International Conference on the Impact of *Sericostachys scandens* on the Conservation of Nyungwe National Park, Rwanda

Rwanda Environment Management Authority
Ministry of Natural Resources

a report prepared for and funded by:
Protected Areas Biodiversity Project (PAB)
REMA/GEF/UNDP

This report was compiled by Nerissa Chao (WCS), Louis Rugyerinyange (RDB-NNP) and Paul Scholte (PAB).

The conference was organized by Louis Rugyerinyange, Nerissa Chao and Paul Scholte with contributions and presentations from Dennis Babassa, Nsengi Barakabuye, Francois Bizimungu, Dr Robert Fimbel, Prof. Eberhard Fischer, Jean Gapusi, Dr Beth Kaplin, Raphael Mpayana, Felix Mulindahabi, Nicolas Ntare and Claudine Tuyishime. The management working group was chaired by Louis Rugyerinyange and Robert Fimbel and the research working group was chaired by Jean Gapusi and Eberhard Fischer.

Special thanks to RDB and REMA, presenters at the workshop, and all those attending the conference whose participation and input have contributed to the findings of this report.

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Introduction

An international conference on the *Impacts of Sericostachys scandens on the conservation of Nyungwe Forest* was organized by Louis Rugyerinyange from Rwanda Development Board (RDB) Conservation Department, Nerissa Chao from Wildlife Conservation Society (WCS) and Paul Scholte from Protected Areas Biodiversity Program (PAB). The workshop aimed to bring together national, regional and international experts and stakeholders of conservation in Nyungwe National Park (NNP) with the objectives to:

1. Develop a common understanding of what is known about *Sericostachys scandens* based on scientific research and observations;
2. Identify priority research needs to evaluate the impacts it has on natural forest regeneration;
3. Identify preliminary recommendations for management.

The conference began with a number of presentations followed by a working group session and discussion and conclusion in the afternoon. Please refer to Appendix 1 for Conference Agenda and Appendix 2 for full list of participants.

International Conference: *Sericostachys scandens*

Opening address by Rosette Rugamba, DCEO RDB Conservation & Tourism

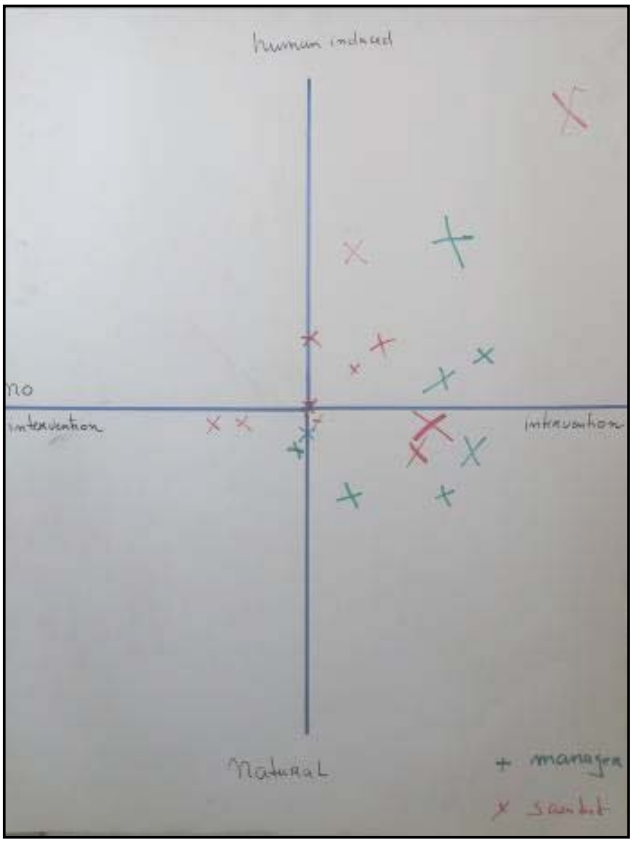
The workshop was opened by Rosette Rugamba. In her opening address she highlighted how important this discussion was to government and policy makers in Rwanda due to the high level of speculation on the status of *Sericostachys scandens* and its role and impact on the ecology and conservation of Nyungwe forest. This highlighted the value of the workshop and the management and decision-making challenges faced by RDB. Rosette Rugamba stressed how important it was to have a better understanding of the issues associated with *Sericostachys scandens*.

Rosette Rugamba also expressed Rwanda's desire to seek long term collaborations in promoting conservation and research in the region and elsewhere and how this conference has brought together national, regional and international experts showing everyone's commitment to conservation in Rwanda and the region. She finished by requesting participants to come up with a common understanding of the conservation challenges brought by this species in Nyungwe National Park combined with suggested management strategies for the successful long term conservation of the Park.

Introduction by Fidele Ruzigandekwe (Executive Director, RWA) and Paul Scholte (Technical Advisor, PAB)

The conference began with the iteration of the different schools of thoughts concerning *Sericostachys scandens.* Although it is a natural part of the Nyungwe Forest ecosystem, is this species still functioning within its historic parameters or has something changed to cause it to expand its presence and impacts on portions of the Nyungwe Forest? Different views related to this were demonstrated through a participatory exercise which was developed to illustrate the variety of opinion expressed by participants. Participants marked on a graph where the y axis represented natural to human induced phenomenon, and the x axis represented the level of management intervention proposed.

Francois Bizimungu (RDB): participatory exercise



Results of participatory exercise

Although opinions varied, the picture to the left shows that the vast majority of participants believed some level of intervention would be appropriate (crosses to the right of the y-axis). However the level of intervention desired varied considerably but aside from one outlier for high levels of intervention, other participants viewed mid to low levels of intervention appropriate. Just over half of participants view *Sericostachys scandens* to be natural rather than human induced (crosses underneath the x-axis). A few individuals remained neutral and many participants stated that the current lack of knowledge and understanding regarding this species limits well-informed decision making.

Presentations chaired by Fidele Ruzigandekwe

Sericostachys scandens – a threat to the forest or part of natural succession?

By Professor Eberhard Fischer, *University of Koblenz, Germany* (Appendix 3)

Professor Fischer started his presentation by discussing how the use of the term "invasive" has been frequently used to describe *Sericostachys scandens.* However, based on a number of definitions of this term, it should not actually be described as invasive as it is within its natural geographical limits. He then went onto to discuss the biology and distribution of *Sericostachys scandens.* It is endemic to Africa, found in montane forests of the Albertine Rift (not in lowland forest) and has mass flowering estimated every 10-15 years (estimated 7-8 years in Kenya). He went on to illustrate its different uses by people in different countries in the region and although it is perceived as a negative plant in Rwanda, especially around its flowering, in other countries there are many positive associations related to it. He then went onto to talk about succession in forest gaps which follows pioneer herbs & climbers, followed by pioneer shrubs, fast growing pioneer trees and finally establishment of climax trees. *Sericostachys scandens* falls under the pioneer herbs & climbers, the initial stage of forest regeneration which can last several years. To address the question why *Sericostachys scandens* appears to be increasing, he presented the high level of human disturbance which occurred in the forest following the genocide in 1994 including the large bushfires which destroyed over 10% of the forest in 1997. This creation of forest gaps, even under natural conditions, favours early succession states including *Sericostachys scandens*. Therefore the problem is not the occurrence of *Sericostachys scandens* but the occurrence of enlarged gaps due to anthropogenic disturbance. He concluded with research needs for the future and possible actions. Under this he highlighted that the reintroduction of large herbivores such as elephants, which is often cited as important in controlling *Sericostachys scandens,* will probably have no impact as evidence from researchers in 1898 and 1907 showed this species to be already abundant in Nyungwe despite the presence of elephants and buffalo.

Sericostachys scandens - Current state of knowledge and research gaps

By Dr Beth Kaplin, Antioch University / NUR (Appendix 4)

Dr Kaplin's presentation was based on a review of the *Sericostachys scandens* literature. She started with a brief history of the plant including evidence of pollen cores found in nearby lake sediments suggesting that *Sericostachys scandens* has been present in the region for at least 6000 years. She continued explaining its distribution that goes as far south as Malawi. She went on to discuss the role of *Sericostachys scandens* in Nyungwe Forest, showing that it is an important component in the diet of Black & White Colobus and is also eaten by Ruwenzori turaco's in Nyungwe and has many beneficial uses to humans including being an important species for honey production. This was followed by a summary of various research carried out on the species in Nyungwe and the region. A summary of the research findings showed that *Sericostachys scandens* profit from forest gaps and human disturbance such as roads and related edge effects, and fire. However, there was no

evidence in the current literature of *Sericostachys scandens* expanding in Nyungwe Forest or inhibiting forest regeneration in Nyungwe. The presentation was concluded with identification of research gaps.

