

**WORKING PAPER 22**

**CONSERVATION IN THE EAST USAMBARA MOUNTAINS**

**- A PARTLY ANNOTATED BIBLIOGRAPHY**

**Stig Johansson**

**September 1997**

# **East Usambara Catchment Forest Project**

## **WORKING PAPER 22**

### **CONSERVATION IN THE EAST USAMBARA MOUNTAINS - A PARTLY ANNOTATED BIBLIOGRAPHY OF SELECTED PUBLISHED AND NON-PUBLISHED MATERIAL**

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## PREFACE

There are places that are known, and there are places which are extremely well known. The East Usambaras, and especially Amani, belongs to the latter. Since the accounts of mid-19th century explorers, such as Richard Burton and John Speke, an ever growing number of documents and studies have been made on the East Usambaras. A major reason for this was the establishment of the Biologisch-Landwirtschaftliches Institut in Amani in June 1902. The institute, which eventually became the East African Agriculture and Forestry Research Organisation during the British colonial period, was the main centre for systematic research activities in East Africa for a long time. Over the years a wealth of information has been acquired and it is important not to loose this information but rather make it available for the present.

Many times, especially in the implementation of development interventions, the wheels are continuously re-invented. This cannot be avoided all together, because it is in the nature of the human mind to be more concerned with the present and the future rather than to dwell on the past. Nevertheless, in a project with the aim to conserve the East Usambara forests it is of utmost importance to keep track of the past, if not for anything else, at least for the sake of the history of biological, agricultural and forestry research in East Africa, and Amani in particular. - We are not only conserving the forest, we are also working in the spirit of so many who made a contribution to the understanding of the forest ecosystem of the East Usambara, and we are one in the chain of this long-term effort to preserve some of the most interesting forests in Africa.

The collection of this partly, still very much partly indeed, bibliography set out because of the reasons above. I though, and do think, we need to know and use what already is known about the place in order to be able to understand why we are where we are, and secondly in order to be able to plan the future based on what we know from the past. A considerable effort has been made to actually acquire the listed documents, and the work is still on-going (probably a never ending task). The purpose of this is to serve those who work with conservation of the Usambaras, and to serve those researchers who visit the area for various studies. Most of the material, except those marked “not available”, are found in the project library and will eventually be found in the Amani Nature Reserve Information Centre at Sigi, and finally at the Amani Nature Reserve HQ in Amani in the future.

I hope the collection is useful, and I really hope that those who have material which is not included would let us know and let us have a copy so that eventually we would have a rather complete collection of the work in the East Usambara.

Stig Johansson  
Chief Technical Adviser

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This study presents a history of ecological change in northeastern Tanzania's Usambara mountains during the late pre-colonial, colonial, and early independence periods. The thesis considers long-term changes in the interrelationships among the region's local agrarian communities, the regional environment, and the exogenous forces of the world economy and the colonial state. It explains under what circumstances indigenous communities alter land management practices and social relations in the face of changing market forces, environmental uncertainty, and political transformation. Moreover, by carefully collating data collected from interviews with African informants with those of the European documentary sources, this analysis demonstrates how Usambara's inhabitants' changing relationship with nature led to ecological stress. The study adds to the scholarship on ecological stress and breakdown by describing a century of ecological change on a Tanzanian mountain massif where pastoralists and farmers exploited 3 ecological zones differentiated by vegetation and climate. In this varied environment, mountain-based (1600m el.) pastoralists, who during the eighteenth and nineteenth centuries carved out a mode of production dependent on forest conservation, had, by the 1960s transformed themselves into farmers on a completely deforested landscape. In precolonial times, their neighbors, who lived in permanent villages sited down slope at about 1400m, had cultivated bananas, sorghum and various legumes in well-watered mountain basins ringing the Usambara massif. In response to the opportunities and challenges of the slave trade and later, colonialism, these farmers continually reorganized both production systems and their choice of cultigens. Moreover, on the semi-arid plains below the mountain escarpments, where a patchwork of forest, pasture and gardens dotted the landscape in 1850, agribusiness plantations dominated by the 1940s. Thus, by Tanganyika's independence in 1961, not only had the precolonial socioeconomic links among the pastoralists and cultivators been broken, but the mountain population had become increasingly vulnerable to food shortages and disease in an environment marked by degradation from accelerated soil erosion.

