

# SYMPOSIUM PROGRAM

## SYMPO 2010

International Symposium on;  
**MODERNIZING LOCAL SUSTAINABLE TECHNOLOGIES  
AS THE ENGINE FOR SUSTAINABLE DEVELOPMENT**

25 - 26th February 2010  
Safari Park Hotel, Nairobi, KENYA



**JKUAT**

ISO 9001:2008 Certified



**JSPS**



**Organized by:**

**Sustainable Materials Research and Technology Centre (SMARTEC), JKUAT, KENYA  
Japan Society for the Promotion of Science (JSPS), Japan**

**Also supported by:**

**Athi River Mining Cement (ARM Cement), Kenya  
Forum for Sustainable Materials and Technologies, Kenya**



**International Symposium on;  
MODERNIZING LOCAL SUSTAINABLE TECHNOLOGIES AS THE  
ENGINE FOR SUSTAINABLE DEVELOPMENT**

Published by:  
Sustainable Materials Research and Technology Centre (SMARTEC)  
Jomo Kenyatta University of Agriculture and Technology  
P.O. Box 62000-00200  
Nairobi, KENYA  
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## INTRODUCTION

Global sustainable development agenda, which is pegged on three intertwined pillars of Environment, Economy and society, presents a grand opportunity for developing countries to re-engineer and re-package their activities and lifestyles in tune with the rest of the world. It is now becoming clear that traditional or local technologies are indeed sustainable, and could be the engine for sustainable development in Africa. Accordingly, the "International Symposium on modernizing local sustainable technologies as the engine for sustainable development" avails a forum for exchange of traditional, local and modern technologies that have direct bearing on the life of people in Africa, within the concept of eco-villages that holistically integrate various aspects of human settlement mainly comprising eco-housing/infrastructure, eco-sanitation/clean water, sustainable agriculture/livelihood, renewable/clean energy, and much more.

This Symposium is a gathering of scholars, academicians, engineers, architects and other professionals in the construction industry, to exchange ideas on how best local technologies and materials could be sustainably harnessed as the engine for sustainable development in infrastructure development. **It is hoped that the symposium will highlight some of the measures that need to be taken in order to rekindle the fire of sustainable development in developing countries.**

### MESSAGE FROM THE HOST VICE CHANCELLOR

I take this opportunity to welcome all delegates to the International Symposium on modernizing local sustainable technologies as the engine for sustainable development. The symposium comes at an opportune time for us in view of on-going extensive construction works within the university and on the Nairobi-Thika super highway, as well as recent establishment of SMARTEC as a regional centre of excellence for sustainable construction and settlement. We are particularly grateful to the Kenya Government for the ongoing construction of the Nairobi-Thika super highway, which will enormously enhance visibility and accessibility to Jomo Kenyatta University of Agriculture and Technology (JKUAT).



Taking note of the positive impact of recent road construction activities in the country, there is no doubt that the development of infrastructure is a core ingredient of sustainable development in any country. As such, we at JKUAT are happy to host this symposium as part of our contribution towards national development and integration in tune with the aspirations of vision 2030.

On behalf of JKUAT and symposium organizers, I wish to thank all our partners for their support that has led to the successful staging of this symposium. I am particularly privileged to pay special tribute to Japan Society for the Promotion of Science (JSPS) of Japan and Athi River Mining Co. of Kenya for their continued friendship and support.

I wish you fruitful deliberations during this symposium.

A handwritten signature in black ink, appearing to read "M. Imbuga".

Prof. Mabel Imbuga, PhD, EBS  
Vice Chancellor, JKUAT

## THE SYMPOSIUM TEAM

**SYMPO 2010**



### KEYNOTE SPEAKERS

PROF. M. KIMURA, KYOTO UNIVERSITY, JAPAN  
MR. P. PAUNRANA, MD-ARM CO., KENYA  
PROF. L. KYULULE, UNIVERSITY OF DAR-ES-SALAAM, TANZANIA

### SYMPOSIUM HOST

**Prof. Mabel Imbuga**, Professor and **Vice Chancellor** of Jomo Kenyatta University of Agriculture and Technology (JKUAT).  
P.O. Box 62000-00200, Nairobi, KENYA,

Assisted by:

**Prof. Esther Kahangi**, Professor and **Deputy Vice Chancellor** in charge of Research, Production and Extension, Jomo Kenyatta University of Agriculture and Technology (JKUAT).  
P.O. Box 62000-00200, Nairobi, KENYA.



