

# 2010 Postgraduate Conference

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2-3 September 2010

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## **Acknowledgements**

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**Opening:** Professor Roger Field (Vice Chancellor, Lincoln University)

**Guest Speaker:** Dr Sam Carrick (Researcher - Soils and Landscape Responses Team, Landcare Research)

### **Keynote Speakers:**

Professor Bruce McKenzie

Dr Patrick Aldwell

Professor Philip Hulme

Dr Greg Ryan

### **Judges:**

Professor Bruce McKenzie

Dr Patrick Aldwell

Professor Philip Hulme

Dr Greg Ryan

Professor Ken Hughey

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**Statistics NZ** - Kirsten Nissen

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**Visual Presentation Technology Workshop** - David Hollander

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Matthew Kavermann

Elizabeth Wandrag

## 2010 Postgraduate Conference Agenda

Day 1 Thursday 2<sup>nd</sup> September 2010

Time	Presenter	Topic
9.00	Hannah Presswood – Chair	Welcome from PG Committee
9.05	Prof Roger Field, Vice Chancellor	Opening remarks
9.15	<b>Guest Speaker:</b>	Dr Sam Carrick – Landcare Research
<b>AGLS</b>		
9.35	<b>Faculty Speaker:</b> Professor Bruce McKenzie	Chair: Hannah Presswood; Convenor: Matthew Kavermann
9.55	Elizabeth Tomasino	Dominant Aroma and Palate Attributes for Regional New Zealand Pinot Noir
10.10	Nelum Vithana	Bioactive Peptides from Red Deer ( <i>Cervus elaphus</i> ) Milk
10.25	Evelyn Teo	Analysis of Oxalates in stir fried silver beet
10.40	<b>Morning Tea – 30 Minutes</b>	<b>Poster session - AGLS</b>
11.10	Andre Eger	Quantifying the soil- and ecosystem-rejuvenating effects of loess in a high leaching environment, West Coast, New Zealand
11.25	Pranoy Pal	Nitrous oxide and carbon dioxide emission responses to litter incorporated in a grassland soil
11.40	Long (Paul) Cheng	How much urea can stay in the lucerne pellet after spraying?
11.55	Nicholas Tabi Amponsah	Effects of solar radiation and relative humidity on germination of <i>Botryosphaeriaceae</i> species conidia
12.10	Sara Mohan	Over expression of <i>Snakin-1</i> and <i>Snakin-2</i> genes under a potato light inducible <i>Lhca3</i> promoter in transgenic potatoes for broad spectrum disease resistance.
12.25	Belinda Whyte ( <i>Proposal</i> )	Transmission of bovine tuberculosis between brushtail possums: routes and mechanisms
12.35	<b>Lunch - 55 minutes</b>	
<b>COMMERCE</b>		
13.30	<b>Faculty Speaker:</b> Dr Patrick Aldwell	Chair: Hannah Presswood; Convenor: Marie-Caroline Lefort
13.50	Bhoj Khanal	An Economic Analysis of Mekong Brand Tourism in the Economic Corridors of the Greater Mekong Subregion: A Case Study of Lao PDR
14.05	Chandra B. Rai	Small forests, big ambitions and a hard reality - Community Forestry in Nepal
14.20	Md. Fardous Alom	Component GARCH Modelling of Food Price Volatility and Testing Heat Waves and/or Meteor Showers Effects
14.35	Juliet Anderson ( <i>Proposal</i> )	ISO 9000: Application to SME in NZ
14.45	Sophie Ngo	Relationship between implementation of Lean Six Sigma and organizational performance: An empirical investigation
15.00	Ashleigh Davies	Value Stream Mapping Application on service orientated business process
15.15	Dessy Aliandrina	(How) A complex system failure: A Study of Indonesian Air Transport System
15.30	<b>Afternoon Tea – 30 Minutes</b>	
16.00	David Thompson	What is a green business, and is green business good business?
16.15	Mariana de Aragao Pereira	Ethnographic decision tree model: learning from people's real world decisions
16.30	Eldrede T. Kahiya	Does the market development initiative impact export performance?
16.45	Dwi Suhartanto	Examining Brand Loyalty in the Indonesian Hotel Industry
<b>6pm</b>	<b>Mix and mingle</b>	<b>Commerce Foyer</b>