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Cordeiro, N.J. 1998. *A preliminary survey of the mountane avifauna of Mt. Nilo, East Usambara, Tanzania. Scopus 20: 1—18..*

Nilo Forest Reserve which encircles the peak of Mt. Nilo in the East Usambara Mountains, Tanzania comprises an area of 5,872 ha. This reserve reaching c. 15000 m is the highest in the East Usambaras and has been comparatively neglected by ornithologically. This site was visited in August 1994 and again albeit only for a few hours in October 1996. The prime objective was to locate globally threatened birds and other restricted range species. The Tanzanian Mountains Weaver *Ploceus nicolli* was relocated in the East Usambaras, the first record in over 60 years. Other globally threatened or near- threatened species found at this locality include Southern Banded Snake Eagle *Cicaetus fasciolatus*, Fischer's Turaco *Tauraco fischri*, Usambara Eagle Owl *Bubo vosseleri*, Long-billed Apalis *Apalis moreaui*, Banded Green Sunbird *Anthreptes rubritorques* and Amani Sunbird A, *pallidigaster*. IN addition, the African Hill Babbler *Pseudaleippe abyssinea* was recorded in the East Usambaras for the first time. Nilo FR is known to be an important site both in the Usambaras and globally for the conservation of birds. The East Usambara Catchment Forestry Project has made great effort to protect forests in the East Usambaras, including Nilo FR, through a variety of measures. However, the pressure for arable land appears to be a growing problem in the area; due to habitat degradation occurring in adjacent public land forests, future attention for land and other socio-economic needs may focus on the better protected forest reserve.

Cordeiro, N.J. and Kiure, J. 1995. *A preliminary survey of the montane avifauna of Mt. Nilo, East Usambaras, Tanzania. (unpubl. report)*

Presents the results of an ornithological survey in August 1994 to Lutindi Forest Reserve in East Usambara. The first observation in 60 years of the Tanzania Mountain Weaver *Ploceus nicolli* was made. Other globally threatened or near-threatened species observed were Southern Banded Snake Eagle *Cicaetus fasciolatus*, Fischer's Turaco *Tauraco fischri*, Usambara Eagle Owl *Bubo vosseleri*, Long-billed Tailor Bird *Orthotomus moreaui*, and Banded Green Sunbird *Anthreptes rubritorques*.

Craven, A. 1880. *On a collection of land and freshwater snails made during a short expedition to the Usambara country in eastern Africa with description of seven new species. Proc. Zool. Soc. London 216—219 (1880). (not available)*

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This report summarises the findings of a biological survey between July and September 1994 in Magoroto forest in East Usambara, NE Tanzania. Notes on ecological requirements and degree of endemism for each species is presented to provide an indication of the number of (a) forest dependent species as opposed to forest non-dependent and non-forest species; (b)

threatened and rare species (IUCN 1994 criteria) and (c) endemics and near-endemics to the Usambara mountains. The survey of Magoroto identified 109 species of tree and shrub, 27 species of mammal, 82 species of bird, 29 species of reptile and 29 species of amphibian. Five shrub and tree species were recorded which are endemic to the Usambara mountains and 30 which have restricted ranges limited to the Eastern Arc and/or East African lowland forests. Forty-eight species are dependent on primary forest, and of these species, 24 are also endemic or near endemic to the Usambara mountains. Seven non-forest tree and shrub species are established within the reserve boundaries. No species were recorded which are endemic to the Usambara mountains but 29 species were recorded as near-endemics, having restricted ranges limited to the Eastern Arc and/or East African lowland forests. Fifty-three species are dependent on primary forest, and of these species, 24 are also near endemic to the Usambara mountains. Thirty-eight non-forest species are established in the estate. Of these, four are established within the forested areas. All areas assessed recorded high levels of pole and timber cutting. Because of this, the forests surrounding Magoroto Estate appear to be under immediate threat due to human extraction of forest resources. People living in the vicinity of Magoroto Hill still rely heavily on forest products. Although many people see that degradation of the forest has occurred due to human disturbance there are no alternatives available for forest products.

