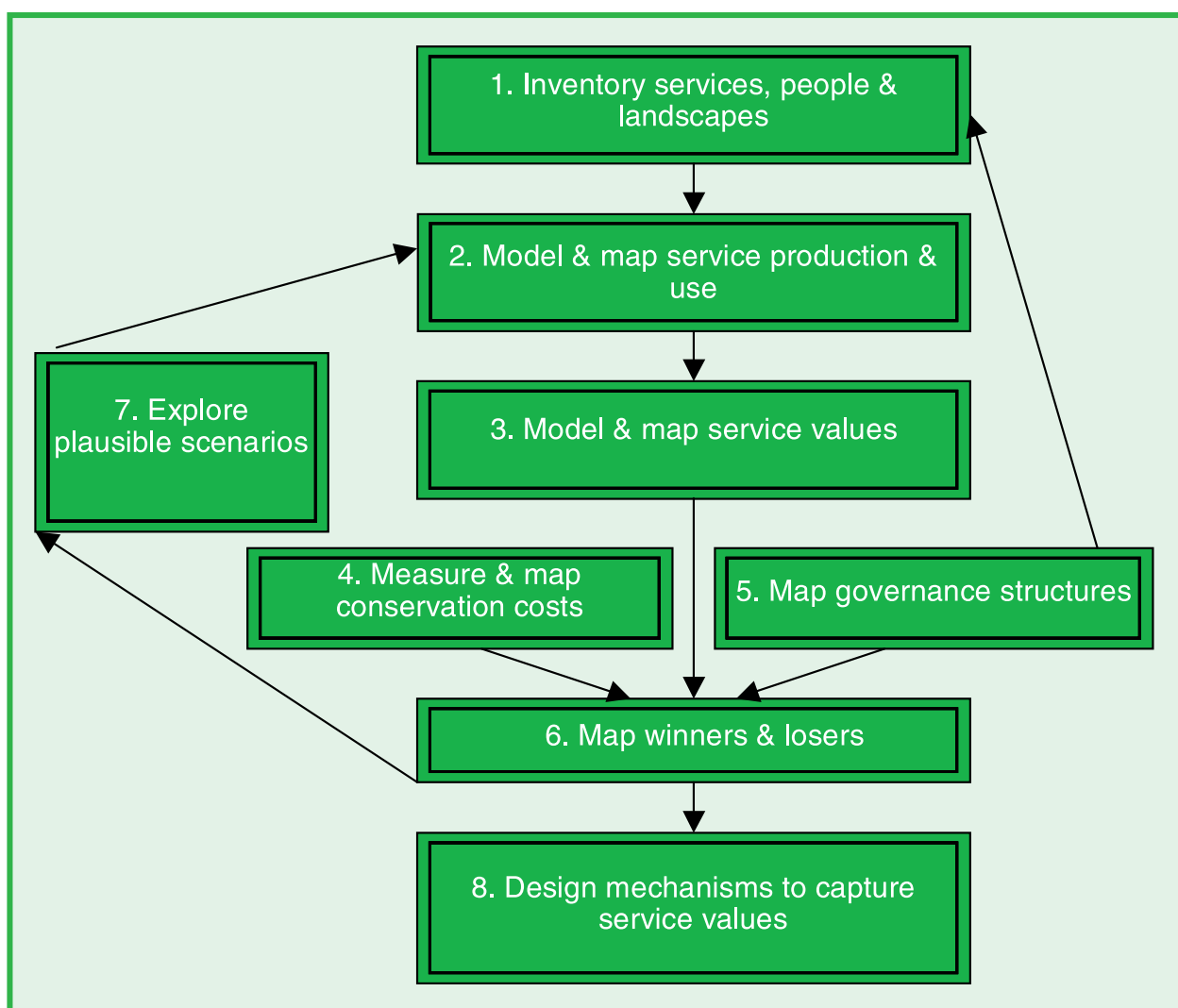
and these values can be estimated just as for other forms of capital, like dams or roads.

A major project of the United Nations, termed the “Millennium Ecosystem Assessment” (www.millenniumassessment.org) described in detail these ecosystem services and what they contributed to human wellbeing and the conservation of natural habitat. This groundbreaking work changed the way that many conservation and human development agencies saw their work, and made it evident that human development in many countries is dependent on natural resources and the services that nature provides freely for human use.