## 2010 Postgraduate Conference Agenda

Day 2 Friday 3<sup>rd</sup> September 2010

Time	Presenter	Topic
9.00	Hannah Presswood	Welcome from PG Committee
<b>CoRE</b>		
9.05	<b>Faculty Speaker:</b> Professor Phillip Hulme	Chair: Ben Hancock; Convenor: Juliet Anderson
9.25	Hoda Ghazali-Biglar	Paenibacillus spp.- Potential biocontrol agent for black rot of Brassicas?
9.35	Amir Daryaei	Understanding the survival, persistence, and bioactivity of the biocontrol agent <i>Trichoderma atroviride</i> LU132
9.45	Karel Lindsay	Impacts of climate on the summerfruit industry with respect to insect pest incursion
10.00	Natalia Guazzone	Distribution of rhizosphere competence within the genus <i>Trichoderma</i>
10.15	Marie-Caroline Lefort	Beetle cuisine and why is it important?: the taste and ambience test
10.30	<b>Statistics NZ Presentation – Kirsten Nissen</b>	
11.00	<b>Morning Tea – 30 mins</b>	
<b>ESDD</b>		
11.30	<b>Faculty Speaker:</b> Dr Greg Ryan	Chair: Raviv Carasuk; Convenor: Tomohiro Hara
11.50	Sarah Edwards	Participation in action: the role of the public in the regulation of Genetically Modified Organisms
12.05	Benard Ochieng	Assessing performance of the Rainforest Alliance Certification as a sustainability initiative in Kenyan tea farms
12.20	Nuttaset Manimmanakorn	Effect of Whole Body Vibration Training on Jump Height: Meta-analysis
12.35	Rhodella A. Ibabao	How 'We' Plan: Informality of Planning Practices in the Philippines
12.50	<b>Lunch - 1 hour</b>	
13.50	Lhakpa Tenji Lama	Understanding Ecotourism from Visitors' Perspectives
14.05	Anu Lama	An Overview of the Nature Based Tourism Stakeholders' Perception of Vulnerability to Climate Change
14.20	Bunly Bith	Community-based Ecotourism and Empowerment of Indigenous People in Cambodia: the Case of Yeak Loam Community-based Ecotourism
14.35	Roland Foster	The ecotourism species concept: the manipulation of taxonomy to advance conservation and tourism development
14.50	Raviv Carasuk	A journey among Devotees, Compliers and Opportunists; exploring tourism businesses motivations for incorporating the 'Responsible Tourism-Qualmark' accreditation
15.05	Steele Taylor	View from the edge: An edgework perspective on risk taking behaviour
15.20	<b>Afternoon Tea – 30 Mins</b>	<b>Poster session - ESDD</b>
15.50	Sunee Sakseau	Applying theoretical models to develop an effective communication for changing undesirable behaviours of visitors in national parks of Thailand: A case study of feeding wildlife in Erawan National Park
16.05	Rupinder Singh	Effect of increasing microbial diversity on the stability of thermophilic anaerobic digesters
16.20	Peter Chamberlain	Community commodified: Planning for a sense of community in residential subdivisions
5pm	<b>Pre-dinner drinks</b>	<b>Landscape Architecture Building Foyer</b>
6pm	<b>Dinner and prize giving</b>	<b>Landscape Architecture Building Foyer</b>

## FACULTY OF AGRICULTURE AND LIFE SCIENCES

### Dominant Aroma and Palate Attributes for Regional New Zealand Pinot Noir

Elizabeth Tomasino<sup>1</sup>, Roland Harrison<sup>1</sup>, Richard Sedcole<sup>2</sup> and Andrew Frost<sup>3</sup>

<sup>1</sup> Centre for Viticulture and Oenology

<sup>2</sup> Applied Biometrics and Statistics

<sup>3</sup> Pernod Ricard NZ, Brancott Winery, Main South Road, Blenheim, New Zealand

Regional wines are an important part of the wine industry as these products are unique and considered a premium product. However to be able to contribute to identity a regional typicity needs to be apparent. This typicity will depict the dominant sensory characteristics of a wine from a specific region. Typicity for many Old World regions have become apparent over many years and New Zealand has just begun to make headway on uncovering a regional typicity for Pinot noir. This study looked at the aroma and palate differences of 16 commercial Pinot noir wines from the 4 main Pinot noir regions of New Zealand; Central Otago, Marlborough, Martinborough and Waipara. Twenty-five sensory attributes were chosen from a preliminary tasting and 21 experienced wine tasters used descriptive analysis to uncover any regional differences. Canonical variate analysis showed that 14 of the 25 attributes were important for the regional typicity. Central Otago Pinot noir had finer particles (graininess), and greatest intensity of herbal, smoky and dark fruit. Marlborough Pinot noir had the most harmonious balance, fullest body, greatest intensity of raspberry and oak. Martinborough Pinot noir had the greatest intensity of oak tannins, black cherry, chocolate and fruit density/concentration. Waipara Pinot noir was characterized by greater intensity of blackberry and spice. Of the 4 Pinot noir regions Waipara is not as clearly defined and may still be searching for its distinct wine style that is shared across the region. The within region differences were greater than the between region differences. However there was still some similarities for several attributes which does suggest that a Waipara style is beginning to emerge.