Some observations of the impact of *Sericostachys scandens* on forest regeneration in Bwindi Impenetrable Forest (Uganda)

By Dennis Babaasa, Robert Bitariho, Aventino Kasangaki, *Institute of Tropical Forest Conservation* (Appendix 5)

This was presented by Mr Babaasa who started with a general introduction on the ecology of Bwindi Forest (Uganda) and the dense tangle of undergrowth dominated by a mixture of species including *Sericostachys scandens.* This mixture makes it difficult to determine ecological interactions and impacts of only one of these species on other forest species. He continued with the dynamics and distribution of *Sericostachys scandens* in Bwindi and possible human activities that could have led to an increase in abundance of this species although may not have affected its spatial distribution. He went on to discuss the ecology and cyclical patterns of this species and described the interactions between large mammals and *Sericostachys scandens* with records of elephants feeding on the leaves. The most visible impact from large mammals is through trampling. However, he explained that large mammals such as elephants are likely to have a positive feedback on *Sericostachys scandens* as they favour these areas of forest gaps and their activity within them can help maintain gaps and further inhibit regeneration. He concluded that past human disturbance is likely to have promoted an alternative successional pathway and long term conservation strategies should look at reducing or eliminating these human disturbances.

Presentations chaired by Francois Bizimungu (Research & Monitoring Manager, RDB C&T)

15 years of monitoring *Sericostachys scandens* in Nyungwe National Park: its influence on forest structure and composition

By Felix Mulindahabi, PCFN-WCS, & Robert Fimbel, PCFN/Washington State Parks (Appendix 6)

In 1994, a long-term monitoring study of *Sericostachys scandens* was established in relatively undisturbed forest surrounding the Uwinka area of Nyungwe National Park, for the purposes of describing this species flowering synchronization and to assess the response of understory vegetation growing in association with this climber. Fourteen paired study sites, including shaded and open canopy plots, were monitored on average 1-2 times per year to identify changes in vegetation cover and composition. Current findings suggest that *Sericostachys'* phenology is highly synchronized across the study area, and that following its dieback post-seed production, a diversity of other life forms rapidly increase in cover. Ten years following dieback *Sericostachys* appears to

reach near pre-crash cover rates (80+% in most plots, with shaded plots showing earlier colonization by the climber compared to gaps), with a concomitant decrease in the cover of other life forms. At present, *Sericostachys* in the study area appears capable of suppressing other vegetation. However, there is limited evidence to suggest that it is permanently altering the cover and composition of other life forms in the understory. At the time of this writing *Sericostachys* is again in bloom across the study area. Monitoring is planned to track this species through a second phenological cycle to determine if longer-term changes in forest composition and structure emerge.

Long term monitoring plan of *Sericostachys scandens* in Nyungwe National Park: Preliminary results

By Nicolas Ntare, PCFN-WCS (Appendix 7)

Mr Ntare started his presentation with a brief introduction and the key questions which the long term monitoring plan managed by the Wildlife Conservation Society PCFN project aims to address: to determine whether *Sericostachys scandens* is spreading, its impact on trees and forest regeneration, and the pattern of growth and die-back. Data was first collected in 2008 and subsequently in 2009, in six sites (Gisakura, Uwinka, Kitabi, Gisovu, Nshili, Bweyeye) in the Park using randomly placed transects. Preliminary results showed that Gisovu had the least infestation of *Sericostachys* likely explained to the flowering and subsequent die-back in 2006. All sites had some trees affected by *Sericostachys scandens,* but the majority of trees measured in Gisakura, Bweyeye and Gisovu were not affected by *Sericostachys scandens*. Trees in Kitabi were seen to be affected the most with a significant number of trees with *Sericostachys scandens* in the canopy of the trees. However, across all sites the vast majority of trees were not affected by *Sericostachys scandens.* It was stressed that the study was designed to be a long term monitoring plan and no final conclusions can be reached at this stage.

Impacts of *Sericostachys scandens* on plant diversity of Nyungwe National Park

By Claudine Tuyishime, NUR (Appendix 8)

The presentation started with a brief introduction presenting the aim of the study to see if other forest species were threatened by the proliferation of *Sericostachys scandens.* The methods were laid out, followed by a summary of results. This included an illustration that areas with less disturbance, i.e. Gisakura, had lower frequency of trees with *Sericostachys* compared to sites which were more highly disturbed. Although the majority of trees sampled did not have *Sericostachys* there was some preliminary evidence suggesting that trees with lower dbh are more likely to be associated with the plant. However the sample size was small and this would need further research. It was concluded that further research is needed to investigate the impact on tree regeneration and health.

Results from Working Groups

Participants were divided into two working groups to focus on management recommendations and research priorities. Participants in each working group can be found in Appendix 2. Details of the questions are in Appendix 9.

WORKING GROUP: ADAPTIVE MANAGEMENT

Led by Louis Rugyerinyange and Robert Fimbel.

Context: The group concluded that it is unclear based on the current evidence in hand that management intervention is essential – it is unclear whether the presence or alleged expansion of *Sericostachys scandens* is a natural forest phenomena that will cycle out before having any lasting damage on the forest.

If management of *Sericostachys scandens* is to be implemented the following recommendations were made: Limited trial management interventions appear warranted in areas that have received recent disturbance events, that are considered outside of historic disturbance levels (with perhaps a very limited number of non-human disturbed sites or control sites), because:

- Pre-disturbance habitat may be slow to establish
- Management trials would help to inform larger restoration efforts in the wake of future disturbance events
- There is a lot of political will for some action.

Management interventions should consider:

- Clearly defined goals and objectives (not elimination of *Sericostachys*; rather suppression to promote restoration of pre-disturbance habitats and monitoring and analysis of these suppression activities to understand whether without this action the plant will spread with potential threat to the forest)
- Take advantage of existing literature and past management actions that may apply to *Sericostachys* (e.g., fern cutting trials)
- Treatments (principally mechanical - cutting, mimic of mega-fauna impacts[1], but perhaps others)
- An economic component to evaluate feasibility for larger-scale application
- Robust design to allow for interpretation of results
- Be of an adaptive nature to use best available science.

[1] Elephants are not likely to reduce *Sericostachys* cover and may lead to expansion of this species via disturbance of young trees and saplings

Interpretation/communication of management trials is essential to inform stakeholders (policy makers, managers, researchers) if desired actions are to be undertaken. A communication plan should be developed before interventions begin!

Reduction of risk: important to develop management plans to reduce the risk of future human impacts to the resource and guidelines on how to respond. Wildfire requires immediate attention.

Timing: First generation intervention actions should be developed in the very near-term to take advantage of *Sericostachys scandens* flowering / dieback conditions. Planning for additional actions can be done in subsequent years.

WORKING GROUP: RESEARCH

Led by Jean Gapusi & Eberhard Fischer

It is recommended that similar studies are conducted simultaneously following the same research design in sites including Kahuzi-Biega, Bwindi and Kibira to enable cross-site comparisons. The results of the research should be communicated in forms additional to publications in scientific journals such as workshops designed for relevant stakeholders. The research priorities identified by this working group are listed below in order of priority:

1. Systematic survey of the actual distribution/extent of *Sericostachys* and its state (GIS and satellite images) including:
    a. The state of population (young plants flowering and fruiting)
    b. Evaluation of the disturbance factors
    c. Edaphic parameters – physical and chemical conditions of the soil related to *Sericostachys scandens* growth and spread
    d. Distribution and abundance of *Sericostachys scandens* in Nyungwe National Park – use of remotely sensed data and GIS as well as ground truthing (plot data) to document and monitor *Sericostachys scandens* in the forest over time.
    e. Use of GIS and satellite images investigated.

2. Modeling the future scenario of *Sericostachys* (climate change monitoring and photosynthesis of the species)

3. Long term monitoring on permanent plots including experimental sites; study the regeneration process/dynamics in permanent plots each year ; is *Sericostachys scandens* causing mortality of trees and if so what are the species affected by *Sericostachys* and are any species avoided?

4. Basic biological questions on *Sericostachys*: interaction with other life forms (pollinators, herbivores, birds; number of seeds per capsule, size of root system, annual growth of stems)

5. The phytosociology of *Sericostachys:* describe the population dynamics of *Sericostachys scandens* and how it relates to or associates with the other plant species in the community.

6. Population ecology, modeling

7. Socio-economic studies including interviews with elders to collect all existing local knowledge about this species and its state in Nyungwe Forest over time.

8. Research on the impact of elephants on *Sericostachys* in Bwindi National Park

Conclusion

There was a general consensus that any proliferation of *Sericostachys* is occurring in areas recently disturbed and this is likely to be the main critical factor. Participants believe that *Sericostachys* is more abundant in the eastern side of the forest as a result of greater levels of human disturbance in this part of the forest. However, accurate information on the distribution of *Sericostachys* is currently lacking and the need for this information was identified by the research working group.

Disturbance in the forest has increased in the recent past and this could explain why *Sericostachys* appears more apparent today, especially as a lot of the disturbance is visible from the road. *Sericostachys scandens* is a key pioneer species after disturbance or creation of forest gaps and therefore seems to have profited from these occurrences. Anecdotal evidence from observations made by Prof. Fischer suggests that *Sericostachys scandens* may be declining in the wake of canopy closure in some areas of Nyungwe. He believes that it will eventually disappear in these areas, although this may take a significant period of time.