### SYMPOSIUM CONVENORS

**Prof. W. O. Oyawa**, Associate Professor of Civil Engineering, and **Director**, Sustainable Materials Research and Technology Centre (SMARTEC), JKUAT. P.O. Box 62000-00200, Nairobi, KENYA.

Assisted by:

**Dr. Komazawa**, **Director**, Japan Society for the Promotion of Science (JSPS) Nairobi Research Station. P.O. Box 14958-00800, Nairobi, KENYA.

**SUMMARY SYMPOSIUM PROGRAM**

	9.00 – 10.30 am	Break 10.30-11.00am	11.00-12.30 pm	Lunch 12.30-2.00pm	2.00-3.30pm	Break 3.30-4.00pr	4.00-5.00pm	Evening
<b>Day 1</b> 25-02-2010		Break	Keynote Papers  Prof. A. Kyulule Mr. P. Paurana	Lunch	Papers	Break	Papers	Social evening
<b>Day 2</b> 26-02-2010	Keynote Papers  Prof. Kimura Dr. I. Rubaratuka	Break	Papers	Lunch	Papers  <div style="text-align: center;">  </div>	Break	DEPARTURE	

**TIME DURATION FOR PRESENTATIONS**

Keynote papers: 30mins

Papers: 20 mins

**SYMPOSIUM PROGRAM**

**Day 1: Thursday, 25<sup>th</sup> February 2010 9.30 am – 5.00 pm**

<b>TIME</b>	<b>ACTIVITY</b>
<b>9.30- 10.30 AM</b>	<p><b>OPENING CEREMONY</b>  <i>Safari Park Bougainville Conference Room</i></p> <p>Opening Remarks by Convenor –Prof. W. O. Oyawa                      Remarks by Deputy Vice Chancellor (RPE), JKUAT – Prof. Esther Kahangi                      Remarks by Vice Chancellor, JKUAT – Prof. Mabel Imbuga                      Speech and Opening by the Chief Guest – Eng. M.S.M. Kamau, PS, Ministry of Roads</p> <p>Photo session</p>
<b>10.30- 11.00 AM</b>	<b>TEA BREAK</b>
<b>11.00- 12.30 PM</b>	<p><b>KEYNOTE PAPERS</b>  <i>Bougainville Conference Room</i>                      Chair/Co-Chair-Prof. S.K. Mwea and Dr. I. Rubaratuka</p> <p>1. Local Sustainable Technologies And Their Dissemination  <i>Prof. A. L. Kyulule, University of Dar-es-Salaam (Tanzania)</i></p> <p>2. Manufacture Of High Quality Rhino Cement  <i>Mr. P. Paunrana, Managing Director Athi River Mining Co. Ltd. (Kenya)</i></p> <p><b>DISCUSSIONS</b></p>
<b>12.30-2.00 PM</b>	<b>LUNCH</b>