### Bioactive Peptides from Red Deer (*Cervus elaphus*) Milk

N. L. Opatha Vithana<sup>1</sup>, S. L. Mason<sup>1</sup>, A. E. A. Bekhit<sup>2</sup>, J. D. Morton<sup>1</sup>

<sup>1</sup> Faculty of Agriculture and Life Sciences

<sup>2</sup> Otago University

Milk proteins are considered the most important commercial source of bioactive peptides and such information on milk from other animal species is very limited. Deer milk and its products have traditionally been used for medicinal purposes. Deer milk has more solid content ( $25.7 \pm 0.76\%$ ) compared to cow's milk ( $12.1 \pm 0.01\%$ ). Deer milk contains on average  $8.8 \pm 0.13\%$  total protein which is twice the levels found in cow's milk ( $4.1 \pm 0.02\%$ ). Casein content in deer and cow's milk are  $8.7 \pm 0.13\%$  and  $4.0 \pm 0.02\%$  respectively. Hydrolysis of milk protein by digestive enzymes and fermentation to produce biologically active peptides was investigated in the present study. To simulate the digestion process, deer and cow's milk were hydrolysed using an *in vitro* digestion system. The digestion was performed in two steps; imitating both the human stomach (Pepsin, pH 2.5) and the duodenum (Corolase PP, pH 7.5). Fermentation studies were also carried out on deer and cow's milk using *Lactobacillus belburueckii subsp bulguricus*, *Streptococcus salivarius subs thermophilus* and *Lactobacillus casi* strain Shirota. Release of peptides during milk digestion and fermentation was quantified using OPA (*o-phthaldialdehyde*). Changes in protein & peptide profiles were compared by sodium dodecyl sulphate polyacrylamide gel electrophoresis (SDS-PAGE). The immunomodulatory activity will be compared for cow's and deer milk peptides after FPLC fractionation.

## **Analysis of Oxalates in stir fried silver beet**

**E. S. M. Teo** and Dr. J. Savage

*Faculty of Agriculture and Life Sciences*

Excessive consumption of oxalates may lead to the formation of kidney stones. Cooking can alter the amount of oxalates consumed in silver beet (*Beta vulgaris var. cicla*). Soaking and/or boiling before stir frying is a common practice in Asian cooking. In this experiment, soaking and/or boiling are regarded as pre-treatment methods. During stir frying, soy sauce was added to taste. Mixing with low fat or standard yoghurts according to the treatments is regarded as post-treatment methods. Total and soluble oxalates were extracted and analysed using HPLC. Autumn grown silver beet leaves contained  $1658 \pm 114$ mg/100g DW of total oxalates,  $954 \pm 49$ mg/100g DW of soluble and  $704 \pm 98$ mg/100g DW insoluble oxalates. Oxalate content was significantly reduced after pre- and post-treatment ( $p < 0.001$ ). Among the pre-treatments, samples that were both soaked and boiled before stir frying had the least amount of soluble oxalate ( $312 \pm 87$  mg/100gDW). Results also showed that the availability of soluble oxalate is significantly different after pre- and/or post-treatment ( $p < 0.001$ ). With complete pre- and post-treatment, soluble oxalate was greatly reduced ( $57 \pm 6$ mg/100gDW). Stir frying imparted an ample amount of fat in the final diet whereas the mean fat content in all pre-treated, standard and low fat yoghurt diets were  $38 \pm 0.2$ g/100gDW,  $29 \pm 0.07$ g/100g DW and  $25 \pm 0.07$ g/100g DW respectively. The regression analysis showed that as the amount of fat increased in the diet, less soluble oxalate was bound to the soluble calcium in the yoghurt. This experiment showed that pre-treatment may encourage soluble oxalate lost through leaching. Further soluble oxalate reduction could be achieved through the addition of yoghurt onto the cooked silver beet leaves.

## **Quantifying the soil- and ecosystem-rejuvenating effects of loess in a high leaching environment, West Coast, New Zealand**

**Andre Eger**, Peter C. Almond and Leo M. Condron

*Faculty of Agriculture and Life Sciences*

Ecosystem succession through pioneer, seral, climax and finally retrogressive communities is usually strongly associated with biogeochemical accession of soil nutrients. In leaching-driven, humid environments, retrogression is known to coincide with soil nutrient decline, particularly soil P. Counteracting this tendency are rejuvenating processes, included within what has been referred to as regressive pedogenesis, which replenish soil nutrients. Despite large areas of old landsurfaces, ecosystem retrogression seems to be rare, indicating that rejuvenation processes are effective in avoiding ecosystem decline. Regressive pedogenesis, however, has received little attention despite its importance for ecosystem evolution. We quantify the regressive effect of loess on soil and ecosystem properties in a superhumid, high leaching environment on the west coast of the South Island, New Zealand. A dune sequence downwind of a riverbed loess source provides a gradient of loess flux, and away from loess deposition, an age gradient (chronosequence). Coincidence of property values between the soils of the loess gradient on the oldest (6500 y old) dune and the chronosequence allow an 'apparent soil age' for a given loess flux to be estimated. A regression index calculated from dune age and apparent age quantifies the regressive effect of the loess flux. Results show the regressive effect of loess is retarding podsol formation and increases foliar nutrient content. This effect seems to reach no further than to 1000 m from the source of the loess. Soil pH does not show any relation to loess accretion. Work is currently underway to determine more soil and ecosystem properties in order to quantify the regressive effect of loess on these properties.