There was also a general consensus that reintroduction of elephants to Nyungwe would not suppress *Sericostachys scandens.* Evidence in Uganda suggests that elephants may even provide positive feedback through maintaining forest gaps and destroying existing saplings, hence further inhibiting forest regeneration. Descriptions from the first explorers to Nyungwe Forest in the late 19th Century also suggest that *Sericostachys scandens* was already abundant in the forest at this time despite the presence of an elephant population. It should be noted, however, that a possible reintroduction of elephant has other advantages, such as restoring ecological processes. The objective of a reintroduction of elephants to Nyungwe should not be to control *Sericostachys scandens*. These and other considerations will be discussed in an upcoming workshop during which results on a pre-feasibility reintroduction study will be presented.

Thanks to the 15 year monitoring of plots around Uwinka, we now have the first quantitative information about the dynamics of *Sericostachys scandens* cover and abundance (see presentation by Felix Mulindahabi and Robert Fimbel – 15 years of monitoring *Sericostachys scandens* in Nyungwe National Park, and annex 6). Complementary anecdotal evidence illustrates the spatial variation in mass flowering, occurring at different places in Nyungwe Forest at varying times, as well as at

varying periods between different locations (e.g. Nyungwe compared to Bwindi, Uganda). Follow-up research needs to follow a full cycle to get a full understanding of its ecology and cyclical patterns

Further scientific research available on *Sericostachys scandens* is only very limited as it has not been a focal point of research. This has resulted in a lack of systematic data and scientific information. In particular, the impact that *Sericostachys scandens* may have on other species remains unclear. *Sericostachys scandens* has not been a focus of prior research because scientists and conservation biologists working in the field did not consider this plant to be a major concern for Nyungwe. It is only recently that anecdotal observations have brought attention to this species.

A general consensus was reached that further research and understanding on *Sericostachys scandens* is a high priority, and that it must also address management concerns. It was also pointed out that better communication and collaboration should be developed between RDB and NUR in terms of research strategies and priorities allowing the University to develop research projects in directly in line with government needs. It was agreed that small experimental plots of trial management actions should be implemented alongside the ongoing long term monitoring and development of research proposals. WCS in collaboration with RDB and with funding from PAB, plan to design and implement initial experimental plots in NNP during 2010. This will allow RDB-T&C and its partners to obtain more 'hands on' experience with regard to especially the impact of *Sericostachys scandens* on other species (e.g. does it kill them?), and its auto-ecology and will enable an informed approach to management decisions.

Appendix 1: Conference Agenda

8.00am	Arrival of participants
8.30am	Opening by Rosette Rugamba, DCEO RDB Tourism & Conservation
8.45am	Introduction to workshop by Fidel Ruzigandekwe with participatory exercise led by Dr. Paul Scholte.
	Presentations: Chaired by Fidel Ruzigandekwe
9.10am	*Sericostachys scandens* – a threat to the forest or part of natural succession? Professor Eberhard Fischer
9.30am	Current state of knowledge and research gaps for *Sericostachys scandens* Dr Beth Kaplin
9.50am	Some observations of the impact of *Sericostachys scandens* on the regeneration in Bwindi Impenetrable National Park, Uganda. Dennis Babassa
10.10am	Questions
10.30am	Coffee Break
10.50am	Presentations: Chaired by Francois Bizimungu
10.55am	15 years of monitoring *Sericostachys scandens* in Nyungwe NP: its influence on forest structure and composition Dr Rob Fimbel/Felix Mulindahabi
11.15am	Long term Monitoring Protocol of *Sericostachys scandens* and preliminary results, Nyungwe National Park Nicolas Ntare
11.35am	Effet du *Sericostachys scandens* sur la diversite vegetale au PNN: preliminary results. Claudine Tuyishime
11.55pm	Questions
12.25pm	Break for Lunch
13.25pm	Working session facilitated by Dr. Paul Scholte
	Group 1: Research priorities for *Sericostachys scandens* – led by Prof. Eberhard Fischer & Jean Gapusi
	Group 2: Management recommendations for *Sericostachys scandens* - led by Dr Rob Fimbel & Louis Rugyerinyange
3.10pm	Coffee Break
3.30pm	Presentation of working groups, Discussion and Conclusion facilitated by Dr. Paul Scholte
5pm	Adjourn & Cocktails

Appendix 2: Conference Participants

Name	Organisation	Working Group	Email Contact
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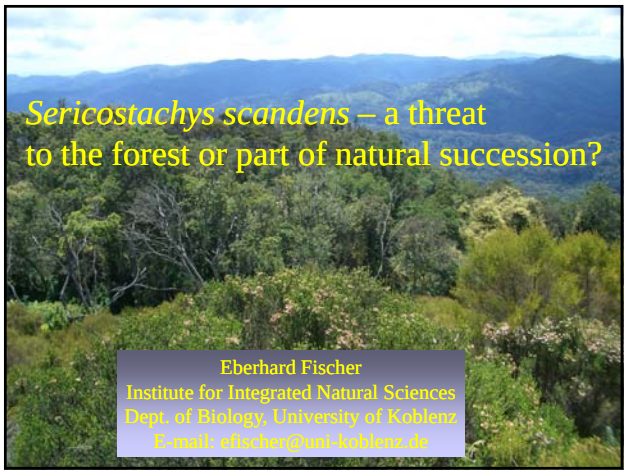
Appendix 3: Sericostachys scandens – a threat to the forest or part of natural succession?

Presentation by Professor Eberhard Fischer, University of Koblenz, Germany

Professor Eberhard Fischer is a Professor of Botany at the University of Koblenz in Germany and lectures for advanced students in plant ecology and diversity. He has been studying the flora and vegetation of tropical ecosystems for more than 25 years with fieldwork undertaken in Rwanda, Uganda, Kenya, DRC, Madagascar and Europe.

He has worked in Rwanda since 1984 undertaking 56 visits over this period with significant work in Nyungwe Forest. He has more than 70 publications on Rwanda including An Illustrated Field Guide to the Plants of Nyungwe National Park, Rwanda.


Sericostachys scandens – a threat
to the forest or part of natural succession?
Eberhard Fischer
Institute for Integrated Natural Sciences
Dept. of Biology, University of Koblenz
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Gisovu, September 1990

Sericostachys scandens – a threat to the forest or part of natural succession?

- Introduction
- What is an invasive plant?
- Biology and distribution of *Sericostachys scandens*
- Ecology of *Sericostachys scandens* and succession of forest gaps
- Why is *Sericostachys* increasing?
- Future perspectives

Liengola, I.: Impact of **invasive** liana *Sericostachys scandens* on Gorilla habitat in Kahuzi-Biega National Park

Masumbuko Ndabaga, C. et al.: Dynamique forestière et impact de *Sericostachys scandens* Gilg & Lopr. (Amaranthaceae) sur l'écosystème forestier en zone montagne, Parc National de Kahuzi-Biega, RD Congo: **plante à l'action envahissante**

Invasive and Alien Plant species (IAP): naturalized plants thriving outside their biogeographical range (Crawley 1997)

The natural expansion of a species in a locality does not render it invasive, if it is within practical environmental, geographical and ecological limits (Smith & Pickup 1993). Beyond its natural geographical limits a spreading species may be considered an alien invasive (Henderson 2001).

***Sericostachys scandens* is by no means an „invasive plant"**

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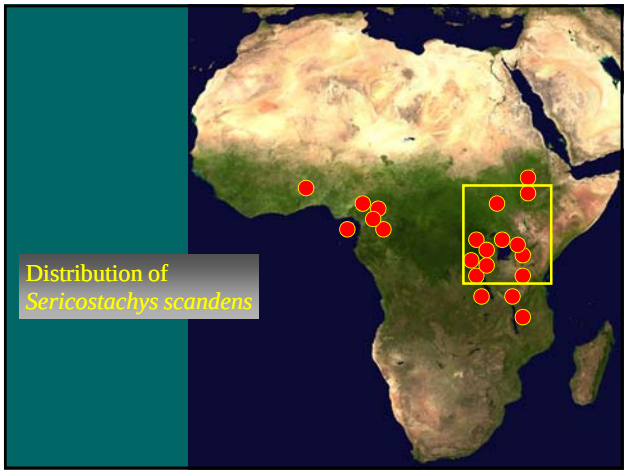
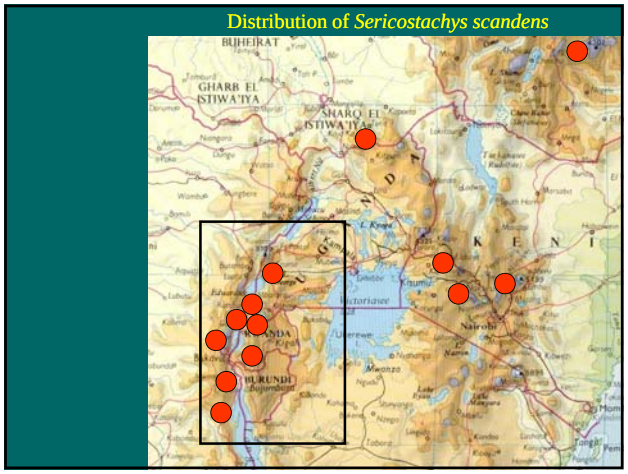