*Cunneyworth, P. & Stubblefield, L. (eds.). 1996. Bamba Ridge Forest Reserve. A biodiversity survey. – East Usambara Catchment Forest Project Techn. Pap. 31, Forest and Beekeeping Division & Finnish Forest and Park Service, Dar es Salaam & Vantaa.*

This report summarises the findings of a biological survey between July and September 1995 in Bamba Ridge Forest Reserve in East Usambara, NE Tanzania. Notes on ecological requirements and degree of endemism for each species is presented to provide an indication of the number of (a) forest dependent species as opposed to forest non-dependent and non-forest species; (b) threatened and rare species (IUCN 1994 criteria) and (c) endemics and near-endemics to the Usambara mountains. The survey of Bamba Ridge identified 167 species of tree and shrub, 28 species of mammal, 26 species of reptile and 23 species of amphibian. One tree species was recorded which is endemic to the Usambara mountains and 39 which have restricted ranges limited to the Eastern Arc and/or East African lowland forests. Forty-five species are dependent on primary forest, and of these species, 18 are also endemic or near endemic to the Usambara mountains. Twenty-five non-forest tree and shrub species are established within the reserve boundaries. Three faunal species were recorded which are endemic to the Usambara mountains and 19 species were recorded as near-endemics, having restricted ranges limited to the Eastern Arc and/or East African lowland forests. Twenty-six species are dependent on primary forest, and of these species, 20 are also endemic or near endemic to the Usambara mountains. One non-forest species is established in the reserve. Of the five areas assessed for levels of human disturbance, three are considered under threat. These areas are in the vicinity of Muhinduro Ndogo and Lukindo plateau. The people that live in the vicinity of the reserve are subsistence farmers. Potential conflict may arise between the apparent wealth of the forest and the marginal lifestyle of the people. Their use and dependence on the forest includes hunting, timber extraction, pole cutting, the collection of herbal medicines and firewood and growing cardamom. These all put pressure on the forest albeit in different degrees.

*Cunneyworth, P & Stubblefield, L. (eds.). 1996. Mlungui proposed forest reserve. A biodiversity survey. – East Usambara Catchment Forest Project Techn. Pap. 32,*

*Forest and Beekeeping Division & Finnish Forest and Park Service, Dar es Salaam & Vantaa.*

This report summarises the findings of a biological survey between July and September 1995 in Mlungui proposed forest reserve in East Usambara, NE Tanzania. Notes on ecological requirements and degree of endemism for each species is presented to provide an indication of the number of (a) forest dependent species as opposed to forest non-dependent and non-forest species; (b) threatened and rare species (IUCN 1994 criteria) and (c) endemics and near-endemics to the Usambara mountains. The survey of Mlungui identified 56 species of tree and shrub, five species of mammal, nine species of reptile and three species of amphibian. No tree or shrub species were recorded which are endemic to the Usambara mountains but 16 were recorded that have restricted ranges limited to the Eastern Arc and/or East African lowland forests. Thirteen species are dependent on primary forest, and of these species, five are also near endemic to the Usambara mountains. Seven non-forest tree and shrub species are established within the reserve boundaries. One vertebrate species was recorded which is endemic to the Usambara mountains and three near-endemic vertebrate species were recorded whose ranges are restricted to the Eastern Arc and/or East African lowland forests. Four species are dependent on primary forest, and of these species, three are also endemic or near endemic to the Usambara mountains. One non-forest species is established in the reserve. The butterfly survey recorded four near-endemic species of which all are forest dependent species. Pole cutting was found at high levels in all areas: mature forest, poorly stocked forest and in previously cultivated areas. Timber extraction was found at higher rates on the lower slopes but limited timber extraction was also recorded on the upper slopes and summit at Mlungui Hill where the only remaining mature forest exists.

