

# 2019 6th International Conference on Environmental Systems Research (ICESR 2019)

**December 18-20**

**Melbourne, Australia**

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# Conference Venue

## Mantra Bell City

**Add: 215 Bell Street, Preston, Victoria, 3072, Melbourne**

Tel: +61 3 9485 0382 / Email: [annabelle.almer@mantra.com.au](mailto:annabelle.almer@mantra.com.au) / website: <http://www.bellcity.com.au/>



### **Hotel Introduction:**

Mantra Bell City offers premium accommodation in Melbourne's vibrant inner North. Just 20 minutes from Melbourne Airport and the CBD the Bell City complex offers prime location for corporate travelers and guests wishing to explore Melbourne and its surrounds at leisure.

Home to two restaurants and a café, resort-style facilities including an outdoor pool; 24hour gym and sauna, Mantra Bell City is the perfect destination.

When you're travelling on a budget, Break Free Bell City offers a relaxing stay at a price you can't resist. The comfortable hotel rooms are suitable for both short and long-term stays, offering everything you need during your time in Melbourne.

**The organizer doesn't provide accommodation, and we suggest you make an early reservation.**

**For the personal and property safety of the participants, please pay attention to notes below:**

**1-Please take care of your belongings all the time in case of any loss.**

**2-Participants are required to wear the conference representative card near the conference venue in the hotel, please do not lend the representative card to the irrelevant people and not "carry" irrelevant people into the venue.**

**3-The organizer is not responsible for the loss of participants.**



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**Session Chair:** Dr. Angela T. Ragusa

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## 2019 Melbourne Conference Introductions

Welcome to HKCBEEES 2019 conference in Melbourne, Australia. The objective of the Melbourne conference is to provide a platform for researchers, engineers, academicians as well as industrial professionals from all over the world to present their research results and development activities in the field of Environment Pollution and Prevention.

**2019 6th International Conference on Environmental Systems Research (ICESR 2019)**

Papers will be published in the following conference proceeding:

E3S Web of Conferences



**E3S Web of Conferences (Open Access proceedings in Environment, Energy and Earth Sciences)**, which is indexed by Ei Compendex, Scopus, Google Scholar, CAS, DOAJ, CPCI (Web of Science), EBSCO, ProQuest.

Conference website and email: <http://www.icesr.org/prog.html>; [icesr@cbees.net](mailto:icesr@cbees.net)



# Presentation Instructions

## Instructions for Oral Presentations

### **Devices Provided by the Conference Organizer:**

Laptop Computer (MS Windows Operating System with MS PowerPoint and Adobe Acrobat Reader)

Digital Projectors and Screen

Laser Sticks

### **Materials Provided by the Presenters:**

PowerPoint or PDF Files (Files should be copied to the Conference laptop at the beginning of each Session.)

### **Duration of each Presentation (Tentatively):**

Keynote Speech: about **40** Minutes of Presentation and **5** Minutes of Question and Answer

Invited Speech: about **25** Minutes of Presentation and **5** Minutes of Question and Answer

Regular Oral Presentation: about **12** Minutes of Presentation and **3** Minutes of Question and Answer

## Instructions for Poster Presentation

### **Materials Provided by the Conference Organizer:**

The place to put poster

### **Materials Provided by the Presenters:**

Home-made Posters

Maximum poster size is A1 (841mm high and 594mm wide)

Poster must be in the "Portrait" orientation not "Landscape"

Load Capacity: Holds up to 0.5 kg

**During your poster presentation, the author should stand by your poster to explain and answer the questions from the attendee. The time duration will be around three minutes.**

## Best Presentation Award





One Best Presentation will be selected from each presentation session, and the Certificate for Best Presentation will be awarded at the end of each session on December 19, 2019.

## Dress code

Please wear formal clothes or national representative of clothing.