The Valuing the Arc Programme

The Valuing the Arc Programme was established as a collaboration between UK and Tanzanian Universities and the WWF network in the form of WWF USA and WWF Tanzania. The aim of the Valuing the Arc programme is to map ecosystem services derived from the Eastern Arc Mountains and surrounding areas, work out where these services are used, and place a value on the service to Tanzania, and in some cases to people living far away from Tanzania. The project has started by mapping and valuing present service provision in Tanzania today, but critically, we are trying to quantify potential future flows under two plausible development futures; one a hopeful future where Tanzanian development policies are working, and another where life continues on its current path (the ‘business as usual scenario’).

Figure 1 - Conceptual model that explains the process that the Valuing the Arc programme is following within the Eastern Arc region of Tanzania



Valuing the Arc is working on the following ecosystem services: a) carbon storage in natural habitats of eastern Tanzania, b) water provision within river basins draining the Eastern Arc Mountains, c) the provision of timber and non-timber forest products from natural habitats, d) ecotourism opportunities provided by mountains and their forests, e) pollination of crops by wild bees and other insects living in natural habitats. At the same time the programme is also mapping biodiversity priorities across the region, based on a compilation of existing data, and is trying to look at the economic values of the ecosystem services and the costs of conservation. More detail is provided on www.valuingthearc.org.

Progress so far

The Valuing the Arc programme lasts for 5 years, and has been working in Tanzania since January 2007. Over the first two years the programme has developed collaborations among institutions

in Tanzania, the UK and the USA. Three PhD and seven Masters students, supported by 20 professional scientists are now working on the programme. Linkage to the policy process in Tanzania and globally is provided by the WWF network, particularly in Tanzania through the Policy Programme of the WWF Tanzania Office.

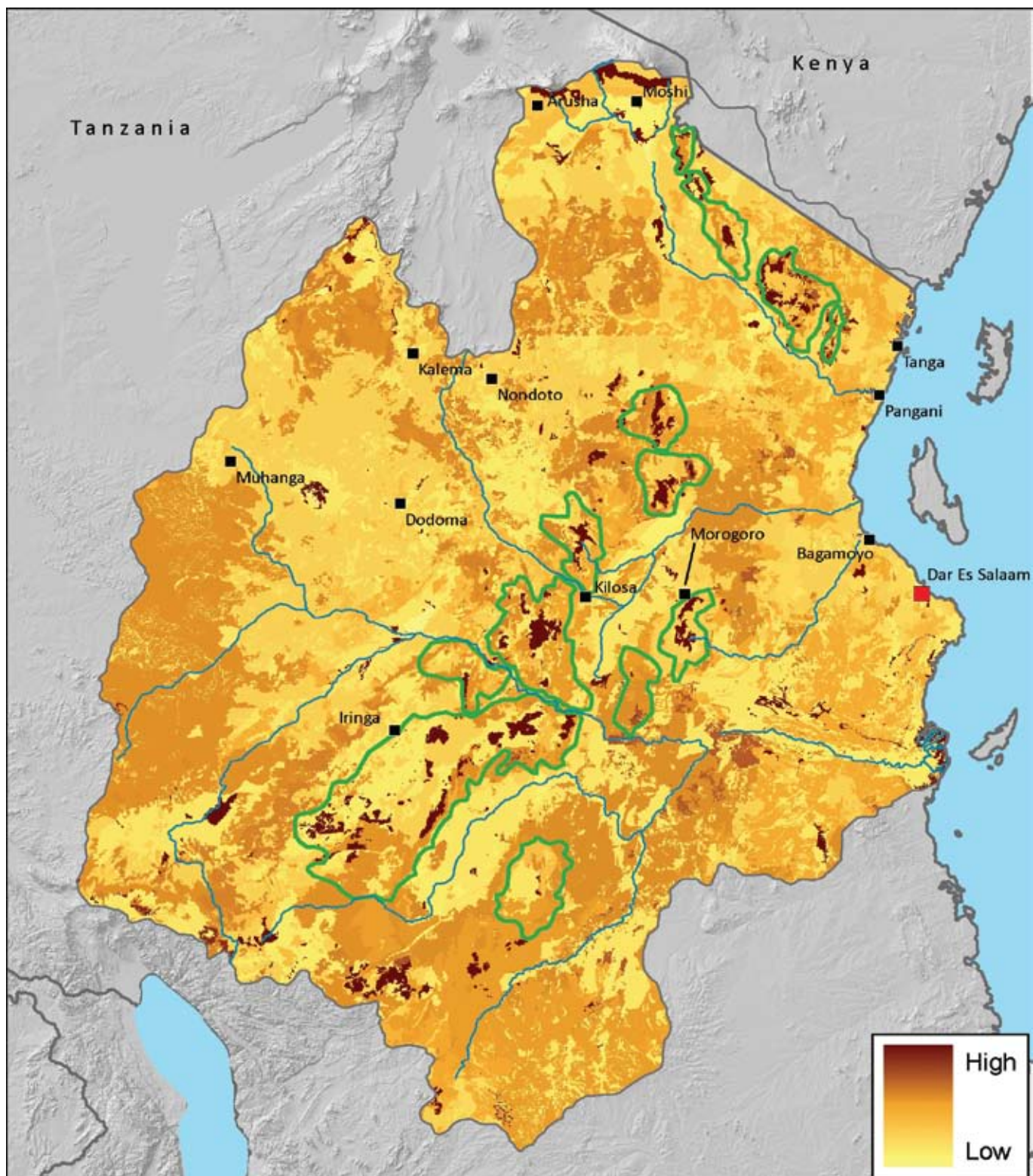
Over the past year the collaborations have started to produce some important results that are relevant to conservation in the Eastern Arc and Coastal Forests regions of Tanzania. Some of the questions we are using these results to address are outlined below.