*Cunneyworth, P. (ed.). 1996. Kwamarimba Forest Reserve. A biodiversity survey. – East Usambara Catchment Forest Project Techn. Pap. 33, Forest and Beekeeping Division & Finnish Forest and Park Service, Dar es Salaam & Vantaa.*

This report summarises the findings of a biological survey between October and December 1995 in Kwamarimba Forest Reserve in East Usambara, NE Tanzania. Notes on ecological requirements and degree of endemism for each species is presented to provide an indication of the number of (a) forest dependent species as opposed to forest non-dependent and non-forest species; (b) threatened and rare species (IUCN 1994 criteria) and (c) endemics and near-endemics to the Usambara mountains. The survey identified 165 species of tree and shrub, 16 species of mammal, 11 species of bird, 17 species of reptile and 11 species of amphibian. Four tree species are endemic to the Usambara mountains and 39 which have restricted ranges limited to the Eastern Arc and/or East African lowland forests. Thirty-seven species are dependent on primary forest, and of these species, 14 were also endemic or near endemic to the Usambara mountains. Twenty non-forest tree and shrub species are established within the reserve boundaries. Three faunal species were recorded which are endemic to the Usambara mountains and fourteen species were recorded as near-endemics, having restricted ranges limited to the Eastern Arc and/or East African lowland forests. Twenty species are dependent on primary forest, and of these species, 15 are also endemic or near endemic to the Usambara mountains. One non-forest species is established in the reserve. The highest level of pole and timber extraction recorded in the reserve was located on the transect which runs near to the central area of the reserve.

Cunneyworth, P. (ed.). 1996. *Longuza Forest Reserve. A biodiversity survey.* – East Usambara Catchment Forest Project Techn. Pap. 34, Forest and Beekeeping Division & Finnish Forest and Park Service, Dar es Salaam & Vantaa.

This report summarises the findings of a biological survey between October and December 1995 in Longuza Forest Reserve, in East Usambara, NE Tanzania. Notes on ecological requirements and degree of endemism for each species is presented to provide an indication of the number of (a) forest dependent species as opposed to forest non-dependent and non-forest species; (b) threatened and rare species (IUCN 1994 criteria) and (c) endemics and near-endemics to the Usambara mountains. The survey identified 106 species of tree and shrub, 10 species of mammal, 9 species of reptile and 1 species of amphibian. No species were recorded which are endemic to the Usambara mountains but 25 have restricted ranges limited to the Eastern Arc and/or East African lowland forests. Twenty species were found to be dependent on primary forest, and of these species, nine are also near-endemic to the Usambara mountains. Eighteen non-forest tree and shrub species are established within the reserve boundaries. No faunal species were recorded which are endemic and only one species was recorded as near-endemic to the Usambara mountains. Three species are dependent on primary forest. One species (*Rattus rattus*) is established inside the forest reserve that is a non-forest species. Past resource extraction accounts for the present degradation observed. Pole extraction appears a low threat as the highest level occurs in an area which is already degraded. Timber extraction is likely to be the greatest threat to the ecology of the small remnant of forest remaining in the central area of the reserve. Encroachment is occurring from all sides leaving a small remnant patch in the middle of the reserve, which is also under pressure.

Cunneyworth, P. (ed.). 1996. *Kambai Forest Reserve. A biodiversity survey.* – East Usambara Catchment Forest Project Techn. Pap. 35, Forest and Beekeeping Division & Finnish Forest and Park Service, Dar es Salaam & Vantaa.