## Nitrous oxide and carbon dioxide emission responses to litter incorporated in a grassland soil

Pranoy Pal<sup>1</sup>, Tim J. Clough<sup>1</sup>, Francis M. Kelliher<sup>1,2</sup> and Robert R. Sherlock<sup>1</sup>

<sup>1</sup>Faculty of Agriculture and Life Sciences

<sup>2</sup>AgResearch, Lincoln Research Centre, Private Bag 4749, Christchurch 8149, New Zealand

While the Intergovernmental Panel on Climate Change (IPCC) guidelines include the possibility of N<sub>2</sub>O emissions from crop residues, they do not include grazed pasture or supplementary feed litters. To quantify the relative greenhouse gas (GHG) emissions from pasture litter, ground shoots of clover (*Trifolium repens* L.), ryegrass (*Lolium perenne* L.) and maize (*Zea mays* L.) were incorporated into soil at 1.5, 1.0 and 0.6 g nitrogen (N) (~12.8 g carbon (C), on average) kg<sup>-1</sup> soil, respectively. A 42 d incubation at 20°C and either 86% (field capacity) or 54% water-filled pore space (WFPS) was performed. During the first 2 d, 92–95% of the N<sub>2</sub>O was emitted. At 86% WFPS, N<sub>2</sub>O emissions were 2–3% of the incorporated N with no litter species differences. At 54% WFPS, N<sub>2</sub>O emissions were 1.7% > 0.7% = 0.5% of herbage N applied, for clover, ryegrass and maize, respectively (*P* < 0.001). At 86% and 54% WFPS, carbon dioxide (CO<sub>2</sub>) emissions averaged 32% and 21%, respectively, with no litter species differences after 38 d. Over 14 d, N<sub>2</sub>O emissions expressed as CO<sub>2</sub>-eq were 67 and 59% for clover, 59 and 31% for ryegrass and 52 and 18% for maize at 86% and 54% WFPS, respectively, of the total (CO<sub>2</sub>+N<sub>2</sub>O) greenhouse gas budget. Emissions of N<sub>2</sub>O corresponded with the biochemical composition of the litter. At either WFPS, the decomposition rates did not differ due to species. The potential for pasture litter to contribute to N<sub>2</sub>O emissions from clover-ryegrass pastures warrants further study *in situ*.

## How much urea can stay in the lucerne pellet after spraying?

L. Cheng and Prof. G. Edwards

Faculty of Agriculture and Life Sciences,

N intake is one of the major components that determine ruminant production. Spraying urea on top of feed is a common practice in developing country to improve animal production. Earlier studies suggested that significant amount of urea can be lost during the spraying process. This trial investigated the major factors that influence urea retaining in the lucerne pellet after spraying. Three small trials were conducted to examine three different liquid urea concentration and two different feed materials (whole pellet and ground pellet) influence on urea losses after spraying. One way analysis of variance was used to determine the treatments effect on urea losses (Genetat 11). There were only 32% and 63% sprayed liquid urea retained in the feed from low and high liquid urea concentration treatments respectively (*p* < 0.05). Whole lucerne pellet retained 52% of urea, in comparison, 83% of the urea was retained when sprayed on ground pellet. The results from this trial indicated that multi-factors could affect urea loss from the feed after spraying. To eliminate urea loss from spraying, limited amount of water should be used for dissolving urea; ground feed should be used rather than whole pellet.

## Effects of solar radiation and relative humidity on germination of Botryosphaeriaceae species conidia

N.T. Amponsah, E.E. Jones, H.J. Ridgway and M.V. Jaspers  
Faculty of Agriculture and Life Sciences

The ability of Botryosphaeriaceae species conidia to survive in the environment is an important factor in determining their infection success, especially if repeated rain events cause further dispersal after their initial release from pycnidia. The purpose of this study was to determine the effects of (i) different levels and periods of solar radiation on survival of conidia, as measured by their ability to germinate, and (ii) different relative humidities on conidial germination. Conidia from three different Botryosphaeriaceae species were put under different levels of sunlight for a period of 7, 14, 28, 56 and 70 hours prior to incubation and in another experiment, freshly harvested conidia of the same species were incubated under 100, 97, 93 and 84% relative humidities. The findings from the study showed that germination of the Botryosphaeriaceae conidia were significantly affected by exposure to different levels of sunlight and relative humidity (RH). After 7 h exposure to non-filtered sunlight (+UV), filtered sunlight (-UV) and shade, germination differed between light levels, being 35, 57 and 81%, respectively, and after 70 h exposure it was 0, 21 and 65%, respectively. Non-germinated conidia were unable to germinate when placed in a moist environment, indicating that they had been killed. High RH favoured germination since 91 and 70%, respectively, germinated after 3 h in 100 and 97% RH. However, in 93% RH, only 44% germinated by 24 h and in 84% RH no conidia germinated. In conclusion, this study has clearly shown that RH and UV light have a major effect on the Botryosphaeriaceae species conidium viability. While low RH alone caused delays in conidium germination, the effect of UV light, possibly in combination with the associated high temperatures, killed the conidia. Botryosphaeriaceae species are therefore more likely to infect grapevine wounds in rainy, cloudy weather than dry, sunny conditions.