**Day 1: Thursday, 25<sup>th</sup> February 2010 2.00 pm – 9.00pm (Cont'd)**

<p><b>2.00 – 3.30 PM</b></p>	<p><b>PAPERS</b>  <b>Bougainville Conference Room</b>  <b>Chair/Co-Chair-Prof. S.K. Mwea and Dr. I. Rubaratuka</b></p> <p>3. Nanotechnology- Based Water Treatment For Developing Countries  <i>M. S. Onyango and F.O. Otieno</i></p> <p>4. Assessment Of Applicability Of Rapid Legal Assessment Tool(RLAT) In Evaluating Adequacy Of Flood Management Policy In Kenya  <i>M.O. Nyadawa (Kenya)</i></p> <p>5. Laterized Quarry Dust And Recycled Concrete For Sustainable Concrete Structures  <i>T. M. Musiomi, W. O. Oyawa and P. Mulu (Kenya)</i></p> <p>6. Energy Considerations In Sustainable Construction  <i>V. A. Okumu, S. M. Shitote (Kenya)</i></p>	
<p><b>3.30- 4.00 PM</b></p>	<p><b>TEA BREAK</b></p>	
<p><b>4.00 – 5.00 PM</b></p>	<p><b>PAPERS</b>  <b>Bougainville Conference Room</b>  <b>Chair/Co-Chair-Prof. A.L. Kyulule and Dr. S.O. Abuodha</b></p> <p>7. Use Of Moringa Oloifera As Coagulant For Algae Removal In Maturation Pond Effluent  <i>G. Mwaura (Kenya)</i></p> <p>8. Total Quality Management As A Control Tool In The Construction Industry For Sustainable Development  <i>I. F. Sanewu and W.O. Oyawa (Kenya)</i></p> <p>9. Research opportunities for young researchers  <i>F. Mathooko (Kenya)</i></p>	
<p><b>7.00 – 9.00 PM</b></p>	<p><b>SYMPOSIUM DINNER</b></p>	

Day 2: Friday, 26<sup>th</sup> February 2010 9.00 pm – 4.00pm

TIME	ACTIVITY	
9.30- 10.30 AM	<p><b>KEYNOTE PAPERS</b></p> <p><i>Bougainville Conference Room</i></p> <p><b>Chairs-Prof. F. Mathooko and Dr. M.O. Nyadawa</b></p> <p>10. Applications Of Do-Nou Technology For The Maintenance Of Rural Infrastructure In Developing Countries <i>Prof. Makoto Kimura, Kyoto University ( Japan)</i></p> <p>11. Next Frontiers In Engineering Education And Practice <i>Prof. W. O. Oyawa (Kenya) and Dr. I.A. Rubaratuka (Tanzania)</i></p>	
	<b>DISCUSSIONS</b>	
10.30- 11.00 AM	<b>TEA BREAK</b>	



**Day 2: Friday, 26<sup>th</sup> February 2010 11.00 AM – 4.00 PM (Cont'd)**

<p><b>11.00– 12.30 PM</b></p>	<p><b>PAPERS</b>  <b>Bougainville Conference Room</b>  <b>Chairs-Prof. F. Mathooko and Dr. M.O. Nyadawa</b></p> <p>12. Infrastructure And Technology Planning And Development For Sustainable Industrial Growth; Lessons From Wood Industries In Kenya  <i>S.I., Ng'ang'a (Kenya)</i></p> <p>13. Experimental Study Of Bamboo As A Sustainable Reinforcement Of Concrete Beams  <i>N.K. Maritim, R. N. Mutuku, C. K. Kabubo and Walter O. Oyawa (Kenya)</i></p> <p>14. Spiritual dimension of development; Theory About The Book Sealed With 7 Seals  <i>R. K. Kirerah (Kenya)</i></p> <p>15. Mainstreaming Participatory Planning And Decision Making Into Modernizing Local Sustainable Technologies In Kenya  <i>K. Doris (Kenya)</i></p>	
<p><b>12.30 – 2.00 PM</b></p>	<p><b>LUNCH</b></p>	
<p><b>2.00 – 3.30 PM</b></p>	<p><b>PAPERS</b>  <b>Chairs-Prof. W. Oyawa and Dr. S.O. Abuodha</b>  <b>Bougainville Conference Room</b></p> <p>16. Integrated Watershed Management For River Basin Organisation: Institutions, Functions And Results  <i>W. Ndirangu (Kenya)</i></p> <p>17. Sustainable Construction: Which Way For Kenya?  <i>J. M. Karimi (Kenya)</i></p> <p>18. The Behavior Of Sugar Cane Waste Fiber Ash As A Cementing Material  <i>J. N. Mwero, G. O. Rading, S. O. Abuodha, S. M.Mumenya and F. P. Kavishe (Kenya)</i></p>	
<p><b>03.30-04.00 PM</b></p>	<p><b>CLOSING</b></p>	

## SYMPOSIUM VENUE - SAFARI PARK HOTEL, NAIROBI, KENYA

The Safari Park Hotel offers unrivalled selection of conference venues, seminar options, workshop ideas and team-building pursuits as well as a complete business support service and an integrated conference planning and management team. The hotel is the largest conference and events venue in Nairobi, Kenya and a household of international conferences in Africa.