This report summarises the findings of a biological survey between January and March 1996 of Kambai Forest Reserve, which is situated in East Usambara, NE Tanzania, including a socio-economic component. Notes on ecological requirements and degree of endemism for each species is presented to provide an indication of the number of (a) forest dependent species as opposed to forest non-dependent and non-forest species; (b) threatened and rare species (IUCN 1994 criteria) and (c) endemics and near-endemics to the Usambara mountains. These three categories are then combined to assess which species are considered at high risk of becoming locally extinct if the forest continues to be further degraded and fragmented. The survey identified 162 species of tree and shrub, 36 species of mammal, 11 species of bird, 18 species of reptile and 15 species of amphibian. Two tree species were recorded which are endemic to the Usambara mountains and 35 which have restricted ranges limited to the Eastern Arc and/or East African lowland forests. Forty-seven species are dependent on primary forest, and of these species, 17 are also endemic or near endemic to the Usambara mountains. Eighteen non-forest tree and shrub species are established within the reserve boundaries. Four endemic and nineteen near-endemic faunal species were recorded. Thirty-three species are dependent on primary forest, and of these species, 21 are also endemic or near endemic to the Usambara mountains. Three non-forest species are established in the reserve

Decken, C. C. von der 1869. *Reisen in Ost-Africa in den Jahren 1859 bis 1865. Vol. I. - Leipzig. (not available)*

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The article provides an account of the land tenure of the Wasambaa primarily based on field investigations and interviews in West Usambara. It describes the Usambaras, the history and evolution of administration, and authorities in land rights. It goes on to describe tribal life with focus on tenure. The author explains various tenure forms for arable land (tribal, family, individual), grazing, buildings, water rights, and miscellaneous aspects such as trespass, rights of way, graves and burial grounds, salt etc. The author presents some figures on land ownership in Vugiri, where the average tenure and cultivated area per family was 2.5 ha and 2.1 ha respectively. It also mentions other articles in Tanganyika Notes and Records (Nos. 1, 2, 3) which deal with the Washambaa and their history.

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Contains the annual reports for the EAARS since the British re-opened the station in March 1927. Includes interesting descriptions of the first years of rehabilitation of the station. The annual reports usually included reports from the Director, and individual reports from the key scientists, such as the Plant Pathologist, Entomologist, Soil Chemist (G. Milne), Biochemist, Plant Physiologist, Plant Geneticist, Systematic Botanist (P.J. Greenway), Ornithological work (R.E. Moreau), Superintendent of Plantations, and the Secretary and Librarian (R.E. Moreau). Also covers the reporting from the period (1928—1934) of the inventory of the Amani Botanical Garden by Greenway.

Eastwood, A. & Maunder, M. 1995. *A conservation assessment of Saintpaulia taxa, cultivated within the Living Collections Royal Botanic Gardens, Kew*. – Species Assessment Report 2, Royal Botanic Gardens, Kew.

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Ellman, A. 1995. *Feasibility study for an outgrower tea and fuelwood project. East Usambara Tea Company Ltd, Tanga*.

The report is a study on the possibilities to start outgrower tea (800 ha) and eucalyptus fuelwood (400 ha) production among farmers in the Amani-Kwamkoro area. Following villages were included in the study. Kwemwewe, Kwesitu, Mbomole, Mgambo, Mikwinini, Misalai, Mlesa, Msasa, Shambangeda, Ubiri, and Zilai. The study provides rather detailed information on demographic information, village land use, socio-economic information, agricultural activities and potential, environmental information, information on employment in the tea estates. It contains a detailed project proposal. A land use classification map covering 12,630 ha based on 1994 aerial photographs was produced for the study by Mlingano Agricultural Research Institute.

Ellman, A.E. 1996. *Handing over the stick? Report of a village forest management and farm forestry consultancy*. – East Usambara Catchment Forest Project Techn. Pap. 18, Forest and Beekeeping Division & Finnish Forest and Park Service, Dar es Salaam & Vantaa.