Distribution of
Sericostachys scandens


Distribution of *Sericostachys scandens*
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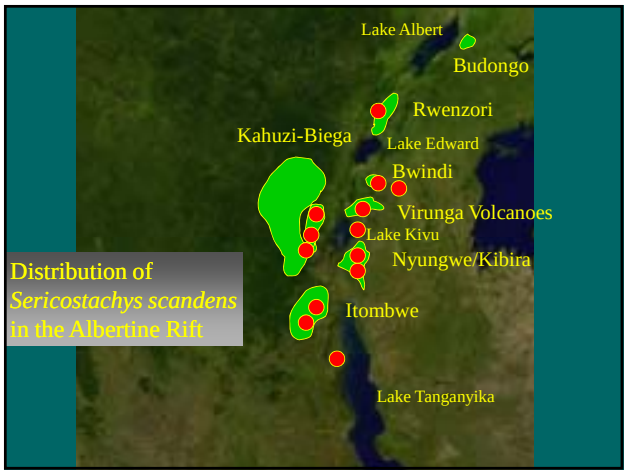
SHARQ EL ISTIWA'IYA
K E N I
Victoria
Nairobi
Mwanza
BURUNDI



Uses of *Sericostachys scandens*:

1. In DR Congo, the leaves are collected from the wild and eaten as vegetables.
2. The leaves are applied as a poultice on wounds, and from the bark a medicine for venereal diseases is prepared.
3. In Uganda, *Sericostachys scandens* is a keystone species for honey production from wild flowers in the forest.
4. In Kenya initiation ceremonies are related to the occurrence of flowering which there is thought to happen once every 7-8 years.

Sericostachys scandens – a threat to the forest or part of natural succession?

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- What is an invasive plant?
- Biology and distribution of *Sericostachys scandens*
- Ecology of *Sericostachys scandens* and succession of forest gaps
- Why is *Sericostachys* increasing?
- Future perspectives

Succession on gaps in montane forests of Rwanda

- Pioneer herbs and climbers: *Sericostachys scandens*, *Ipomoea involucrata*, *Pteridium aquilinum*, *Rubus spp.*. This stage may be long lasting (several years).
- Pioneer shrubs: *Mimulopsis solmsii*, *Brillantaisia cicatricosa*, *Vernonia auriculifera*.
- Fast growing pioneer trees: *Macaranga kilimandscharica*, *Polyscias fulva*, *Neoboutonia macrocalyx*, *Dombeya torrida*.
- Establishment of climax trees: *Carapa grandiflora*, *Parinari excelsa* etc. A closed canopy forest develops and the climbers (e.g. *Sericostachys*) disappear, leaving viable diaspores in the soil.

Sericostachys scandens – a threat to the forest or part of natural succession?

- Introduction
- What is an invasive plant?
- Biology and distribution of *Sericostachys scandens*
- Ecology of *Sericostachys scandens* and succession of forest gaps
- Why is *Sericostachys* increasing?
- Future perspectives

From 1994 to 1999 high level of human activity in Nyungwe, e.g. burning of large areas in the Eastern part. That created extensive gaps in this tropical rainforest.

Gap sizes even under natural conditions are fairly large, and burning or illegal logging further enlarged the gap sizes. This had negative impact on tree regeneration and favoured a first succession state with *Sericostachys*.

Thus many gaps are in a low-canopy state dominated by a dense tangle of herbs, shrubs and climbers.

The problem is not the occurrence of *Sericostachys scandens* but the occurrence of enlarged gaps due to anthropogenic disturbance

Sericostachys scandens – a threat to the forest or part of natural succession?

- Introduction
- What is an invasive plant?
- Biology and distribution of *Sericostachys scandens*
- Ecology of *Sericostachys scandens* and succession of forest gaps
- Why is *Sericostachys* increasing?
- Future perspectives

Research Needs for the Future:

Monitoring of *Sericostachys scandens*: Flowering, fruiting, occurring herbivores

Monitoring and assessment of succession state in large gaps by means of phytosociological relevés

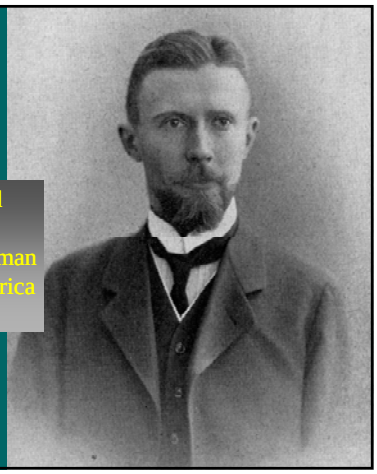
Controled seed bank studies showing the potential of viable diaspores from pioneer species in the soil

Possible action for the Future:

Planting of pioneer trees like *Macaranga kilimandscharica* or *Polyscias fulva* (the latter reaching 15 m in 10 years) in selected gaps to achieve a closed canopy

Reintroduction of large herbivores (buffalo, elephant) is important for conservation purpose, but will probably have **no impact** on *Sericostachys*

Nyungwe 1898
Richard Kandt,
Caput Nili



Dr. Johannes Mildbraed
1907
Member of the First German Expedition to Central Africa
1907-1908

Dr. Schubotz and Dr. Mildbraed in Nyungwe, Aug. 1907

„The most conspicuous, however, is an amaranth (*Cyathula* spec.?), which unfortunately I never saw in bloom; it forms great thickets and bowers, climbs high without exactly being a liana and hangs down again in dense, broad clusters or festoons, making the undergrowth perfectly impenetrable“ (**Mildbraed in Mecklenburg 1910, p. 72**)

Margeliantha lebelii Eb. Fischer & Killmann

Polystachya bruechertiae Eb. Fischer, Killmann & Lebel

Appendix 4: Sericostachys scandens - Current state of knowledge and research gaps

Presentation by Dr Beth Kaplin, Antioch University / NUR

Beth Kaplin began research in Nyungwe forest in 1990, studying forest regeneration and primate ecology for her PhD at the University of Wisconsin-Madison, USA. From this research and subsequent work, Beth has published numerous articles and book chapters, and speaks at professional meetings, universities, and community events about her work. She is currently Program Director for the PhD program in the Department of Environmental Studies at Antioch University New England in the USA where she teaches ecology and conservation biology and advises graduate students from the USA and Africa. She is founding director of the Center for Tropical Ecology & Conservation at Antioch University. In 2005 she received funding from the MacArthur Foundation to start a project at the National University of Rwanda (NUR) to bring biodiversity conservation to the Biology Department; in 2006 she moved to Rwanda to serve as Technical Advisor. She is back at Antioch University and returns to Rwanda every few months for the project and research in collaboration with WCS and RDB. She received MacArthur project renewal funding for 2009-2011, and in this phase she and her colleagues at NUR are launching a masters program in biodiversity conservation, the first one in the region.

Sericostachys scandens

Current state of knowledge & research gaps

Beth Kaplin, PhD
Antioch University New England and National University of Rwanda

Seed dispersal, forest regeneration, primate ecology

ANTIOCH UNIVERSITY NEW ENGLAND

Who or what is this *Sericostachys scandens?*

S e r i c o s t a c h y s GILG et LOPR. 1899 (D.H.2310).

Sericostachys scandens GILG et LOPR. 1899.
Syntypi : Zenker 1420 (Jaunde), Lehmbach 140 (Buea).
A F R I C A T R O P I C A : Ug.Con.Ca.
Obserclatio. - In Aethiopia forma typica nondumreperta.
- var. **maior** CHIOV.1940.
Typus : Giordano 2468 (Tabor in Saio).
A E T H I O P I A: GS.

From **Enumeratio Plantarum Aethiopiae Spermatophyta,** Georg Cufodontis, 1953 in *Bulletin du Jardin botanique de l'État a Bruxelles*

History of *Sericostachys scandens* *Where did it come from??*

Pollen record data indicate that *Sericostachys scandens* has been present in tropical montane forest for thousands of years (since at least 6,000 BP).

Identified by pollen sampling at Lake Masoko,southern Tanzania, showing that this plant has been present in African montane tropical forest since at least 4,000 years BP (before present).

– study by Vincens et al. 2003 in the journal Palaeogeography, Palaeoclimatology, Palaeoecology.

Sericostachys was found in pollen samples from East Africa dating to 6000 years BP

From: Peyron et al. 2000 *Climate of East Africa 6000 14C Yr B.P. as Inferred from Pollen Data* published in Quaternary Research

Where is it found today?

Afromontane forest:
Ethiopia, Sudan, Cameroon, DRC, Uganda, Rwanda, Burundi, Kenya, Ivory Coast, Nigeria, Angola, and Malawi.

"The unidentified creeper (Ecol. 67) mentioned p. 30 in Dowsett-Lemaire (1989) has recently been matched to *Sericostachys scandens,* a Guineo-Congolian Afromontane linking species reaching its southern limit in northern Malawi." From F. Dowsett-Lemaire, *Bulletin du Jardin botanique national de Belgique,* 1990.