## Over expression of *Snakin-1* and *Snakin-2* genes under a potato light inducible *Lhca3* promoter in transgenic potatoes for broad spectrum disease resistance

Sara Mohan<sup>1,2</sup>, Sathiyamoorthy Meiyalaghan<sup>1</sup>, Erian Jones<sup>2</sup>, Jeanne Jacobs<sup>1</sup>, Anthony Conner<sup>1,2</sup>  
<sup>1</sup>New Zealand Institute for Plant & Food Research, Private Bag 4704, Christchurch, New Zealand  
<sup>2</sup>Agriculture and Life Science Division, Private Bag 84, Lincoln University 7647, Canterbury, New Zealand

Snakin-1 (SN1) and Snakin-2 (SN2) are low-molecular weight antimicrobial peptides produced in potato tubers. Such proteins are thought to play important roles in the innate defence against invading microorganisms. Over-expression of *StSN* genes is known to provide broad spectrum activity against a wide range of bacterial and fungal pathogens in potato. Based on homology to other genes, these proteins have also been hypothesised to be involved in diverse biological processes, including: cell division, cell elongation, cell growth, transition to flowering, and signalling pathways. *StSN1* and *StSN2* genes were isolated from potato cv. Iwa. The coding regions of these genes were individually cloned into the intragenic expression cassette harbouring the *Lhca3* (cab) promoter and the *Lhca3* (cab) terminator. The resulting intragenic cab5'-*StSN*-cab3' chimeric genes were cloned into transgenic binary vector pMOA33. The binary vectors pMOA33cabStSN1 and pMOA33cabStSN2 were individually used for *Agrobacterium*-mediated transformation of potato. Thirty-three and thirty-two independently derived SN1- and SN2-transgenic plants were regenerated respectively. Multiplex-PCR confirmed the presence of the *nptII* selectable marker gene and the specific gene in all regenerated lines. Based on quantitative RT-PCR of each SN gene, seven lines were selected for each of the SN1- and SN2-transgenic plant populations for disease resistance assessment. Pathogenicity bioassays showed that the over-expression of either *StSN1* gene or *StSN2* gene from the intragenic cassettes conferred resistance against the enterobacterial phytopathogen *Pectobacterium atrosepticum* (formally *Erwinia carotovora* ssp. *atroseptica*).

## **The influence of possum movement behaviour on the transmission of bovine tuberculosis** *(proposal)*

**Belinda Whyte**; Dr James Rossand and Dr Graham Nugent  
*Faculty of Agriculture and Life Sciences*

Bovine tuberculosis in livestock causes economic problems due to death, chronic disease and restrictions on the movement of stock. Possums are the primary wildlife reservoir of bovine tuberculosis in New Zealand and are the greatest barrier to the eradication of this disease from livestock. Scientists are still unclear about how this disease is transmitted among possums, and between possums and livestock. This lack of knowledge prevents the accurate modelling of the disease process and efficient disease control programmes, and likely contributes to New Zealand's inability to be classified as 'tuberculosis-free'. One of the major gaps in our knowledge is how changes in possum movement behaviour affects transmission of tuberculosis. For example, does an individual encounter more possums once it becomes infected, increasing transmission risk? As such, the objectives of our research are to determine whether possum movements change after becoming infected and after control of a site reduce populations to low densities. To achieve these objectives, possums will be fitted with collars containing Global Positioning Systems, to establish movement patterns through space and time. We then aim to assess whether these changes affect transmission of this disease among possums, and between possums and livestock. The results of this research could potentially be used to design more effective control programmes in the future, such as updating key parameters in the current possum-tuberculosis transmission model. As bovine tuberculosis is a worldwide problem, this research will also be of international importance.

## **FACULTY OF COMMERCE**

### **An economic analysis of Mekong Brand Tourism in the Economic Corridors of the Greater Mekong Subregion: A Case Study of Lao PDR**

**Bhoj Khanal**

*Faculty of Commerce*

The Greater Mekong Subregion (GMS) Economic Corridors were established to encourage trade, investment and tourism and ease the cross-border movement of people and goods. The tourism infrastructure and institutional programs including border trade facilitation and harmonization are expected to enhance tourism and tourism related business in the GMS. The GMS Tourism Sector Strategy for 2006-2015 has given priority to develop the Mekong as a single destination to promote the "Mekong Brand Tourism" (ADB, 2005).

Tourism is an important economic sector of Lao PDR and is rapidly becoming the major source of foreign exchange earnings and employment. A total of 1.6 million tourists generated US\$233.3 million in 2007 making tourism among the top two foreign revenue earner accounting for more than 7 percent of the national GDP (NSC, 2007). The GMS economic corridors have direct impacts on visitors arrivals in Lao PDR but there are concerns that the economic corridors play the role of transport corridor in Lao PDR since only minimum economic activities have been taking place along the corridors (Mekong Institute, 2008).

