



**HIGHER EDUCATION AND CAPACITY DEVELOPMENT FOR SUSTAINABILITY AND  
CLEAN TECHNOLOGIES IN THE FOREST SECTOR IN MOZAMBIQUE  
“VAGALHÃO”**

**TRAVEL REPORT**  
**August 30 – 14 September, 2014**

**PROGRAM FOR THE FINNISH AND MOZAMBICAN TEAMS**  
**August 30 – 14 September, 2014**

Finnish team:

Roope Husgafvel	Project coordinator
Mikko Martikka	Lecturer

Mozambican team:

Andrade Egas	Professor
Reinaldo Luís	Researcher
Inácio Lhate	Lecturer
Narciso Bila	Researcher/lecturer
Ernesto Júnior	Researcher/lecturer
Tomás Bastique	MSc Student
Adelino Bucuane	“
Devson Gouvindo	“
Zigy Langa	“
Carvalho Matsinhe	“
Eunice Siteo	“
Darla Arrone	“
Paulo Timóteo	Technician
Rafael Munguambe	Driver
Alzido Macamo	“

**Program:**

Sun 31.08		Arrival to Gaborone (Botswana), Registration and welcome bomo reception of The Fifth IASTED African Conference on Environment and Water Resource Management (Africa EWRM 2014), Modelling and Simulation (Africa MS 2014), Power and Energy Systems (AfricaPES 2014) & Health Informatics (AfricaHI 2014)
Mon 01.09 – Wed 03.09		Conference keynotes, sessions and excursions
Fri 05.09		Arrival Johannesburg and travel to Pretoria
Sun 07.09		Arrival of the Mozambican team to Pretoria
Mon 08.09	09:00 – 14:00	Visit to the SAPPI Technology Center in Pretoria. In the evening, travel to Nelspruit.
Tue 09.09	09:00 – 15:30	Visit to the Sappi Ngodwana Mill & field excursion to SAPPI Lowveld forestry operations
Wed 10.09	09:00 – 16:00	Travel to Maputo by UEM cars.
Thu 11.09	09:00 – 16:00	UEM workshop preparations
Fri 12.09	08:00 – 13:30	UEM workshop

## 1. September 1-3, The Fifth IASTED African Conference on Environment and Water Resource Management (AfricaEWRM 2014)

This conference covered multiple themes and MSc (Tech) Mikko Martikka presented our joint paper with the UEM researchers (Prof. Andrade Egas and Dr. Natasha Ribeiro) titled “Development of a study module on environmental engineering – experiences from Mozambican and Finnish higher education collaboration” in the AfricaEWRM Session 2 – Sustainable Development and Climate Change Effects. There was a lot of interest towards our project and its approach. Good discussion took place after the presentation and we were able to establish new links to Botswana actors in this field. Particularly promising discussions for future collaboration took place with distinguished Prof. Hilary I. Inyang, Vice Chancellor of the Botswana Institute of Science and Technology as well as Lecturer and Postgraduate Coordinator Tshiamo Motshegwa at the Faculty Of Science within University of Botswana. We also met many new colleagues during lunches, dinners and excursions and learned a lot about the activities of the Botswana Innovation Hub (<http://www.bih.co.bw/>). Potential collaboration was identified in many areas such as Clean and Bio Technology sectors e.g. for water management and the mining industry which are major topics in Botswana and in the surrounding region. Other interesting focus areas included the role of the science and technology parks in promoting university and industry partnerships and sustainable energy engineering. Our participation in this event was sponsored by FinCEAL travel grants (an initiative by the Finnish Ministry of Education and Culture).