Safari Park hotel

The symposium will be held in the Bougainville Conference Room. The Bougainville Conference Room is charmingly presented and African themed, with floor to ceiling windows. This room opens out to the garden terrace with sweeping view of the hotel's inland lake. **Features of the Bougainville Conference Room** include Pillarless room with wooden polished floor, with a capacity of 200 delegates. Delegates are most welcome to enjoy African hospitality at its best.

### Hotel map



Bougainville Conference Room

## ABOUT THE HOST CENTRE

**SMARTEC**  
Sustainable Materials' Research and Technology Centre  
Pursuing Excellence in Sustainable Construction



### Introduction

Sustainable Materials Research and Technology Centre (SMARTEC) is established at JKUAT as a multi-disciplinary research centre of excellence in sustainable construction and settlement. The centre is **inspired** by the observed world-wide trend towards sustainable development (hence sustainable construction and settlement), as well as the acute shortage of housing and infrastructure in Kenya.

Noting that provision of housing and infrastructure are key components of vision 2030, SMARTEC's **mission** is to conduct research, create innovations, and train next generation researchers and scholars in the area of sustainable construction and settlement.

The **vision** of SMARTEC is to become one of the leading research, innovation and technology centres in sustainable construction materials and technologies relating to construction and building technology and eco-technology in general.

### Research, Innovation and Extension Projects

Research and innovation at SMARTEC are undertaken in the form of projects.

Current projects include;

- i) Eco-housing and Infrastructure Project
- ii) Eco-village project

#### Eco-housing and Infrastructure Project

Eco-housing and Infrastructure Project is the flagship project of SMARTEC. Inspired by the global need for sustainable development earth(soil) is re-emerging as the grand eco-material for the 21<sup>st</sup> century due to its availability, environmental/cultural appropriateness, structural adequacy, familiarity to the local people, "breathability", amongst others.

As part of prototype testing and implementation, model eco-structures employing local materials have been constructed, and training conducted for the youth in rural areas (Figs. 1-2). Additionally, the project seeks to; improve the environmental sustainability of low-cost/affordable housing, increase the active participation of ordinary men and women in the markets for building materials, construction and shelter.



Fig. 1 Constructed eco-house, and training the youth in the construction of rammed earth wall



Fig. 2 Double-storey rammed earth building and single story eco-house under construction

### Postgraduate courses at SMARTEC

#### MSc in Construction Engineering & Management

This popular MSc course has been designed for professionals involved in the construction industry or recent graduates who have a recognized basic degree in Civil Engineering or Construction Engineering and Management or Architecture or Construction Management, or Agricultural Engineering or Biomechanical & Process Engineering or equivalent, The course theory is conducted in Nairobi Central Business District (CBD), while practicals/laboratory work is conducted at the main campus at Juja. The main objective of the programme is to develop competent and well-rounded construction engineers and managers who will have the skills to source, secure and effectively handle projects in the domestic and international construction market. The Master of Science Degree shall be done by course work, examination and thesis.

### Short courses at SMARTEC

One week and two-week short courses are available in the following areas;

- 1) Eco-building Technology and Sustainable Construction
- 2) Production of Eco-materials
- 3) Construction Project Management
- 4) Concrete and Cement Technology

# *A tribute to our partners*



## EAST AFRICAN JSPS ALUMNI ASSOCIATION



ForSMAT was founded as a forum of like-minded scholars in Kenya, Japan, etc., to promote training and practical activities related to the adoption of sustainable technologies and materials for infrastructure development.