Who likes *Sericostachys scandens*?

Colobus

"Angolan colobus at Nyungwe feed heavily on terrestrial vegetation, particularly *Sericostachys scandens (*Amaranthaceae), the mature leaves of which were among the top food items in both studies of colobus diets at Nyungwe" (Fimbel *et al.*, 2001; Vedder and Fashing, 2002, *unpub.data*).

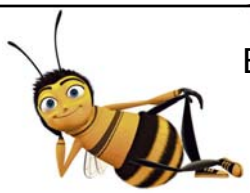
Ruwenzori turaco

Eats *Sericostachys scandens* leaves

PhD research by Chin Sun, published in The Auk journal with the title Foraging Ecology of Three Sympatric Turacos in a Montane Forest in Rwanda in 1997.

Who else likes *Sericostachys scandens*?

Sericostachys scandens has been shown to be economically important as a medicinal plant (using leaves and bark) and for production of honey.



Bees

"Key species to specialist users are *Faurea saligna* (*omulengere*) and *Sericostachys scandens* (*omuna*) for hives and honey…"

"Areas of forest with high densities of prolifically flowering trees (*e.g. Faurea saligna*), shrubs (*e.g. Brillantaisia*, *Mimulopsis* in valleys) and climbers (*e.g. Sericostachys scandens* in disturbed montane forest, and an unidentified species, *orumaga*, Malphigiaceae in lowland forest)are well known to beekeepers, and hills near to these areas are favoured for placing of hives."

From a report by A.B. Cunningham in 1996 entitled **'People, park and plant use'.**

Bees

"Beekeeping and conservation of Rwanda's scarce remaining forests are directly related. Nyungwe contains large areas dominated by the creeper umukipfu (Sericostachys scandens) which is an excellent honey source but flowers only every 15 years."

From a report '**THE DEVELOPMENT OF HONEY EXPORTS FROM RWANDA' in 2005 by consultant David Wainwright, Consultant for Chemonics International.**

Miscellaneous

- Used by midwives (from **A.B. Cunningham 1996 report People, park and plant use).**

What has Sericostachys scandens been up to in our forests?

- Spreading?
- Invading?
- Killing trees?
- Creating open areas in the forest?
- Eating up Nyungwe forest?

A review of studies

In some forests it is reported to be spreading and inhibiting regeneration (i.e., Kahuzi-Biega NP, DRC; Nyungwe NP, Rwanda; Bwindi Impenetrable NP, Uganda) although this is based on limited data and mainly on anecdotal observations.

In other forests it is not mentioned as a problem although it is present (e.g., Kakamega Forest, Kenya).

A few studies have anecdotally mentioned the relationship between large herbivores such as elephants and the ecology of *Sericostachys scandens*, though the idea that such herbivores would control the climber's invasive ability is not yet based on analysis of empirical data.

"Le secteur haute altitude du parc semble être le siège d'une prolifération de *Sericostachys scandens*, une liane endémique mais envahissante qui n'est pas consommée par les gorilles ou les chimpanzés. Cette liane a colonisé les clairières récentes causées par les défrichements et les incendies, et supplante actuellement la canopée adjacente, tuant les arbres et les bambous et favorisant la création de grandes prairies à végétation dominante unique qui ne sont pas appréciées par les grands singes.

Bien que les liens causaux conduisant à la prolifération de *Sericostachys scandens* ne soient pas encore connus, il est évident que cela représente une menace pour les gorilles, et une limite potentielle au rétablissement des populations dans le secteur de haute altitude du parc."

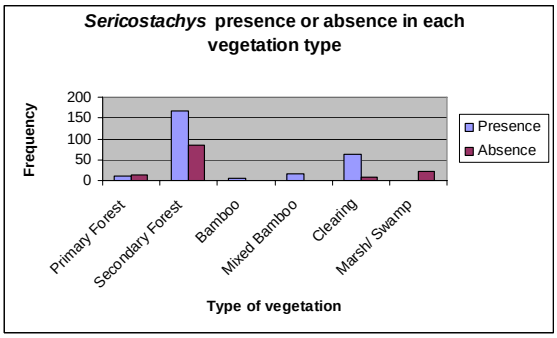
From Innocent Liengola and John Hart, *Journal de Berggorilla & Regenwald Direkthilfe,* 2005

Observation in Nyungwe:

"However, regrowth in some old clearings appears choked by the invasive exotic vine Sericostachys scandans, the African buffalo is gone, and the forest elephants are reduced to a handful." *P.* Alpert BioScience 1996.

Let's look at some data

From DRC:



Impact of the "invasive" liana *Sericostachys scandens* on forest composition and recovery of the Grauer's gorilla (*Gorilla beringei graueri)* in the Kahuzi-Biega National Park, Democratic Republic of Congo (DRC).
Innocent Liengola, Masters degree research

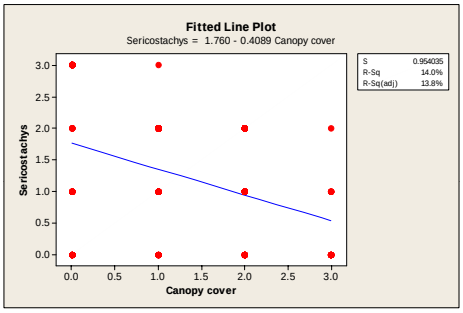


Figure 10. Fitted line plot of Sericostachys coverage with canopy cover.

From Kenya:

"The first invaders of gaps are herbs and lianas of the families Acanthaceae (*Justicia* spec., *Isoglossa* spec.), Amaranthaceae (*Achyranthes aspera*,*Sericostachys scandens*),…"

PhD Dissertation by Arnhild Johanna Althof - **Human Impact on Flora and Vegetation of Kakamega Forest**, Kenya, 2005.

From Uganda – Bwindi Forest

"Herbaceous plant species such as *Pteridium acquilinium* (L.) Kuhn (Dennstaedtiaceae), *Mimulopsis solmsii* Schweinf. (Acanthaceae) and *Sericostachys scandens* Gilg. & Lopr. (Amaranthaceae) were found mainly in the gaps."

From GERALD EILU & JOSEPH OBUA Tropical Ecology 2005

Nyungwe

"Recruitment of *Sericostachys* appears to be by seed …"

"This study … provides little evidence to suggest that the Nyungwe Forest is in transition towards greater *Sericostachys* dominance. … it is projected that a variety of native species will be able to rapidly colonize *Sericostachys* die-back areas, including woody species that have the potential to out-grow the climbing ability of *Sericostachys*. Many areas of the forest appear to support cohorts of even-aged trees, perhaps suggesting 'escapees' during the episodic flowering / fruiting events."

From report by R. Fimbel, WCS in 2004.

Summary of research findings

- *Sericostachys* likes forest gaps
- *Sericostachys* is found in disturbed forest
- Bees and honey producers like *Sericostachys*
- Colobus monkeys and turacos in Nyungwe eat *Sericostachys* leaves

I found no evidence based on existing research to show that:

- Sericostachys is expanding in Nyungwe
- Sericostachys is inhibiting regeneration forest-wide in Nyungwe

Research Gaps

- What is the distribution of *Sericostachys scandens* – what tree species is it covering, how widespread is it in Nyungwe?
- Is *Sericostachys scandens* spreading in extent?
- Is *Sericostachys scandens* causing tree mortality?
- Is *Sericostachys scandens* inhibiting tree regeneration?
  (developed with WCS-PCFN June 2008)

Research Gaps

- State of regeneration of Nyungwe forest tree species, and relationship between tree regeneration and *Sericostachys*
- Correlates of *Sericostachys* distribution – disturbance, fire, specific habitat types,…

Thanks to

- WCS-PCFN
- PAB
- All the people who did the studies
- People who love Nyungwe!

Appendix 5: Some observations of the impact of Sericostachys scandens on forest regeneration in Bwindi Impenetrable Forest

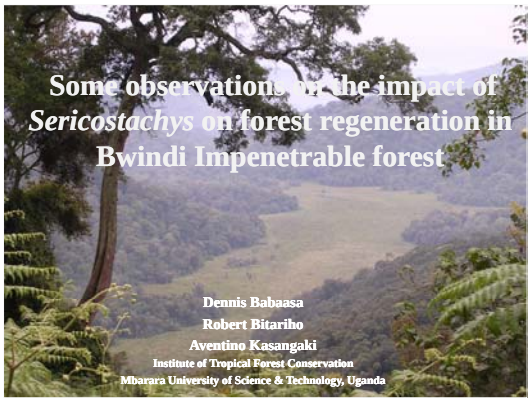
Presentation by Dennis Babaasa, Robert Bitariho, Aventino Kasangaki.

Institute of Tropical Forest Conservation, Bwindi / Mbarara University, Uganda

Presented by Dennis Babaasa

Dennis Babaasa was formerly the Coordinator of the Ecological Monitoring Program at the Institute of Tropical Forest Conservation in Bwindi Impenetrable National Park between 1998 and 2007 where he carried out research on topics such as gap characteristics and regeneration in Bwindi and habitat selection by elephants.