How much carbon is stored in eastern Tanzania?

We have used maps of land cover and data on carbon storage in vegetation and below ground, to develop simple tables and preliminary maps (see Figure 2) of the amount of carbon stored in eastern Tanzania. These preliminary data suggest that lowland swamps and mangroves contain the

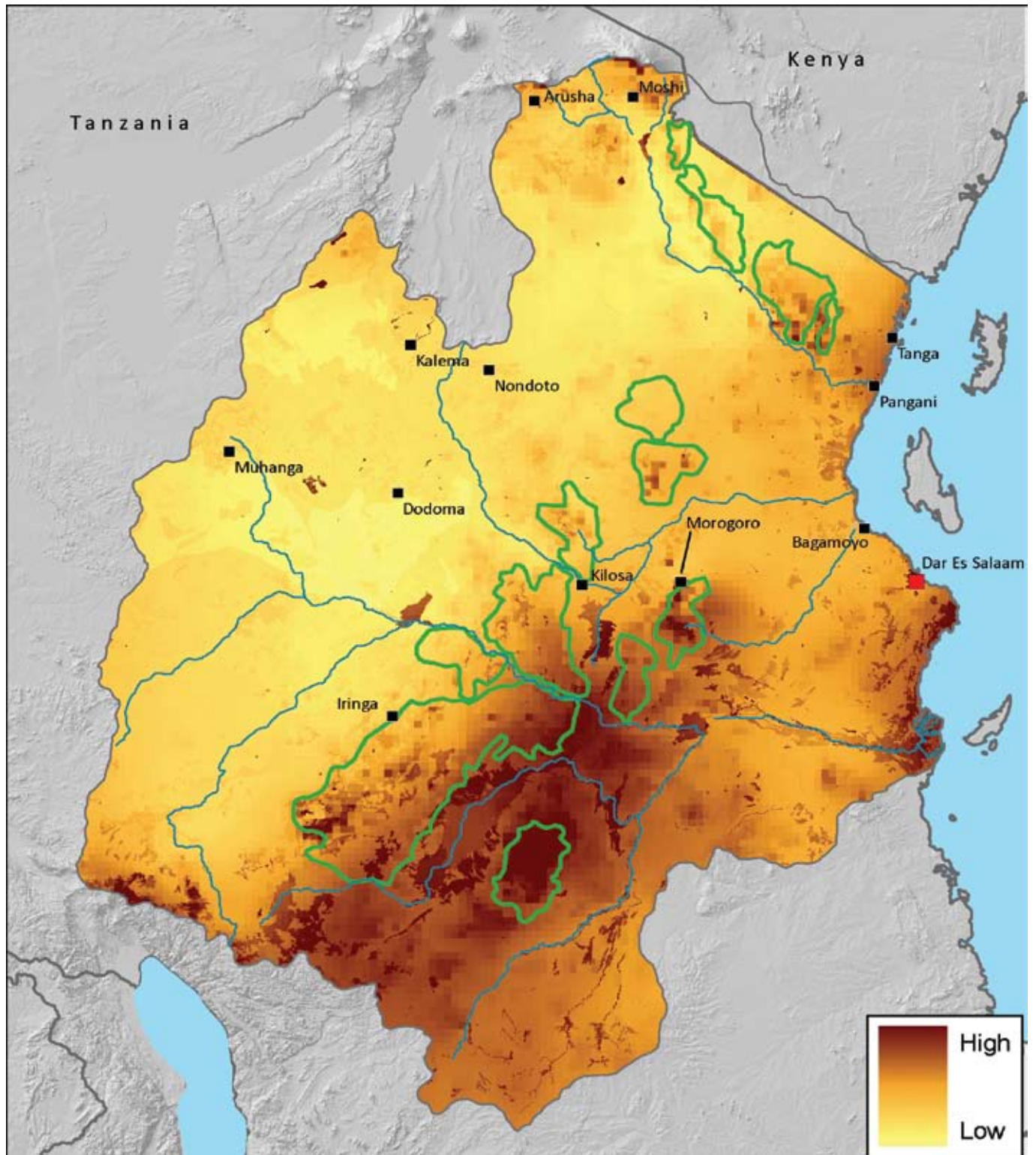
highest density of stored carbon (over 600 tons carbon per hectare, mainly in the soil), followed by forest habitats in the Eastern Arc Mountains (up to around 300 tons carbon per hectare, mainly above ground). Looking at the protected area network it appears that around 35% of the carbon is within protected areas, with the highest density found in Forest Reserves and Nature Reserves managed by the Forestry and Beekeeping Division. The largest unprotected carbon stores are found in wetlands, and in unprotected forest habitats, mainly on the Eastern Arc Mountains.

Figure 2 – Map of carbon storage in eastern Tanzania. The darker the brown colour of an area the greater the amount of stored carbon. Outlines of the main Eastern Arc Mountains are also shown, extending from the North and South Pare Mountains in the North west, to the Udzungwa and Mahenge Mountains in the south.



Where are the most important areas for water supply? Our initial maps of water runoff indicate that there are three different types of landscape important for water provision (Figure 3). The first and most important areas are the large wetlands – for example the Kilombero Valley to the south of the Udzungwa