## Brief Schedule for Conference

<b>Day 1</b>	<p><b>December 18, 2019 (Wednesday)</b> 10:00~17:00</p> <p><b>Venue: Mantra Bell City (Lobby)</b>                  (Add: 215 Bell Street, Preston, Victoria, 3072, Melbourne)                  Participants Onsite Registration &amp; Conference Materials Collection</p>
	<p><b>December 19, 2019 (Thursday)</b> 9:00~18:30</p> <p>Arrival Registration, Keynote Speech, Invited Speech, Conference Presentation</p>
<b>Day 2</b>	<p><b>Morning Conference</b> <b>Venue: Vienna Room</b></p>
	<p><b>Opening Remarks</b> 9:00~9:05</p> <p>Prof. R. J. (Dick) Haynes                  The University of Queensland, St Lucia, Queensland</p>
	<div style="display: flex; align-items: center;">  <div> <p><b>Keynote Speech I</b> 9:05~9:50</p> <p>Topic: “Constructed Wetlands Technology as an Aid to Remove Metal/Metalloid Pollutants from Wastewater Streams”                      Prof. R. J. (Dick) Haynes                      The University of Queensland, St Lucia, Queensland</p> </div> </div>
	<div style="display: flex; align-items: center;">  <div> <p><b>Keynote Speech II</b> 9:50~10:35</p> <p>Topic: “Progress on Developing Small Scale Biogas Electric Generation for Developing World”                      Prof. Tjokorda Gde Tirta Nindhia                      Udayana University, Indonesia</p> </div> </div>
	<p><b>Coffee Break &amp; Group Photo Taking</b> 10:35~11:00</p>
	<div style="display: flex; align-items: center;">  <div> <p><b>Invited Speech I</b> 11:00~11:30</p> <p>Topic: “Carbon Footprint of an EUR-sized Wooden and a Plastic Pallet”                      Dr. Ivan Deviatkin                      Lappeenranta-Lahti University of Technology LUT, Finland</p> </div> </div>
<div style="display: flex; align-items: center;">  <div> <p><b>Invited Speech II</b> 11:30~12:00</p> <p>Topic: “Awareness that Coal-Powered Energy is Environmentally Degrading Insignificantly Affects its Consumption”                      Dr. Angela T. Ragusa                      Charles Sturt University, Australia</p> </div> </div>	



2019 HKCBEEES MELBOURNE CONFERENCE

	<b>Lunch 12:00~13:30</b>	
	<b>Venue: Restaurant in the Hotel</b>	
	<b>Afternoon Conference</b>	
	<b>Session 1: 13:30~15:45</b> <b>Venue: Vienna Room</b> 9 presentations-Topic: "Energy Saving and Emission Reduction" <b>Session Chair: Dr. Ivan Deviatkin</b>	<b>Session 2: 13:30~15:45</b> <b>Venue: Beijing Room</b> 9 presentations-Topic: "Water Resources and Environmental Technology" <b>Session Chair: Prof. Jai-Young Lee</b>
	<b>Coffee Break 15:45~16:00</b>	
	<b>Poster Session: 16:00~16:30</b> <b>Venue: Vienna Room</b> 9 presentations-Topic: "Resource and Environmental Science" <b>Session Chair: Prof. Tjokorda Gde Tirta Nindhia</b>	
	<b>Session 3: 16:30 ~18:30</b> <b>Venue: Vienna Room</b> 8 presentations-Topic: "Air Pollution and Water Pollution" <b>Session Chair: Prof. R. J. (Dick) Haynes</b>	<b>Session 4: 16:30~18:30</b> <b>Venue: Beijing Room</b> 8 presentations-Topic: "Environment and Sustainable Development" <b>Session Chair: Dr. Angela T. Ragusa</b>
<b>Dinner 18:30</b>		
<b>Venue: Restaurant in the Hotel</b>		
<b>Day 3</b>	<b>December 20, 2019 (Friday) 9:00~17:00</b> <b>One Day Visit</b>	

**Tips:** Please arrive at the conference to upload or copy PPT into the laptop room 10 minutes before the session begins.

**Note:** (1) The registration can also be done at any time during the conference.

(2) The organizer doesn't provide accommodation, and we suggest you make an early reservation.

(3) One Best Presentation will be selected from each presentation session, and the Certificate for Best Presentation will be awarded at the end of each session on December 19, 2019.