He is currently a PhD Candidate in the Wildlife Conservation Program at the University of Massachusetts in USA which he began in 2007. His current area of research is the mapping of mountain gorilla habitat in Bwindi Impenetrable National Park.



Presentation Outline

- Introduction
- Study area
- Dynamics and distribution of *Sericostachys*
- *Sericostachys* ecology and cyclical patterns
- Interactions of *Sericostachys* with large mammals
- *Sericostachys* and forest regeneration
- Conclusions

Introduction

- Afromontane forests have little closed canopy forest
- This encourages the growth of a dense tangle of light loving herbs, vines, climbers and shrubs
- Bwindi forest in Uganda is known as the 'Impenetrable' because of the dense tangle of undergrowth dominated by a mixture of *Sericostachys*, *Mimulopsis*, Bracken fern, *Rubus apetalus*, *Momordica*, *Alchornea hirtella* that make human movement within forest difficult
- Often these species are mixed in different proportions rarely occurring in pure/single stands

Introduction

- Therefore ecological impacts and interactions of any one species most likely confounded by presence of others
- Though of wide distribution and considerable biomass, there is little empirical evidence on the impact of these herbs/climbers/shrubs species on other forest species
- In addition, the determinants of succession (rates, trajectories etc) in Afromontane forests are not well known

Location of Bwindi Impenetrable

Dynamics and distribution of *Sericostachys*

- *Sericostachys scandens* occurs throughout the Bwindi (1,160 – 2,670m)
- More luxuriant in the more rugged 'south sector' of the forest (>1,700m)
- Early anecdotal records show the presence of dense tangle of forest undergrowth composed of herbs, vines and climbers
- George Schaller in 1958 discarded Bwindi as a study site for gorilla behavior because of the dense tangle of herbs, vines and climbers

Dynamics and distribution of *Sericostachys*

'South sector' more open because of:

• steep slopes that prevent the formation of closed canopy because of small stature of trees

• frequent number of tree falls and snapping of surviving trees

• unstable soils

Dynamics and distribution of *Sericostachys*

Human activities like:

- logging
- agricultural encroachment
- forest fires
- large mammal poaching of 1970s and 80s

could have led to increase in abundance of *Sericostachys* and other species in the open clearings/large gaps but perhaps did not affect the spatial distribution

***Sericostachys* ecology and cyclical patterns**

Known for mass flowering

Followed by die-back

***Sericostachys* ecology and cyclical patterns**

- This process is not well documented for Bwindi apart from imprecise information from local communities and observations of ITFC researchers
- Last mass flowering and die-back occurred in 1998/99 for *Sericostachy*s and *Mimulopsis* in much of the south sector of Bwindi

***Sericostachys* ecology and cyclical patterns**

Flowering and die-back frequently patchy as in 2008/9

Followed by regeneration from seed

***Sericostachys* ecology and cyclical patterns**

- Flowering intervals estimated at 7 to 10 years but no record of this for Bwindi
- Local communities correlate *Sericostachys* mass flowering to high production of bee honey and high miscarriages among pregnant women, though there is no evidence of this

Interactions of *Sericostachys* with large mammals

- There are scientific records of gorillas feeding on *Mimulopsis* pith, and elephants on Bracken fern rhizomes and *Sericostachys* leaves
- The most easily visible large mammal impact on *Sericostachys* is trampling
- Due to the extinction of the buffalo, reduction of elephants, duikers and giant forest hog and low numbers of mountain gorillas, perhaps there is little impact on Sericostachys given its current biomass and spread

Sericostachys and forest regeneration

- *Sericostachys*, *Mimulopsis* and Bracken fern infestation found to be the cause of low sapling stem abundance in the large gaps (>600m^2) of Bwindi
- Difficult to separate the effects of *Sericostachys* as it mostly occurs mixed with other herb/climber/shrub species
- Elephants and gorillas are prefer the dense tangle of herbaceous undergrowth for food

Sericostachys and forest regeneration

- Large mammal activity (excavating, trampling and feeding) has a positive feedback as it leads to herbs/climber/shrubs persisting or even rapidly proliferating and clogging already open areas of the forest
- Impact of *Sericostachys* on bamboo growth: large climber loads breaking bamboo stems and leading to loss of vigor
- Dense tangle of herbs and climbers provide cover to seed and seedling predators like rodents, thus further preventing tree regeneration

Sericostachys and forest regeneration

- Past human disturbance (logging, agricultural encroachment, fires, poaching) could have promoted an alternative/unfavorable successional pathway
- Typical pathway: light disturbance to secondary forest trees to primary/climax forest trees
- Alternative/unfavorable successional pathway: heavy disturbance to herb/shrub/climber tangle stalled in low canopy state

Conclusions

- Human disturbance reduces on habitat integrity and effects of this past disturbance persist for a very long time
- The question for long-term investigations is whether reduction/elimination of human disturbance could return the forest to the desired state and how long this process could take

Conclusions

- In eastern Amazonia, Uhl *et al*. (1988) calculated that recovery to primary forest could occur in lightly used sites within 100-200 yrs, but 500 yrs or more might be required at sites with heavy land-use histories
- Conservation actions to restore the forest to the desired state need to be based on knowledge on the determinants of succession in Afromontane forests, but such data is scarce

Appendix 6: 15 years of monitoring Sericostachys scandens in Nyungwe National Park – its influence on forest structure and composition

Presented by Felix Mulindahabi & Dr Rob Fimbel, PCFN-WCS

Felix Mulindahabi is the Research & Monitoring Manager for the WCS Nyungwe Forest Conservation Project (PCFN). He has been working for PCFN since 1993 where he started as a research assistant. He has been involved in a number of different research projects in Nyungwe including the long term *Sericostachys scandens* study developed with Rob Fimbel. He has had a strong research focus on primates in Nyungwe studying the ecology of the Cyamudongo chimpanzees, black and white colobus and grey-cheeked mangabeys. Currently he is instrumental in the long term monitoring of birds and mammals and ranger-based monitoring and training of park field staff and rangers.

Dr Rob Fimbel was Director of the Nyungwe Forest Conservation Project (PCFN) from 1992-1995. During this period he established a long term *Sericostachys scandens* monitoring study in select areas around Uwinka which continues to this day. He continues to support PCFN through assistance in this study in data analysis and interpretation.

Robert is currently responsible for the stewardship of Washington State's natural resources; a 120 park system in the NW corner of the continental United States that spans 9 ecoregions.

15 years of monitoring *Sericostachys scandens* in Nyungwe National Park: its influence on forest structure and composition

Felix Mulindahabi
and Robert Fimbel

Nyungwe Forest Conservation Project

September 2009

Study objectives

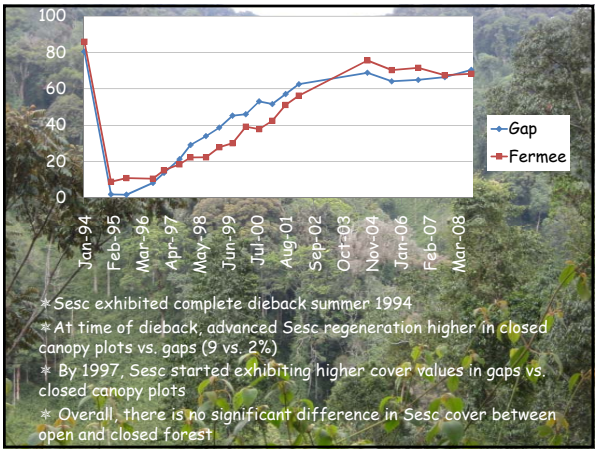
- To describe the degree of flower synchronization across *Sericostachys scandens* (Sesc) dominated sites exhibiting different aspects and canopy cover; and,
- Assess changes in understory species composition during and following a Sesc flowering event.