Mountains and the Mkata wetlands to the north of the Mikumi National Park – which are seasonally inundated swamp areas. Secondly the Eastern Arc Mountain peaks are also significant sources of water, especially those peaks closest to the Indian Ocean – such as the Ulugurus, East Usambara and Udzungwa ranges; thirdly the coastal area adjacent to the Indian Ocean is also highlighted as an area of water provision. Inland of the Eastern Arc Mountain range the water yield is particularly low and these areas experience water shortages for large parts of the year.

Figure 3 – Map of water yield in eastern Tanzania. The darker the brown colour the higher the annual yield of water from that area. Eastern Arc Mountain blocks are marked in green outlines.



How can we make these results useful to support the policy process in Tanzania? We believe that our results are already useful to the Tanzanian policy process, in particular to the emergence of large internationally funded collaborations that are looking at reducing carbon dioxide emissions from deforestation and degradation of forest habitats. A decision at the thirteenth meeting of the United Nations Framework Convention on Climate Change (UNFCCC) in Bali in 2006 made it clear that forest carbon would be included in the re-negotiation of the Kyoto protocol. This decision recognised that 20% of global CO₂ emissions came from forest destruction and degradation, and that paying to keep forests standing might be one of the cheapest ways to reduce CO₂ increase in the atmosphere and hence slow global warming.