**For the personal and property safety of the participants, please pay attention to notes below:**

**1-Please take care of your belongings all the time in case of any loss.**

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## Keynote Speaker Introductions



### Keynote Speaker I

9:05~9:50

Prof. R. J. (Dick) Haynes  
The University of Queensland, St Lucia, Queensland

**Professor R. J. (Dick) Haynes** works in the areas of soil and environmental science. His present research interests are in the use and recycling of industrial, agricultural and municipal wastes and minimising their effects on the environment. He has extensive experience having worked as both an applied research scientist and as a university professor and has worked in New Zealand, South Africa and Australia. He has published over 170 original research papers in international journals, over 20 review papers in international volumes as well as many conference and extension papers and contract reports. He has been an invited keynote speaker at 7 international conferences and has served on the editorial board of 4 international research journals. He has acted as principal supervisor and co-supervisor of PhD, MSc and honours students in both South Africa and Australia. Professor Haynes has carried out research in commercial horticultural, pastoral, arable and forestry production as well as in small-holder semi subsistence agriculture. He has also worked on bioremediation of soils contaminated with organic pollutants, rehabilitation of mined sites, application of organic and inorganic wastes to soils and the effects of heavy metal contaminants on soil processes. His research has been mainly in the areas of applied soil chemistry and soil microbiology/biology with links to soil physical properties and to pollution of air and water. He has specialised in working on applied problems and maintains strong links with industry. Major areas of research have included the role of grazing animals in the fertility of pastoral soils, N cycling and gaseous and leaching losses from arable and pastoral systems, soil quality and soil degradation under agricultural land use, effects of soil contaminants on soil processes, rehabilitation and remediation of contaminated, degraded and mined sites and use of wastes as soil amendments.

**Topic: “Constructed Wetlands Technology as an Aid to Remove Metal/Metalloid Pollutants from Wastewater Streams”**

**Abstract**—The advantages of lower operational and maintenance costs have resulted in the use of constructed wetlands for wastewater treatment increasing rapidly throughout the world. The three main types of constructed wetland are surface flow, horizontal subsurface flow and vertical subsurface flow. Often hybrid systems are used. The removal of nitrogen and organics by such systems has gained substantial attention in recent years. Nonetheless, constructed wetlands can also be used to remove inorganic pollutants from wastewater. Inorganic contaminants (e.g. phosphate, metals and metalloids) are removed by a combination of mechanisms including precipitation reactions prevalent under anaerobic and/or aerobic conditions and specific adsorption reactions onto the surfaces of the filter medium. In addition, precipitation of Fe and Al initially present in the wastewater stream can result in formation of new, highly active, hydroxyl-Al and Fe adsorption surfaces which can coat the



surfaces of the filter medium. Waste-based adsorbent materials such as blast furnace slag and Fe and Al oxide ores can be used in the filter medium of the wetland or as add-on reactive filters in order to increase the effectiveness with which inorganic contaminants are removed. Although plant uptake of pollutants is often small, the presence of growing plants in a wetland promotes removal of pollutants by a variety of mechanisms including the filtering effect of roots, rhizodeposition of organic matter, transport of O<sub>2</sub> to the rhizosphere and moderation of rhizosphere pH. While organic pollutants are biodegraded and removed from the wastewater stream, phosphate and metals remain sequestered within the wetland. The reversibility of the sequestering reactions therefore needs to be carefully considered since the ultimate fate of metals is an important consideration. Constructed wetlands are now a widely accepted green technology for wastewater treatment and improved removal efficiencies will come from a greater understanding of the interacting processes involved.



## Keynote Speaker II

9:50~10:35

Prof. Tjokorda Gde Tirta Nindhia  
Udayana University, Indonesia

**Prof. Tjokorda Gde Tirta Nindhia** received Doctor Degree from Gadjah Mada University (UGM) Yogyakarta, Indonesia on August 2003, with major field of study was Material Engineering. He participated in various international research collaborations such as with Muroran Institute of Technology Japan (2004), Toyohashi University of Technology Japan (2006), Leoben Mining University Austria (2008-2009), Technical University of Vienna Austria (2010), Institute Chemical technology of Prague Czech Republic (2012-now) and very recently with Michigan State University (MSU) and University of Hawaii in the USA under Fulbright Scholarship. His current job is as Full Professor in the field of Material Engineering at Engineering Faculty, Udayana University, Jimbaran, Bali, Indonesia. His research interest covers subjects such as, Biomedical Engineering, biosensor, biomaterial, waste recycle, failure analyses, advance ceramic, metallurgy, composite, renewable energy, and environmental friendly manufacturing.