A report of a three month consultancy on participatory management of village forests and promotion of farm forestry initiatives in East Usambara villages. Four pilot villages were selected for detailed study, two focusing primarily on village forest management and two on sustainable farm forestry practices. PLA Action techniques were used to prepare forest conservation and farm forestry management plans in the villages. General, and specific lessons learned on village forest management and farm forestry are provided. The report provides several recommendations. These include: A major information campaign; Study tours; Training of foresters in farm forestry and participatory planning and management techniques; Closer cooperation between environmental agencies; On-farm tree planting. Recommendations are made on actions required in the four EUCFP pilot villages, including guidelines for village forest management and for farm forestry development.

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Preliminary population density estimates are presented for a recently discovered population of the Sokoke scops owl *Otus ireneae* in the lowlands of the East Usambara mountains, Tanzania. Calling birds were mapped at two sites totalling 6.3 km<sup>2</sup>. Approximate densities were 3—4 territories /km<sup>2</sup> in Kwamgumi Forest Reserve and <1.5 territories /km<sup>2</sup> in Manga FR, a much more heavily logged site. Densities in prime habitat in Arabuko-Sokoke forest, Kenya, the only other locality for the species, exceeded 7 territories /km<sup>2</sup>. The total population in the East Usambaras cannot be calculated, but it is probably markedly smaller than in Arabuko-Sokoke. Suggestions of more precise surveys are made.

Evans, T. 1997. *Records of birds from the forests of the East Usambara lowlands, Tanzania, August 1994-February 1995. Scopus 19: 92—108.*

Following the completion of the Frontier-Tanzania Coastal Forest Survey Programme, the Society for Environmental Exploration and the Faculty of Science, University of Dar es Salaam embarked on a similar joint programme of surveys in the East Usambara lowlands, Tanga Region, northeast Tanzania. As part of the programme, bird surveys were carried out in the East Usambaras from August 1994 to February 1995 in five forest patches - Magoroto, Kisiwani, Manga, Longuza (north) and Kwamgumi. Manga and Longuza (north) had not been visited by ornithologists before. Previous coverage below 400 m during warm season, October-March, had been largely restricted to a single site, Kisiwani. The paper summarises the new distributional data gathered, and observations of seldom-recorded species. Data on forest extent and conservation prospects are also given.

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Evans, T.D., Watson, L.G., Hipkiss, A.J., Kiure, J., Timmins, R.J. & Perkin, A.W. 1994. *New records of Sokoke Scops Owl Otus ireneae, Usambara Eagle Owl Bubo vosseleri*

and East Coast Akalat *Sheppardia gunningi* from Tanzania. *Scopus* 18: 40-47. **(not available)**

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Fernie, L. M. 1948. *The Amani plantations. An account of some of the more interesting horticultural features to be seen at the East African Agricultural Research Institute, Amani, Tanganyika Territory*. – *East African Agricultural Journal of Kenya, Tanganyika, Uganda and Zanzibar* 14(2). 86—93.

FINNIDA. 1994. *East Usambara Catchment Forest Project, Phase II Appraisal Report*. FINNIDA, Helsinki.

The report of a joint Government of Tanzania and Finland mission to appraise the proposal for the Phase II of the East Usambara Catchment Forest Project. The mission stressed the need for a even sharper focus on biodiversity conservation.

FINNIDA. 1993. *Mid-term review of the Usambara Catchment Forestry Project, Tanzania*. FINNIDA, Helsinki.

A review of the project conducted in early 1993. Emphasised the need to focus more on local participation and proposed the phasing out of the plantation forestry component of the project.

FINNIDA . 1990. *East Usambara Catchment Forest Project. Project Document 1990-1993*. FinnIDA, Helsinki.

Describes the background, objectives, outputs, activities and inputs, including budgets (15.2 mill FIM), of the FINNIDA supported project. The project was based on the proposals of the

AFIMP (1988). Project components included Nature Conservation, Catchment Forestry, Plantation Forestry, and Institutional Support.