The proposed mechanism to assist the reduction of CO₂ emissions from forests is titled 'Reduced Emissions from Deforestation and Degradation'. The final steps in the re-negotiation of the Kyoto climate agreement will take place at the

Copenhagen climate change conference in 2009. Tanzania is one of the countries selected to pilot potential REDD mechanisms, even before the Copenhagen agreement is finalized. For example, the Norwegian government has approved a 100 million US\$ grant for the implementation of REDD in Tanzania. There is also considerable interest from other nations, the United Nations and the World Bank

Plans for the coming years. The Valuing the Arc programme aims to complete its mapping of ecosystem services in the Eastern Arc Region by the end of 2009. At the same time as mapping the distribution and flow of services, there will be an analysis of the values of the various services. This provisional analysis will be refined in 2010, leading to the main outputs by 2011. All the work is being done as a collaboration between UK and Tanzanian Universities, and the WWF network. It is hoped that this work will provide guidance for policy development in Tanzania and be an example of the kinds of work that might be possible, and useful, in other countries.





Biofuels, Land Tenure and Rural Livelihoods in Tanzania

By Emmanuel Sulle, Tanzania Natural Resources Forum

This study was carried out from October, 2008, through March, 2009, as a joint undertaking between the Tanzania Natural Resource Forum's Forestry Working Group (TFWG) and the International Institute for Environment and Development. The TFWG is a collaborative working group of civil society member organizations that are all involved in efforts to improve the governance of forests and other natural resources in Tanzania.

During the past several years, biofuels in rich countries have come to be regarded as an important option for reducing consumption of petroleum, in order to achieve policy goals related to recent high oil prices, energy security concerns, and global climate change. For African countries, this is leading to growing interest from western and

Biofuels are broadly defined as liquid, solid or gaseous fuels that are predominantly or exclusively produced from biomass. The main types of biofuels include biodiesel, ethanol, or purified biogas derived from crops, plant residues or wastes. All of these can be used as a substitute or supplement for the traditional fossil fuels used for transportation, domestic, and industrial uses.

Asian private investors in biofuels projects, as well as growing support from development partners for incorporating biofuels into government policies and development plans. For African countries which are non-oil producers, biofuel production has the potential to provide a substitute for costly oil imports which are one of the major uses of foreign exchange and sources of inflation in African economies, and to provide a new source of agricultural income in rural areas.

External interest in biofuel production in African countries is driven largely by the low cost of land and labour in rural Africa. Investments are targeting many areas of land that are perceived as being 'unused' or 'marginal' in terms of their productivity and potential. With interest in allocating such areas for biofuel increasing, the security of land tenure and access or use rights on the part of local resident communities across rural African landscapes potentially at risk. In addition, expansion of biofuels production may lead to other negative impacts such as environmental damage, for example due to deforestation or industrial pollution, and indirect impacts from rising food prices where food crops are cultivated for biofuels production.



Bioshape saw mill for processing timber from coastal forests on their farm



Timber harvested from Bioshape jatropha farm

At the same time, however, there is also the potential for biofuel production to provide new economic and livelihood opportunities for rural farmers. Biofuel crops such as oils (palm, coconut, jatropha, sunflower) may provide important new opportunities for improving the returns on agriculture, including from relatively unproductive or infertile lands.

In order to realize such gains, it is important to develop public policies as well as private investor 'best practices' which support business models based around smallholder production. It is also essential to develop public policies and investor guidelines which safeguard rural communities' and smallholder farmers' rights in land in order to mitigate the potential negative impacts of the new 'scramble' for land driven by biofuels investments.

Tanzania is one of the African countries that has seen a rapid increase in biofuel production and

investment proposals during the past few years. To date, a total of 640,000 ha of land have been allocated for biofuel investments, with approximately 4 million ha requested by investors. Projects call for capital outlays of up to \$1.5 billion, thus attracting considerable attention from Tanzanian policymakers. A number of biofuel projects have been initiated during the past few years that involve highly capitalized foreign investments and have affected large numbers (e.g. 5,000-10,000) of local people by leading to the alienation of their rights over customary lands. Some of these, such as the project at Kisarawe, outside Dar es Salaam, have attracted local and international media coverage and led to growing concern within the public and civil society as to the environmental and social impacts of expanding biofuel investments. This concern is compounded by the limited planning, inter-sectoral coordination, and policy provisions governing biofuels investment in Tanzania at present.