### Topic: “Progress on Developing Small Scale Biogas Electric Generation for Developing World”

**Abstract**—Anaerobic digester is solution for processing organic waste with providing useful side product such as biogas and fertilizer. anaerobic digestion has in recent years received attention among governments in a number of countries. A lot of biogas plant were built with incentive from the government that make biogas available abundantly. Biogas can be used as a fuel of internal combustion engine. The engine can be used to run electric generator and providing electricity. It is available in the market biogas electric generator wit big size to serve big biogas plant with certainly expensive since the engine should be design specifically for biogas combustion Engine. Small size biogas engine are not available in the market due to complexity arrangement in the biogas plant. This report is provided with successful design of small size biogas electric generator that suitable for small size biogas plant. The engine can be made from 4 stoke engine or 2 stroke engine or more even can also by converting small diesel engine to be fueled with biogas. The technologies that are over in these work is not base on dual



fuel of biogas and petroleum, but concentrate for flexible fuel, that is mean the engine is can be operated with biogas or if biogas not available the engine can be run with petroleum or LPG gas separately. By this technology, small biogas electric generator can be provided from around 1000 Watt up to 10000 watt.

Coffee Break and Group Photo Taking

10:35~11:00



## Invited Speaker I

11:00~11:30

Dr. Ivan Deviatkin

Lappeenranta-Lahti University of Technology LUT, Finland

**Dr Deviatkin** currently acts as a postdoctoral researcher at LUT University, Finland. He completed his doctoral degree in November 2017 on the topic of the environmental sustainability of waste management systems with the focus on pretreatment using multiple wastes as case-studies. During his doctoral studies, he has participated in several projects studying the impacts of managing deinking sludge, sewage sludge, sewage sludge ash, municipal solid waste, thermal residues, and waste incineration bottom ash. After finishing his doctoral degree, he was conducting research at Technical Research Center of Finland VTT during 2018 where he has been involved in projects related to pyrolysis of plastic waste and assessment of environmental impacts of li-ion batteries, among other projects. His present research interests explore environmental sustainability of waste management. Particularly, he studies the impacts of producing composites from construction and demolition waste, the impacts of recovering nitrogen during thermal drying of sewage sludge and other organic residues. Deviatkin has published over 15 scientific articles. The research projects to be launched during this year assess the sustainability of flexible electronics and optics, as well as waste management in Russia.

### Topic: "Carbon Footprint of an EUR-sized Wooden and a Plastic Pallet"

**Abstract**—Pallets are an essential element of existing logistics worldwide. Pallets are simple in structure, yet they can be made of different materials, in varying dimensions, and be marketed via alternative management systems. This paper examines a carbon footprint, an indicator of impact on climate change, of a widely used EUR-size (1200 mm x 800 mm) pallet made of wood or plastic using the data from previously published literature. The study is geographically representative of Finland, while time and technological representativeness depend on the studies reviewed. On average, the production of a wooden pallet, i.e. cradle-to-gate, has a partial carbon footprint of 5.0 kg CO<sub>2</sub>-eq. and of -34 kg CO<sub>2</sub>-eq. if accounting for carbon sequestration in wood. Manufacturing of a virgin plastic pallet releases 62 kg CO<sub>2</sub>-eq. Given the functional unit of 1000 customer trips and service life of 20 times for a wooden pallet and 66 times for a plastic pallet, the cradle-to-grave impacts of the wooden and the plastic pallets are 17 kg CO<sub>2</sub>-eq. and 1790 kg CO<sub>2</sub>-eq., respectively when the pallets are incinerated at the end-of-life, or 0.34 kg CO<sub>2</sub>-eq. per one wooden pallet and 120 kg CO<sub>2</sub>-eq. per one plastic pallet.