## 2. September 8-9, SAPPI Technology Center, Ngodwana Mill and forestry operations

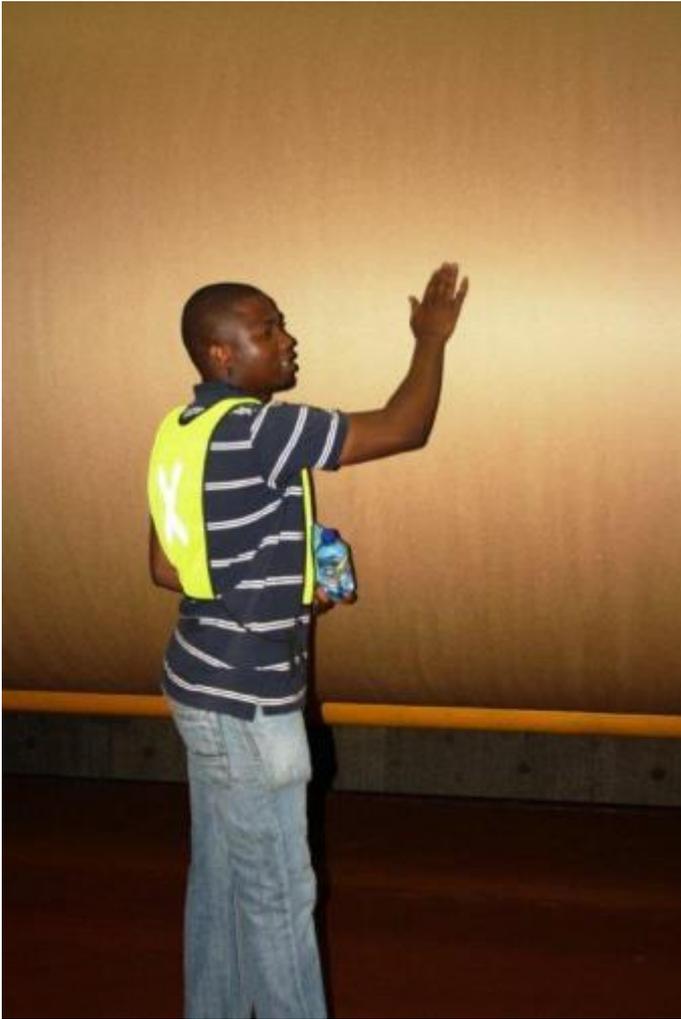
Our comprehensive tour encompassed, for example, presentation of fibre processing, paper sciences, chemical sciences and environmental research capabilities. Research center Manager Charlie Clarke welcomed us and joined the tour and fruitful discussions along with the research line head supervisors and relevant experts sharing knowledge with UEM students and universities staffs. Mozambican visitors were familiarized with laboratory equipment and associated main methodologies. The service role and customers of the center were also discussed. Future collaboration was discussed during lunch offered by SAPPI.



After the research center visit we travelled on UEM transports across the northern part of the country heading east to Nelspruit for overnight stay. There was also spectacular scenery on the way and a good and relaxed atmosphere to talk about the days' experiences, next steps in the project and future planning.

On September 9<sup>th</sup> we had a very informative as well as interactive day at the SAPPI Mpumalanga sites. Visit started with an introductory lecture of local pulp and paper manufacturing by the Ngodwana Mill Manager Mr. Schalk Engelbrecht followed by a mill tour. After the pulp and paper mill visit we were taken right to the heart of the forestry operations guided by one of the leading scientists of the forestry plantations Mr. Phillip Fischer. The holistic and very thorough visit encompassed all fields of interest relative to the UEM study modules; environmental management and engineering aspects as well as sustainability in addition to detailed technical and practical presentation of plantation forestry. Responsibility, Forest and Chain-of-Custody certification, community investment, recycling, biodegradability and carbon issues were also addressed from industry perspective with links to both voluntary initiatives and governmental steering in this field such as policies and regulations. Following pictures present the activities at the Mpumalanga sites on this very productive day.







The forestry operations part of the day took us to tree nurseries, road construction and many plantation sites with hard- and softwood species. Mr. Fischer and SAPPI Forests Environmental Manager Peta Hardy took us around the operations and gave us a lecture “under the canopy” and provided printed summary materials for all students. We learned a lot about tropical plantation forestry and associated sustainability, responsibility, and environmental aspects. Water issues and their history were also extensively covered as were forest sector employment situation and sectoral industry investments in South Africa as a whole. Sappi forests, tree breeding, productivity, pest and diseases, risk management and the numbers and characteristics of forest industry dependent people were also discussed.

The links between forestry and the natural environment including footprint aspects were thoroughly presented and discussed during this excursion. Specific issues covered, for example, grassland management and conservation and water resources, infrastructure, biodiversity stewardship and certification/monitoring. Our forestry operations tour ended up with a fire management demonstration where UEM students has a chance to join in the action. We learned multiple valuable lessons about fire management as a crucial element of plantation forestry in tropical conditions.

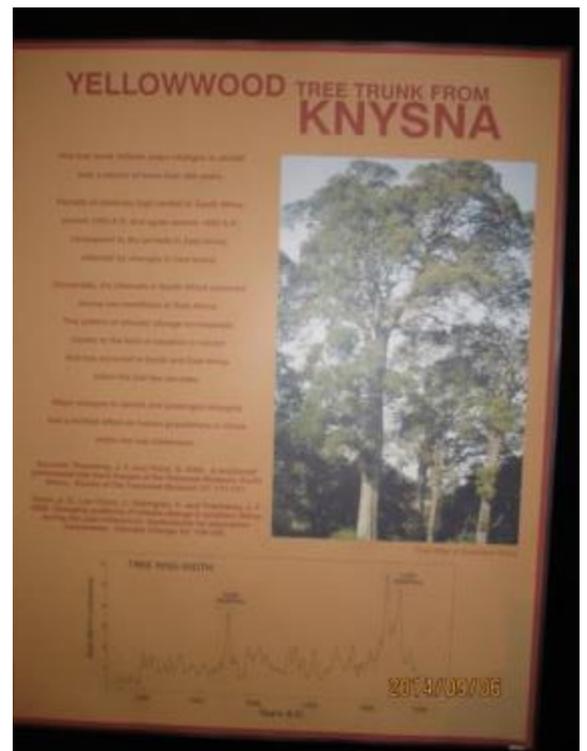








Days in Pretoria gave us a chance to briefly visit and see the Union Buildings and the National Museums of Cultural and Natural History. We also learned about the local wood species in some of the exhibitions.