Tourism expansion in Lao PDR is judged on the basis of gross values of macro-economic factors such as number of tourist arrivals, total earnings and contribution to the country's balance of payment (LNTA, 2006). Additionally, tourism is not a separate entity in the sectoral classification of economic activities in Lao PDR. As a result, the tourism economic data should be disaggregated from many other related economic sectors. This study applies an input-output model to examine the economic impacts of tourism, interrelationship of other economic sectors using economic multipliers and backward forward linkages of the tourism sector of Lao PDR. The input-output model in this research describes how the tourism sector is distributed throughout the economy of Lao PDR. The study compares the impacts of tourism in two time periods of GMS economic corridors construction between 2003 and 2008 and also identifies the problems and obstacles of the tourism industry in Lao PDR.

### **Small forests, big ambitions and a hard reality - Community Forestry in Nepal**

**Chandra Rai**, Dr. Hugh Bigsby, Dr. Ian MacDonald

*Faculty of Commerce*

Community forestry in Nepal is intended to reduce poverty by sustainable management of forests. Timber is one of the most high-value forest products, especially in the case of Sal (*Shorea robusta*) forests in the Terai region of Nepal. Despite having several advantages of high value forest, fertile land, connection with transportation network, and being close to the regional market, there is no or very little timber production from Sal forests. This research analysed why there is no/little production/supply of timber from community forests from Sal forests to the market. This research examined three aspects of community forest user groups (CFUG) using the institutional/transaction cost economics and micro-economic theories. First, the scale of CFUG operations is examined in terms of ability to carry out logging and organise market sales. Second, the capacity of CFUGs to carry out logging in terms of resources and property rights is examined. Finally, barriers to vertical integration

with the market in terms of contracting and cooperation with other CFUGs are investigated. To answer these questions, data from 85 CFUGs were and interviews were carried out with forty key respondents from CFUGs, government agencies, private firms, and non-government organisation. Data are analysed using simple regression and NVivo qualitative software. The results showed that the size of the forest was not an issue for harvesting logs and sales to the market. However, the organisational capacity of CFUGs was found to be weak because of a lack of financial resources, limited property rights over timber, control by the District Forest Office, policy constraints, and corruption. In terms of vertical integration, a lack of legal rights to enter into contracts, a high degree of uncertainty about policy and property rights, small and irregular amounts timber harvest, and the interpretation of CFUG rules by the District Forest Office were found to be barriers for the formation of long-term contracts between CFUGs and private firms, and of cooperative developments between CFUGs.

## **Component GARCH modelling of food price volatility and testing heat waves and/or meteor showers effects**

**Md. Fardous Alom**, Bert Ward, Barding Hu

*Faculty of Commerce*

This paper examines the volatility and cross country mean and volatility spillover effects of food prices within and across global and selected Asian and Pacific countries namely Australia, New Zealand, South Korea, Singapore, Hong Kong, Taiwan, India and Thailand. The principal method of analysis comprises the development of a set of component GARCH-type models of conditional variance. Volatility characteristics and spillover effects of food prices are examined across a full (1995-2010) and two subsamples (1995-2001 and 2002-2010) with daily food price indices. Main findings of the study are as follows: (1) like other asset prices, food price volatility can be modelled by CGARCH variant of GARCH-family models for world as well as country specific levels, (2) world food price returns show asymmetric and persistent volatility across all samples, (3) excepting New Zealand and Singapore, all countries' food prices show asymmetric and long run persistent volatility for full sample period, (4) for the period 1995-2001, food price returns are found to be symmetric but long run volatility persistent in Korea, Singapore and Hong Kong while asymmetry and persistency are found for all other countries though persistency is not found for New Zealand, (5) for the sample period 2002-2010, Australia, New Zealand and Thailand food prices follow long run persistent but symmetric volatility while other countries show persistent and asymmetric volatility, (6) in the short run, transitory effects of shocks are found to be statistically significant while persistency are very low across all sample period, sum of transitory persistence components are lower than permanent components imply slower mean reversion in the long run (7) increased risk does not necessarily lead to increased returns for world and specified countries except few instances, (8) mixed evidence of cross country mean and volatility spillover effects are reported. No exact direction of spillover effects from exporter to importer or importer to exporter countries can be drawn rather mixed evidence of spillover from exporter to importer, exporter to exporter, importer to exporter and geographical proximity can be documented. The 'meteor shower' hypothesis that the conditional variance of the change in one market depends on the past information of other markets dominates 'heat wave' hypothesis that the conditional variance depends on the past information of that market while for shorter time period 'heat wave' effects dominate 'meteor shower' effects. For the period 1995-2001, partial meteor shower effects are found to be significant for Australia, New Zealand, India and Thailand; however, recent (2002-2010) data supports some meteor shower effects for Australian, Hong Kong and Taiwan food markets. The empirical findings of this study provide some insights for policymakers in designing food policies and for food futures and options traders.