Jatropha planted along road in Riloda Village Babati District



Local oil palm farm in Kigoma, Photo by: E.Sulle

Table 1: Summary of existing and proposed (pipeline) biofuel investments in Tanzania.

Investor	Crop	Location	Land Area Acquired (ha)	Land Area Requested (ha)	Project Status
FELISA	Oil Palm	Kigoma	4,258	5,000	Land dispute in court for extra 350 ha obtained from 2 villages. No EIA done.
BioShape	Jatropha	Kilwa	34,000	82,000	400 ha pilot farm planted. Integrity of EIA questioned
Sun Biofuel	Jatropha	Kisarawe	8,211	50,000	8,211 ha of land formerly belonging to 12 villages transferred to general land; finalizing derivative title.
SEKAB BT	Sugarcane	Bagamoyo	22,500	24,500	Seed cane planted and irrigation reservoir constructed
SEKAB BT	Sugarcane	Rufiji	0	400,000	In land acquisition process.
Diligent Tanzania Ltd	Jatropha Croton megalocarpus	Arusha Babati Handeni Singida Monduli Arusha	n/a	n/a	Contracted over 4000 farmers Producing Jatropha vegetable oil in its factory in Arusha Recently collecting seeds from already existing trees in Arusha
Donesta Ltd & Savannah Biofuels Ltd	Jatropha	Dodoma	2,000		200 ha planted
Trinity Consultants/ Bioenergy TZ Ltd	Jatropha	Bagamoyo	16,000	30,000	Surveying land to be granted
Shanta Estates Ltd	Jatropha	Bagamoyo	14,500		Agreement with villagers signed
Tanzania Biodiesel Plant Ltd	Oil palm	Bagamoyo	16,000	25,000	Land not surveyed; land granted by district but not by TIC
Clean Power TZ Ltd	Oil palm	Bagamoyo	3,500		Project abandoned after realized high cost of doing land use plans.
CMC Agriculture Bio-energy Tanzania	White sorghum	Bagamoyo	25,000		Land request approved but asked to do land use plans
ZAGA	Jatropha	Kisarawe		Undisclosed	Applied for land
African Green Oils	Oil palm	Rufiji	860		Planted 360 ha and financing land use plans in 7 villages
InfEnergy Co. Ltd	Oil palm	Kilombero	5,818		Land lease pending. Cultivating rice while growing oil palms.
Bio Massive	Jatropha & Pangamia	Lindi Region	50,000		
JCJ Co. Ltd.	Jatropha	Mwanza Mara Shinyanga Tabora			Aimed to sensitize local communities but project abandoned due to alleged lack of govt support
African Biofuel and Emission Reduction Co. TZ. Ltd.	<i>Croton megalocarpus</i>	Biharamulo	20,000		No operational progress due to lack of funds.
Prokon BV	Jatropha	Mpanda	10,000		Contract farming with 2000 smallholders; do not own plantation land
Mitsubishi Corporation	Jatropha	Arusha Dar es Salaam Coast			Looking for land in these regions
Kapunga Rice Project	Jatropha	Mbarali District	50,000		Planned to replant rice with Jatropha by developing Jatropha seeds; President recently ordered no rice replacement in the area.
DI Oils Tanzania Ltd	Jatropha				Abandoned plans for Tanzania
Kikuletwa Farm	Jatropha & Aloe vera	Kilimanjaro	400		Growing Jatropha