*FINNIDA. 1988. The research strengthening project in the East Usambara Mountains, related to natural forest conservation and utilisation. Project Document proposal. - FINNIDA, Helsinki*

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The report provides an inventory of income generating activities in Tanga Region. It provides detailed information on four villages, of which Kwagunda, Mashewa and Mlesa in Muheza District border the proposed Amani Nature Reserve. The Annexe Report provides gross margin calculations for major annual (maize, beans, paddy, groundnuts, cassava, cowpea) and perennial (banana, coconut, cashew) crops in the area.

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*Fowler, S. & Nyambo, B. 1996. Report of a short consultancy on the potential of biological control of invasive species in Amani Nature Reserve. East Usambara Catchment Forest Project Techn. Pap. 20, Forest and Beekeeping Division, Finnish Forests and Park Service & International Institute of Biological Research. Dar es Salaam, Vantaa & London.*

A joint consultancy to look at the needs and possibilities for biological control of *Maesopsis eminii* and other invasive introduced species in the East Usambara forests. The consultants concluded that *M. eminii* is less of a threat to the indigenous forests than previously suggested. They thought that selective logging could damage regenerating native species, and that even localised disturbance could encourage the re-invasion of *M. eminii*. If the succession to native species is to be accelerated killing existing *M. eminii* by ringbarking seems probably better than selective felling or the use of herbicides. Further they noted that if the current low levels of

human disturbance of the forests are not maintained then *M. eminii* will invade. If this is perceived as a risk, then investigating biological control might be prudent. Neither *Lantana camara* or *Clidemia hirta* appear to be significant problems to either the conservation of the indigenous forest or to local agriculture. However, *Clidemia hirta* can colonise intact canopy forest as a low growing, understorey shrub, and if it continues to spread it could represent some threat to native understorey plants and cause problems for forest regeneration by rapidly colonising natural light gaps. They recommended monitoring of *C. hirta*. *Psidium cattleianum* may be a species of great concern. They recommended that extent of invasion should be surveyed, and control measures to restrict its further spread should be considered.

Franzmann, N.-E. 1983. A new subspecies of the Usambara Weaver *Ploceus nicolli*. *Bulletin of the British Ornithologists' Club* 103: 49-51. **(not available)**

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Green, E.C. 1963. The Wambugu of Usambara (with notes on Kimbugu). *Tanzania Notes and Records* 61: 175—189. **(not available)**

Greenway, P. J. 1934. *Report of a botanical survey of the indigenous and exotic plants in cultivation at the East African Agricultural Research Station, Amani.* - Unpubl. report.

The most comprehensive survey of the Amani Botanical Garden, i.e. the trial plantations of the Biologisches-Lantwirtschaftliches Institut, Amani in what is the presently included in the Amani East and Amani West Forest Reserves and in parts in the Amani Estate (the NIMR Amani Research Centre). Contains a detailed, plantation by plantation, compartment by compartment assessment of the plantation. Was followed up by the survey by Hoeness in 1963. Further unpublished surveys were done by Ruffo in 1989 for the East Usambara Agricultural Development and Environmental Conservation Project, and by TAFORI in 1993 and Sandy *et al.* (1997) for the East Usambara Catchment Forestry Project.

Hakizumwani, E. 1996. *Constraints for on-farm fuelwood supply. A case study in Amani Division, East Usambara Mountains, Tanzania.* M.Sc. thesis, Dept. of Land Resources and Urban Sciences, International Institute for Aerospace Survey and Earth Sciences, Enschede.

Hall, J.B. 1995. *Maesopsis eminii and its status in the East Usambara Mountains.* East Usambara Catchment Forest Project Techn. Pap. 13, Forest and Beekeeping Division & Finnish Forests and Park Service, Dar es Salaam & Vantaa.

Report of a consultancy to investigate the present state of *Maesopsis eminii* in the East Usambaras. Five key factors which enabled the success of *Maesopsis* in Amani were identified. The rate of spread of *Maesopsis* into the forest has declined since logging ended. There is no clear evidence that *Maesopsis* is suppressing or preventing the regeneration of indigenous species or later successional species, nor that it retain sites.

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## East Usambara Catchment Forest Project Working Paper Series

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