## **ISO 9000: Application to SME in NZ (proposal)**

**Juliet Anderson**

*Faculty of Commerce*

The business environment is more competitive than ever before. Businesses are now not just competing with businesses across the road or within their country but also across waters as well. NZ businesses are competing with the likes of Australia, China and the United States of America in the world markets. Therefore NZ needs to be smart and innovative with new technologies, products and ways of operating our businesses. NZ's economy is more than 90% made up SME (Small business in New Zealand, 2010) and this means there needs to be particular attention paid to these businesses to ensure they remain competitive. Quality Management Systems (QMS) are becoming increasingly popular in commerce as competition for market share increases and firms look to gain competitive advantage. ISO 9000 is a popular QMS around the world in a range of industries. However, there is much debate over the implementation, effectiveness and value the QMS actually has for an organisation. A case study research and analysis is proposed to explore how the ISO 9000 Standards were implemented and maintained in a small manufacturing firm in the New Zealand context. The study will investigate how or if this specific firm has capitalised or further benefited from the implementation of ISO 9000.

## **Relationship between implementation of Lean Six Sigma and organizational performance: An empirical investigation**

**Sophie Ngo, Jeff Heyl**

*Faculty of Commerce*

Lean Six Sigma represents the next step forward in the evolution of process improvement programs (Shah, 2006). The practices of organizing and managing operations has observed an increased existence of universal, systematic patterns of Lean Six Sigma joint implementation in large corporations currently (Shah, Chandrasekaran and Linderman, 2008). Despite this reality the academic literature is still lacking an empirical investigation of the exact extent and nature of the organizational performance improvement benefits that can be achieved. From a practical perspective, the primary unanswered question is whether Lean Six Sigma can be empirically tied to superior operating performance and whether the combination of Lean and Six Sigma results in superior performance than when either model exists on its own.

Given the motivation to fill a perceived gap in our knowledge as well as the need to meet the existing demand for greater insights into Lean Six Sigma from practitioners, the aim of the research is to explore the relative changes in organizational performance improvement that can be attributed to the implementation of Lean Six Sigma. The outcomes of this study may assist practitioners in deciding whether they should include Six Sigma projects in a Lean Manufacturing context as well as provide them a better understanding of how their peer organizations utilize Lean Six Sigma and the level of performance improvement benefits that are achieved.

A survey instrument has been developed to survey and interview multiple manufacturing firms in New Zealand context which are identified as implementing Lean production and/or a Six Sigma program.

Data collection has been successfully done using a mail survey. By obtaining assistance and recommendations from various Lean and Six Sigma consultants and other experts around the country, I have approached many Lean implementers and have achieved an excellent response rate from managers in these companies. I have also received thought provoking and significant feedback from a number of key Lean Six Sigma combined implementers and companies involved in the use of Six Sigma in New Zealand. This has implications for not only this research but for other Lincoln researchers and the University as a whole.

## **Value Stream Mapping Application on service orientated business process**

**Ashleigh Davies**

*Faculty of Commerce*

Carlton Taylor Industries is in the process of implementing Lean Manufacturing across the organization. In the majority of cases the implementation process has focused on the manufacturing floor and not applied to the process from order receipt (including quotation requests) through to order delivery. Carlton Taylor believed there was a need to apply Lean through the use of the Value Stream Mapping technique and was done to the administrative process up until the manufacturing job release. The partnership with Lincoln University was used for a student to carry out this Value Stream Mapping process as part of an honour's degree research to identify whether Value Stream Mapping can be used in a service orientated setting and whether or not it enables improved performance. The presentation is an overview of the process, summary of the findings and benefits to both student and company.

## **(How) A complex system failure: A Study of Indonesian Air Transport System**

**Dessy Aliandrina**

*Faculty of Commerce*

Aircraft accident is a term that is used to indicate the failure in an operation. It is not a single linear process but a dynamic set of complex open-ended and interactive processes. These processes, namely pre-condition, occur as a complex combination of technical, individual, group, organizational and social factors that work together with culture to affect assumptions and practices. This study aims to illustrate the processes and determine contributing factors in the processes by examining Indonesian air transport as a social system. Thus, process studies used to examine research questions that deal with how things change and develop over time, while time and history then are used as the centre of analysis. Discourse analysis is employed as an approach so two discourse data were used as sources: written and spoken discourse.

This study revealed that deterioration in the Indonesian air transport system was caused by knowledge-based deficiencies, rules or regulations-based deficiencies, and enforcement-based deficiencies which, through time, lead to a complex socio-technical failure.

## **What is a green business, and is green business good business?**

**David Thompson**

*Faculty of Commerce*

As the environment struggles to cope with burgeoning population and the growth of consumerism, sustainability and green business methods are moving from being an alternative business model to what could arguably be described as the most important of all business paradigms. Increasing numbers of businesses are engaging in green practices and consumers are starting to realise that green consumption is good consumption, but what is it like to be a green business? Is being a green business merely a "feel-good" option for business owners who want to do the right thing? Or is it a

smart business paradigm that leads to greater profitability, happier staff, more loyal customers and a longer and more successful future?