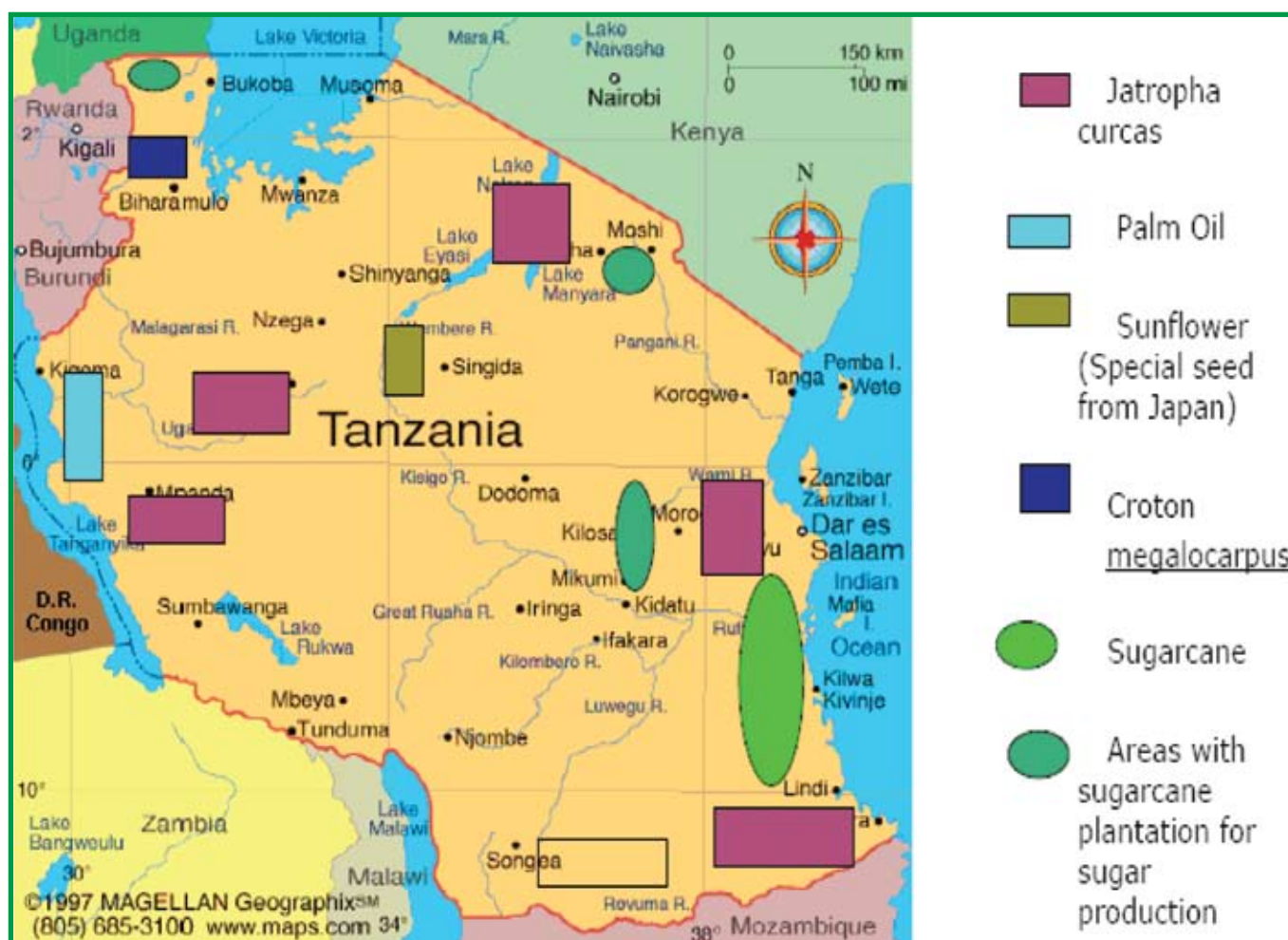
Source: Field data October 2008 - March, 2009; Kamanga, 2008; Kulindwa, 2008; Songela and Maclean, 2008

At present the main crops used for producing biofuels in Tanzania are oil palm and jatropha. Sugarcane is widely cultivated in Tanzania to produce sugar, and now several proposals have been developed to extend sugarcane cultivation to biofuel production.

In April 2006, the government, through the Ministry of Energy and Minerals (MEM), formed a National Biofuels Task Force (NBTf) with responsibility for creating an enabling policy and regulatory environment for the production and use of biofuels. The NBTf comprises 11 government agencies, Ministries, and executive offices, as well as two private sector representatives. Since its convening, NBTf has been crafting a biofuel policy for Tanzania that can guide developments and investments. It produced initial biofuel production guidelines in August, 2008. Following stakeholder consultation, a new draft biofuels guidelines was released in November 2008. Currently the guidelines and all other biofuels matters have been discussed by the cabinet secretariat and are awaiting the cabinet's approval to pave the way for future development of the biofuels sector. It is where companies are seeking to acquire large

areas of village land that skepticism about the relative costs and benefits of biofuel investments are most warranted. Several fundamental problems are evident from experiences thus far and may be difficult to avoid in business models that require such transfers or alienations of large areas of land currently under village authority.