Methodology

- Study site: Uwinka area (2265-2430m elevation)
- Plots: 14 paired plots (1 gap – 1 closed canopy); each plot 10x25m
- Two 100 point intercept line transects / plot
- Two observers per plot (mean of observers)
- Plots assessed for species cover 20x from 1994-2008

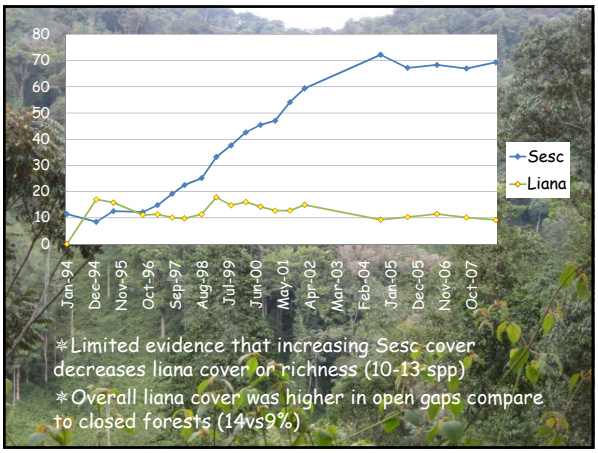
Current findings

Sesc cover (%) in gaps vs. closed canopy conditions



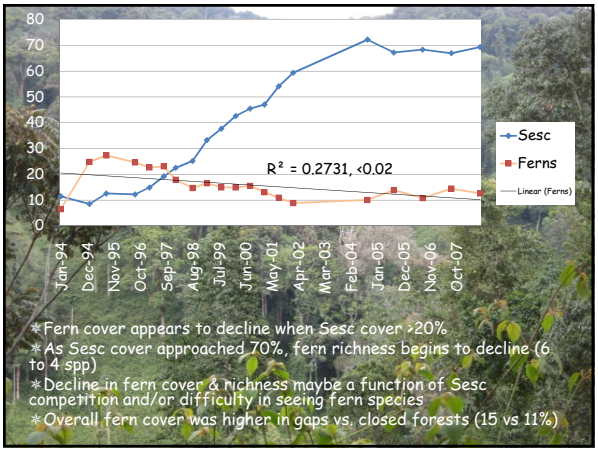
- Sesc exhibited complete dieback summer 1994
- At time of dieback, advanced Sesc regeneration higher in closed canopy plots vs. gaps (9 vs. 2%)
- By 1997, Sesc started exhibiting higher cover values in gaps vs. closed canopy plots
- Overall, there is no significant difference in Sesc cover between open and closed forest

Sesc and liana cover (%)



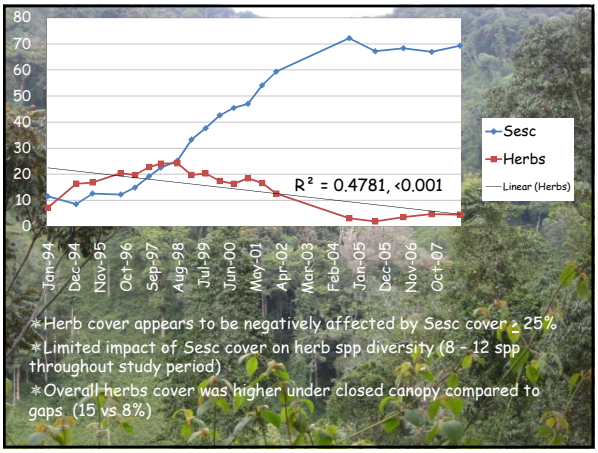
- Limited evidence that increasing Sesc cover decreases liana cover or richness (10-13 spp)
- Overall liana cover was higher in open gaps compare to closed forests (14vs9%)

Sesc and fern cover (%)



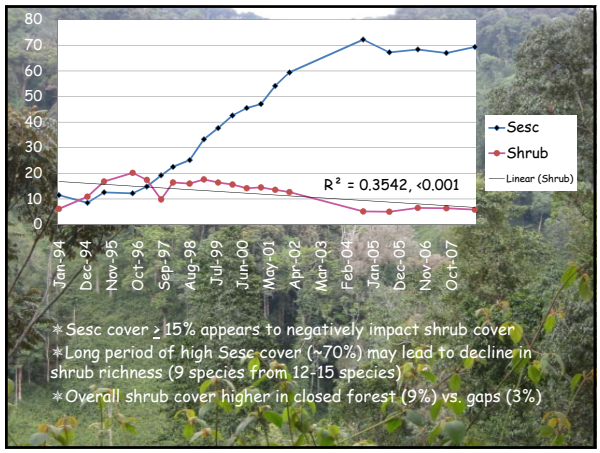
- Fern cover appears to decline when Sesc cover >20%
- As Sesc cover approached 70%, fern richness begins to decline (6 to 4 spp)
- Decline in fern cover & richness maybe a function of Sesc competition and/or difficulty in seeing fern species
- Overall fern cover was higher in gaps vs. closed forests (15 vs 11%)

Sesc and herb cover (%)



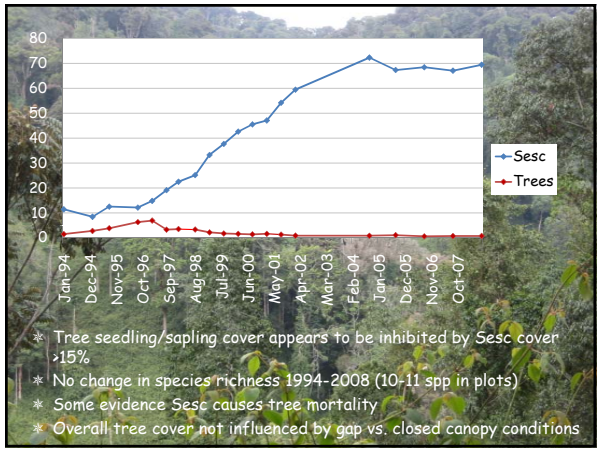
- Herb cover appears to be negatively affected by Sesc cover > 25%
- Limited impact of Sesc cover on herb spp diversity (8 - 12 spp throughout study period)
- Overall herbs cover was higher under closed canopy compared to gaps (15 vs 8%)

Sesc and shrub cover (%)



- Sesc cover ≥ 15% appears to negatively impact shrub cover
- Long period of high Sesc cover (~70%) may lead to decline in shrub richness (9 species from 12-15 species)
- Overall shrub cover higher in closed forest (9%) vs. gaps (3%)

Sesc and tree cover (%)



- Tree seedling/sapling cover appears to be inhibited by Sesc cover >15%
- No change in species richness 1994-2008 (10-11 spp in plots)
- Some evidence Sesc causes tree mortality
- Overall tree cover not influenced by gap vs. closed canopy conditions

Tree highlights

- 203 tree seedlings-saplings/ ha (0.5-4m tall)
- Dominant species include *Macaranga kilimandscharica*, *Carapa grandiflora*, and *Psychotria mahonii*
- One third of trees with >50% Sesc crown coverage

Tentative conclusions

- Immediately following dieback, most lifeforms appear to rapidly increase their cover
- Sesc appears to reach extent of its full cover in 10 years
- Sesc leads to the decline in cover of most lifeforms
- Sesc appears capable of altering species composition (for at least limited periods of time)
- Overall, limited evidence to suggest Sesc is eliminating lifeforms / species in plots

Future of this study

- Modify design to include count of all trees in plots (≥ saplings)
- Continue monitoring for one more Sesc lifecycle
- Study complements other Sesc monitoring efforts at different sites in park

Appendix 7: Long term monitoring plan of Sericostachys scandens in Nyungwe National Park – preliminary results

Presentation by Nicolas Ntare

Nicolas Ntare is a biologist and has been working with PCFN-WCS in Nyungwe National Park as the research and monitoring assistant since 2007. A graduate from the National University of Rwanda, he has carried out a number of research projects in Nyungwe including the diet and behavior of *Cercopithecus hamlyni,* small mammal survey of Nyungwe, assisted natural regeneration in burnt areas and was instrumental in the development and implementation of the Long term monitoring plan of *Sericostachys scandens* in Nyungwe National Park.

Long term monitoring plan of *Sericostachys scandens* at Nyungwe National Park: Preliminary results

By
Nicolas NTARE

Introduction

- *Sericostachys scandens* (*Umukipfu* in Kinyr.) of the plant family Amaranthaceae, is a slender semi-woody climber growing to 20-30m in length (Troupin, 1985).
- The plant forms a dense herbaceous understory layer and being a light demanding species.
- Relationships with large herbivores are not very well studied and are generally anecdotal.

Key questions

- What tree species are infested by *Sericostachys scandens*?
- Is *Sericostachys scandens* spreading?
- Is *Sericostachys scandens* impacting tree mortality?
- Is *Sericostachys scandens* inhibiting tree regeneration?
- What is *Sericostachys scandens* growth and die-back pattern?

Methodology

Six site have been located : Gisakura, Kitabi, Uwinka, Bweyeye, Gisovu and Nshili

1 km transect per site with Six 200m transects

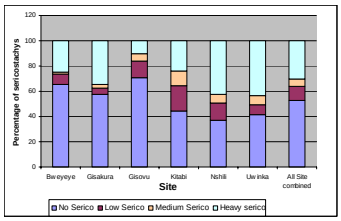
Methodology

- Presence and density of *Sericostachys scandens* is ranked every 20m along the 200m transect in 1m^2 plot.
- Counting of the number of seedlings in the same plots
- Assessment of the general reproductive patterns will be based on estimates of stem tips showing different reproductive stages

Methodology (cont.)

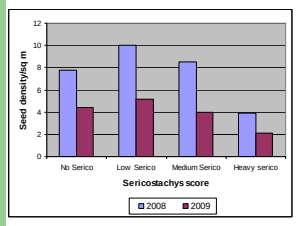
- All tree species greater than 15 cm DBH will be identified along the transects, and presence / absence of *Sericostachys scandens* will be made for each tree.

Score of Sericostachys scandens per site



The area with the least heavy infestation is Gisovu which might be explained by the recent (in 2006) flowering of *Sericostachys scandens* in that area followed by the characteristic die off.