## Invited Speaker II

11:30~12:00

Dr. Angela T. Ragusa  
Charles Sturt University, Australia

**Dr. Angela T. Ragusa** is an environmental sociologist at Charles Sturt University in Albury, NSW, Australia. Angela has a PhD and Master Degree in Sociology and second Master's Degree in Science & Technology Studies from Virginia Polytechnic Institute and State University in Blacksburg, Virginia in the United States. Her Bachelor's Degree is in Psychology from St. Francis College, Brooklyn, New York. She is Editor-in-Chief for *Rural Society: Journal of global research into rural social problems for sustainable communities*, a role held for over a decade and has published 3 books and >80 academic publications. Recent research projects include identifying what prompts individuals and communities to engage in pro-environmental behaviours (air, land, & water pollution), factors affecting health and environmental literacy/knowledge, and how media and sociocultural norms affect socioeconomic priorities and beliefs (ie, biodiversity and nonhuman species' extinction).

**Topic: "Awareness that Coal-Powered Energy is Environmentally Degrading Insignificantly Affects its Consumption"**

**Abstract**—This paper contributes findings from a social survey conducted to examine individual awareness of coal's non-renewability, environmental issues, and home energy behaviours. The sample exhibited high (86%) awareness of coal's non-renewability and 74% self-identified energy issues as key environmental problems affecting their lives. Government presumptions that education campaigns are needed to increase Australian public awareness of carbon emissions and may induce pro-environmental energy behaviours are questioned. Energy issue awareness failed to significantly affect 4 home energy behaviours (choosing A/C settings, type of home temperature control, turning lights off in unoccupied rooms, turning appliances off standby) for 'environmental sustainability' reasons. Findings support international research documenting disparity between individual awareness of environmental issues and pro-environmental actions for such issues. Consistent with prior research, age was the most significant factor affecting pro-environmental energy behaviours. Older individuals were most likely to consider environmental sustainability for home temperature and A/C settings. Education, age, and energy issue awareness did not significantly affect 'low stakes' consumption behaviours (appliances or lights) for environmental reasons. In locations with non-renewable energy, policy and education initiatives improving knowledge that aggregated carbon consumption from seemingly minor individual behaviours may reduce environmental degradation may make 'unnecessary' energy consumption less culturally normative or acceptable.



# Session 4

**Tips:** The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

**Afternoon, December 19, 2019 (Thursday)**

**Time: 16:30~18:30**

**Venue: Beijing Room**

**8 presentations-Topic: “Environment and Sustainable Development”**

**Session Chair: Dr. Angela T. Ragusa**

## **M5006 (Session 4) Presentation 1 (16:30~16:45)**

Development of GIS and Database Program on Website for Concerned Government Office for Environmental Management under PES and BioCarbon Concepts

**Nutthakarn Phumkokrux**, Somkid Phumkokrux, Komsan Kiriwongwattana, Supharek O-In, Akirat Abdulkade, Preeyaporn Muenratch, and Arisa Jirasirichote  
Silpakorn University, Nakhon Pathom, Thailand

*Abstract*—This study aims to develop GIS and database program for ecosystem services management, environmental management and policy planning for natural conservation in the representative areas under the Integrated Community-based Forest and Catchment Management through an Ecosystem Services Approach project (CBFCM) by using Payment for Ecosystem Services (PES) and Biological storage of carbon (BioCarbon) concepts. At first, the concerned data were collected by brainstorming of the needs of GIS and database program with staffs from 4 pilot areas in Thailand: Mae Sa watershed area in Chiang Mai, Lam Sae Bai River Basin in Ubon Ratchathani, Tha Chin watershed area in Samut Sakhon and Phangan River Basin in Surat Thani. Then, the situations and variables which affect to natural resources were analysed. Secondly, GIS and database program were designed and developed. However, the program can be divided into 3 sub-programs for different proposes which are; (1) to enhance coordinated and follow-up performance of change of PES and Bio-carbon concept, (2) to increase communication and training for delegate areas to understand about PES and BioCarbon concept and (3) to collect and manage data and information for representative areas.

## **M5013 (Session 4) Presentation 2 (16:45~17:00)**

Transformation of Flood Risk Management with Evolutionary Resilience

**Herath Mudhiyanselage Malani** and NTS Wijesekera  
University of Moratuwa, Colombo, Sri Lanka

*Abstract*—The occurrence of flood disasters has become a vicious problem in many urban regions. Operationalization of flood resilience has become a significant concern with the