First, the transfer of land from village to general land has the effect of extinguishing customary rights over that land, and basically removes these areas and their natural resources from the village domain in a permanent manner. In addition the compensation process is fraught with a number of basic problems including variations in the procedures for determining compensation and situations in which villages may not fully understand the implications of relinquishing customary rights over large areas of village land, and marginalized members of the community may have limited opportunity to influence decisions. Some analysts have recently highlighted the importance of third-party mediation in negotiations between villagers and investors and the biofuel guidelines recently proposed by WWF advise that investors should rely on district officials for land



allocations rather than negotiating directly with villagers. While impartial third-party facilitation, particularly in terms of advising villages on their legal rights with respect to land and resources, would undoubtedly aid the process in some cases, care should be taken with regards to the role of different institutional actors. In Kilwa, the outcome of compensation negotiations appears to be that four villages have transferred large areas of their village land to the investor, Bioshape, but the majority of compensation payment made has gone to the district rather than the villages. While it is understandable for district governments to seek direct revenue streams from large-scale foreign investments, such income should not serve to displace village-level compensation payments since it is the villages which are losing rights over and access to land. Districts are not landholding bodies or land managers according to the Village Land Act, and paying districts directly may do little to mitigate the negative impacts of lost village level land access.

While certain actions, such as training villages with regards to their land rights and the economic implications of land transfers, may improve the compensation process, the transfer of large areas of land from village authority to the TIC to foreign investors will inherently be subject to conflicts of interest and information asymmetries between the various parties. Compensation, in these cases, will often be inequitable or questionable, and it will in any case be difficult to fully evaluate the impacts of these transfers until many years have past.

A core conclusion from this report is therefore that large-scale biofuel investments that require transfer of village lands to general lands are inherently subject to problems of equity, transparency, and difficulty in evaluating the distribution of costs and benefits. These types of biofuel investments are likely to create the most frequent negative local impacts and grievances. Such investments should therefore be approached by government officials, NGO's, and investors themselves with considerable caution. This is doubly so given that there are numerous market uncertainties surrounding biofuels at present, and alternative production and investment models exist.

Some companies, such as SEKAB BT, appear to be now considering alternative land holding structures such as village land trusts or equity-based joint ventures. Such developments are promising and creative collective thinking between private, public, local, and civil society groups on ways to stimulate private investment in biofuels while at the same time safeguarding long-term local rights in land is essential. Experiences in Tanzania in other sectors demonstrate that such synergies are possible, such as the private-village joint ventures that have been established for nearly twenty years to govern tourism companies' access to village lands in parts of northern Tanzania (Nelson, 2004). These ventures also demonstrate that villages can be the most effective negotiators on their own behalf, provided they are given access to information on key legal and market issues.



Women boiling palm oil ready for milling locally, Photo by: E.Sulle



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About the Tanzania Forest Conservation Group

The Arc Journal is published by the Tanzania Forest Conservation Group (TFCG). Established in 1985, TFCG is a Tanzanian non-governmental organisation promoting the conservation of Tanzania's high biodiversity forests.

TFCG's Vision

We envisage a world in which Tanzanians and the rest of humanity are enjoying the diverse benefits from well conserved, high biodiversity forests.

TFCG's Mission

The mission of TFCG is to conserve and restore the biodiversity of globally important forests in Tanzania for the benefit of the present and future generations. We will achieve this through capacity building, advocacy, research, community development and protected area management in ways that are sustainable and foster participation, cooperation and partnership.

TFCG supports field based projects promoting participatory forest management, environmental education, community development, advocacy and research in the Eastern Arc Mountains and Coastal Forests. TFCG also supports a community forest conservation network that facilitates linkages between communities involved in participatory forest management. To find out more about TFCG please visit our website www.tfcg.org.

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