

UNIVERSITI MALAYSIA TERENGGANU 11TH  
INTERNATIONAL ANNUAL SYMPOSIUM ON  
SUSTAINABILITY SCIENCE AND MANAGEMENT

# UMTAS 2012

## PROCEEDINGS

*Greening the Technologies and Resources  
for Human Wellbeing*



9 – 11th July 2012  
Ri-Yaz Heritage Marina Resort & Spa,  
Kuala Terengganu, Malaysia

*Hosted by*  
Faculty of Agrotechnology and Food Science  
and  
Faculty of Fisheries and Aqua-Industries

#### Declaration

All manuscripts printed in this proceeding had been reviewed and edited by academicians of Universiti Malaysia Terengganu. Organizing committee will not be responsible for any unintentional errors made during the publication of this proceeding. Each participant is responsible on the originality and quality of the manuscript.



## PREFACE

Sustainable development has become an important trend of thought in the scientific community, especially the concern for human wellbeing which includes cleaner environment, sustained level of economic development without excessive waste and pollution, and the protection of natural resources and biodiversity. To accomplish this, a sense of citizenship in the sustainable development should be developed through the delivery of quality education and training, by reappraisal of our core values system, and the empowerment of green community that affect the personal behavior and preference towards green technologies.

Thus, the theme of this year's seminar – "Greening the Technologies and Resources for Human Wellbeing" is relevant because green technologies is believed to be the key to overcome environmental degradation of natural resources, improve health and lives, protect ecosystems, reduce costs to the government in its efforts to mitigate the impact of development, and serve as an alternative in order to boost the economy. Green technology acts as an umbrella term encompassing the investment asset class, technology and business sectors which include clean energy and environmental, sustainable green products and services.

This symposium is therefore timely and most welcome because it has brought together scientists, policy-makers, businessmen and concerned individuals to examine the challenges and opportunities to make this world a better place for all creatures. The sub-themes encompass topics of relevance in the present context of sustainability science and management. The largest contributions for this proceeding are in the field of Sustainability, Food Science and Technology as well as Science, Technology and Engineering with more than 30 papers submitted for each category. Papers from other subtopics i.e. Agriculture, Fisheries, Aquaculture and Social Sciences remain popular topics with almost equal number of papers. It is important to note that this meaningful gathering has acquired a great amount of scientific knowledge and provides an excellent platform for all resource people and individuals with experience to share their research findings and exchange information on best practice on sustainable development and resources.

The manuscripts submitted were edited and refereed by a dedicated group of academicians from UMT. I would like to thank all of them for their efforts and contributions. My heartfelt thanks also dedicated to all contributors for their papers.

Finally, on behalf of our Editorial Board, my deepest gratitude to the Vice Chancellor and the Chairman of the Organizing Committee for their endless support and encouragement in ensuring the success of Universiti Malaysia Terengganu 14th International Annual Symposium on Sustainability Science and Management.

Chief Editor  
June 2012

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