## **Road to Maputo.**

### **3. September 12<sup>th</sup>, UEM Maputo workshop**

Once back in Maputo the group prepared for a workshop on students' thesis planning and module feedback. The programme of the workshop is presented in Table 1. The report of the workshop is available in our blog and the main theme was research in wood technology encompassing two panels: 1) Drying, preservation and wood chemistry and 2) mechanical processing and wood design. The event was opened with the opening words by the Faculty Dean and the "VAGALHÃO" project coordinators. This was followed by the MSc student thesis topics presentations and group work on UEM research priorities. Each group presented their findings at the end before the networking lunch. The summary of the key findings is presented below.

#### **Summary of discussions**

Discussions/suggestions on MSc research topics

In general, participants considered the selected topics relevant and targeting the main problems related to the wood processing industry in Mozambique. Participants advanced some suggestions for each MSc research topic which will be considered by the students in their research proposal.

## Discussions/suggestions on research priorities in wood technology

### **Wood products from natural forest**

Research should be addressed mainly to lesser used species, specifically in:

- anatomical, physical and mechanical properties of wood;
- design of new products, including the optimization of the dimensions of furniture components;
- drying and preservation; and
- sustainability of the value chain.

Updated national forest inventory is required in order to allow sustainability in forest management. The following criteria for selection of lesser used species should be considered:

- stock availability;
- natural resistance to biodegradation of available species; and
- appearance of wood (grain, colour, texture, brightness, etc. );

### **Wood products from forest plantations**

Research should prioritize:

- anatomical, physical and mechanical properties and wood chemistry of fast growing species;
- Improving applications of stems with juvenile wood;
- efficiency of environmentally friendly preservatives in treatment of wood of fast growing species;
- design of wood furniture of fast growing species, including Eucalyptus wood
- application of wood of fast growing species in civil construction

### **Wood energy**

- Technical, economic and environmental viability for establishing fast growing plantations for charcoal and firewood production;
- evaluation of the quality of charcoal of natural forest and plantations;
- alternative use of harvesting residues and byproducts of the forestry industry for energy generation (ex: briquettes); and
- viability of re-utilization of charcoal residues (charcoal fines) for energy in urban centers.





### Conclusions and recommendations

The workshop provided relevant suggestions for improving the content of the research topics of the current MSc program. Research priorities in wood technology were established it constitutes an important platform for defining research topics of MSc in Wood Technology for next editions.

Table 1. Workshop programme. Facilitator: Reinaldo Luís

Hours	Activities	Responsible
08:00 – 08:30	Registration of participants	Organizing committee
08:30 – 08:45	Opening session	Faculty Dean: Tomás F. Chiconela Vagalhão Coordinator at Aalto University: Roope Husgafvel
08:45-09:00	Objectives of the workshop	Vagalhão Coordinator at FAEF: Andrade Egas
	Presentation and discussion of research topics of MSc program	
09:00 – 09:45	<b>Panel 1. Drying, preservation and wood chemistry</b>	Chair: Narciso Bila
	Effects of the thickness of boards in the quality of conventional drying of wood of Messassa ( <i>Bracystegia spiciformis</i> )	Tomás Bastique
	Use of wood extractives as wood preservatives for lesser used species with low natural durability	Eunice Siteo
	Comparison of lignin content of <i>Eucalyptus grandis</i> and <i>Eucalyptus camuldulensis</i> in different ecological conditions	Darla Arrone
	Discussion	
09:45 - 10:45	<b>Panel 2. Mechanical processing and wood design</b>	Chair: Alberto Manhiça
	Technological analysis of curving wood of 3 tropical species of high commercial value	Carvalho Matsinhe
	Effect of the geometry of saw teeth on productivity and technological quality of sawn wood of Umbila ( <i>Pterocarpus angolensis</i> ) and Chanfuta ( <i>Azelia quanzensis</i> )	Devson Gouvindo
	Optimization of engineering design of school desks of Messassa wood ( <i>Bracystegia spiciformis</i> )	Zigy Langa
	Feasibility of the production of wood products of native forest species using the Numerical Control Computerized	Adelino Bucuane
	Discussion	
10:45 - 11:00	Coffee break	Organizing committee
11:00 – 12:00	Group work: research priorities in wood technology	All
12:00 – 12:45	Oral presentation of group work	All
12:45 - 13:15	Summary and closing session	Project coordination FAEF
13:30	lunch	All