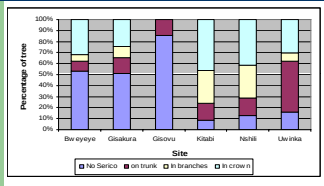
Impact of *Sericostachys scandens* on seedling



➢Results illustrate that there are more seedlings in quadrates with less infestation of *Sericostachys scandens*.

➢ There is a decrease of seedlings compare to the *Sericostachys* score

Presence/absence of Sericostachys scandens on tree per site

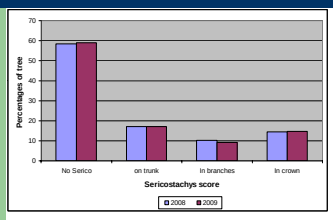


➢All sites have some trees with *Sericostachys scandens* on part of the trees

➢Kitabi, Nshili and Uwinka are the most affected

➢Gisovu has only *Sericostachys* on trunk because of die-off in following flowering in 2006 and now is grown back.

Presence/absence of Sericostachys scandens on tree



➢More than 50% of trees do not have Sericostachys on their part.

➢There is no change for 2 years thus several years are needed to compare results

Conclusion

- This monitoring protocol has been designed to be implemented in the long term to develop a good understanding of this liana
- After a full year of monitoring and from comparisons over several years, in-depth analysis can be carried out which will be able to provide more concrete results.

THANK YOU

Appendix 8: Impacts of Sericostachys scandens on plant diversity in Nyungwe National Park

Presentation by Claudine Tuyishimwe

Claudine is a 4th year Botany and Conservation student at the National University of Rwanda, Biology Department. She carried out her University memoire in Nyungwe National Park in collaboration with NUR and PCFN-WCS on the Impacts of *Sericostachys scandens* on plant diversity in Nyungwe Forest. She also carried out her internship with PCFN-WCS botany team in Nyungwe.

National University of Rwanda

Biology department

Impacts of *Sericostachys scandens* on plant diversity of Nyungwe National Park

Claudine TUYISHIME

Supervised by:

Dr Elias Bizuru

Mrs Nerissa Chao

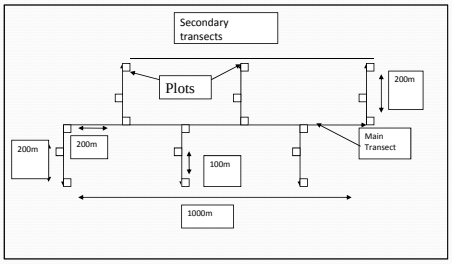
Introduction

- *S. scandens* is a vine that dominates disturbed mountain forests (Cunningham, 1996).
- It has colonized the gaps in the forest caused by fire and cutting of trees in Kahuzi-Biega National Park, DRC and has covered the canopy of trees (Liengola, 2008).
- In Rwanda, *S. scandens* is indigenous species that is among the abundant species at Nyungwe National Park (Plumptre *et al*, 2002).
- The aim of this study is to know whether there are species threatened by the proliferation of *S.scandens*.

Methods

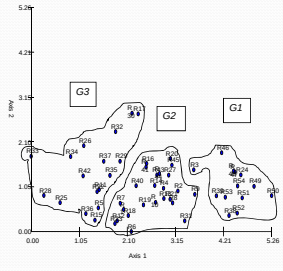
- Prospected sites : *Kitabi, Uwinka, Gisakura*
- Transects: 1 main transect (1km) at each site with 6 secondary transects of 200m each
- Plots : 3 plots at each secondary transect => total of 18 plots per site
- Data collected:
  - DBH (cm)
  - Height (m)
  - *Sericostachys* score & other species score(%)
  - Absence/Presence of *Sericostachys* on tree
- Data analysis: Excel, MVSP

Sampling method



Results

Plant communities identified



G1: *Alchornea hirtella & Chassalia subochreata* located at Gisakura

=>No *S.scandens* because Gisakura is not disturbed and is dominated by tall trees, so the canopy there, is closed; that shows *Sericostachys* like opened areas.

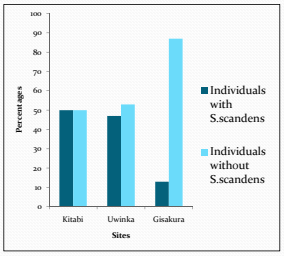
G2: *Sericostachys scandens & Macaranga kilimandscharica* located at Kitabi

=>*Sericostachys* as a light depending species, is associated to *M.kilimadscharica* because this one is of secondary forest species, so all prefer the disturbed & opened areas

G3: *Sericostachys scandens & Pilea bambuseti* located at Uwinka

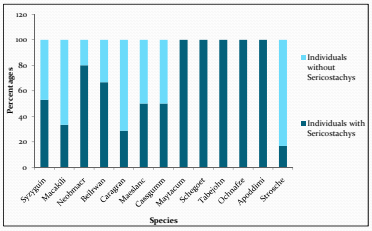
=>*S.scandens* is associated to *Pilea bambuseti* because the transect of Uwinka was located in humid areas that are preferred by *P.bambuseti*

Presence/Absence of Sericostachys on trees at 3 sites



- Kitabi and Uwinka has more *Sericostachys* on trees than Gisakura:
  - the two sites are disturbed,
  - light is abundant,
  - canopy is open.
- Gisakura, is not disturbed, the canopy is closed =>low *S.scandens*

Species affected by *Sericostachys*



Species	Sample size
Syzyguin	17
Macakili	12
Neobmacr	5
Beilrwan	3
Caragran	7
Maeslanc	2
Cassgumm	2
Maytacum	1
Schegoet	1
Tabejohn	1
Ochnafze	1
Apoddimi	1
Strosche	6

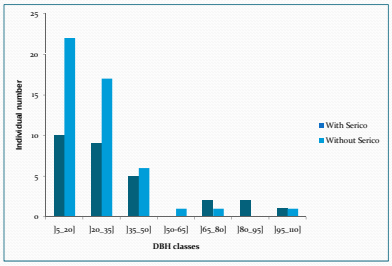
- *Neoboutonia macrocalyx, Syzygium guineense* are also affected by *Sericostachys*, they are of secondary forest; they regenerate highly in disturbed areas which are preferred by *Sericostachys*
- *Beilschimidea* is of primary forest, but it has found in disturbed areas, it could have escaped the forest disturbance

S.scandens around *M.kilimandscharica*

S.scandens around *Neoboutonia macrocalyx*

***Sericostachys* &Tree Size: DBH (cm)**

DBH]5-20] & DBH]20-35] approx. 50% of trees did not have *Sericostachys*
Other classes sample size is too small



***S. Scandens* covering short trees and still climbing on tall trees**

Sericostachys can prevent light reaching the tree.

Gaps colonized by *Sericostachys*

Recommendations

Some studies should be done about *Sericostachys* like:

- The same study in other sites and increase sample size
- *Sericostachys* impacts on tree regeneration and tree health

Appendix 9: Working Groups

WORKING GROUP -1

ADAPTIVE MANAGEMENT (led by Dr. Rob Fimbel and Mr. Louis Rugyerinyange)

BACK-GROUND QUESTIONS

- Is Sericostachys increasing in coverage in Nyungwe over the long-run (over multiple cycles of growth & die-back)?
- Does Sericostachys actually kills healthy trees?
- Has Sericostachys ever been controlled by large mammals now locally extinct (elephants & buffalo)?
- Can young trees establish themselves successfully during and subsequent to the die-back period of Sericostachys, before it increases coverage again?

General

Pls specify stakeholders and their respective responsibilities for each question

1. What are the options for interventions to 'control Sericostachys'? Short term / Long-term
2. How do we monitor the impact of these interventions?

Specific

3. Has the reintroduction of larger mammals (i.e. elephant, buffalo), a rationale in the control of *Sericostachys*?

4. Will Assisted Natural Regeneration be influenced by Sericostachys?
   (refer to the proposed large scale ANR , for which carbon sequestration funding is presently sought)
5. Mechanical removal, is it useful / feasible / economic rational?
6. Is there a potential for demonstration plots – to 'show off' the undertaken control? (also given the pressure to do 'something') / Specify such 'Action Research' activities
7. How to plan 'interventions' – 'action –research' in relation with the Sericostachys cycle?
8. How to communicate management results beyond the management - research community?

WORKING GROUP -2

RESEARCH (led by Mr. Gapusi and Prof.Fischer)

BACK-GROUND QUESTIONS

- Is Sericostachys increasing in coverage in Nyungwe over the long-run (over multiple cycles of growth & die-back)?
- Does Sericostachys actually kills healthy trees?
- Has Sericostachys ever been controlled by large mammals now locally extinct (elephants & buffalo)?
- Can young trees establish themselves successfully during and subsequent to the die-back period of Sericostachys, before it increases coverage again?

General:

Pls specify stakeholders and their respective responsibilities for each question

1. What are the current research needs / gaps in having a better understanding of the ecology and forest function of Sericostachys?

2. What research is needed to determine if management interventions are appropriate?

3. Please determine immediate, medium and long term research and prioritize the identified research questions and who should be responsible.

4. Is there a benefit to cross-site comparisons? If so how best to develop a systematic monitoring protocol to be used at different sites?

5. How to communicate research results beyond the research community