In order to answer these questions a case study of a successful NZ winemaker that has embraced “green” business ideologies is being conducted. The study is exploring the impact using a green business model has had from the perspectives of shareholders and directors; staff and distributors. The goal of the study is twofold: first to give a perspective on the viability of going green for other businesses, particularly those in the wine industry, and second to add to the knowledge by recording the actual experiences of embracing the green business model of key groups of stakeholders.

### **Ethnographic decision tree model: learning from people’s real world decisions**

**Mariana de Aragao Pereira<sup>1,2</sup>, Keith Woodford<sup>2</sup>, John Fairweather<sup>2</sup>, Peter Nuthall<sup>2</sup>**

<sup>1</sup>*Embrapa Beef Cattle-Brazil*

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In a complex and challenging world, scholars have been incorporating multiple perspectives into problem-solving. Within the social sciences, models that build on peoples’ perceptions, beliefs and preferences have been getting researchers’ attention. One example is the Ethnographic Decision Tree Model. The model is ethnographic because it builds on how and why informants (‘insiders’) make “real world” decisions in contrast with models developed by scientists (‘outsiders’) to test their theories. The model involves both quantitative and qualitative aspects and is useful for researchers, policy-makers and others in gaining insights on “insiders’ perspectives” on issues of interest. In this study, which is qualitative by nature, this method was employed to enhance the understanding on technology adoption behaviour of Brazilian innovative beef farmers. Thirty four innovative beef farmers in Brazil provided detailed accounts of their adoption decision-making on cattle supplementation (production technology) and on production cost analysis (managerial technology). These accounts were used to identify relevant decision criteria and to build a decision tree model for each technology. Results indicated decision criteria were predominantly tangible for decisions on cattle supplementation and conceptual for the cost analysis decision, given the “hard” and the “soft” nature of these technologies, respectively. The models also demonstrated that farmers had a better understanding of cattle supplementation than of cost analysis, which resulted in a more elaborated decision-making process and higher adoption levels for the former. The lack of production and profit related criteria on the cost analysis model suggested farmers did not perceive this technology as a way to improve the farm performance, justifying its low adoption rate. Thus, any attempt to increase the adoption of cost analysis must target education to improve farmers’ economic literacy. These findings enhanced the decision-making theory and can contribute to policy-making and to the development and transfer of sound technologies.

### **Does the market development initiative impact export performance?**

**Eldrede Kahiya, Dr. David Dean and Dr. Jeff Heyl**

*Faculty of Commerce*

Export performance is a measure of the extent to which a firm meets its strategic and financial objectives. Most studies link export performance with internal firm demographics and external or contextual factors arising from the business environment. This study attempts to link performance

with export marketing strategy. Of particular interest is the significance of the firm's market development efforts. There are two distinct dimensions of the market development initiative. Firstly the firm decides which markets to serve based on perceived psychic or cultural distance. The second decision relates to the actual process of developing prospects in the markets. Extant literature explains that closer similarity (or shorter psychic distance) between domestic and foreign markets, impels performance. Another proposition is that the use of proactive processes to develop prospects, may also enhance performance. Using a sample of New Zealand exporters, we tested these propositions to establish the impact of market development initiatives on export performance. The analysis involved dividing the sample along the 'proactive/reactive' dimension and the 'short/long' psychic distance typology. T-tests show that a proactive approach to prospecting leads to better performance compared to a reactive one. We also found evidence to support the proposition that confining export sales to markets with which New Zealand has a perceived shorter psychic distance, leads to enhanced performance. Support for both hypotheses illustrates that the market development effort is fundamental for export performance. This is particularly significant from a marketing strategy perspective because market development sets the platform for segmentation, targeting and positioning. Our results also support the well-documented view that superior performance does not just happen: it is a function of a clear and deliberate approach to export marketing.

## **Examining brand loyalty in the Indonesian hotel industry**

**Dwi Suhartanto**

*Faculty of Commerce*

The hotel industry has become increasingly competitive as it reaches life-cycle maturity and the world economy falters. In this environment, creating and maintaining customers' brand loyalty can be an important strategy to maintain a competitive advantage. Despite the notable impact that brand loyalty has on business performance, research appears to be divided in understanding the structure of brand loyalty and its determinant factors. The purpose of this study is to gain an understanding of the dimensional structure and the drivers of brand loyalty.

This study proposed that brand loyalty consists of behavioural loyalty and attitudinal loyalty consisting sub-dimension of cognitive loyalty, affective loyalty, and conative loyalty. Furthermore, it is proposed that brand image, service quality, perceived value, and customer satisfaction directly and indirectly affect brand loyalty. Fifteen hypotheses were developed from this research model. To test the hypotheses, questionnaires were completed by 444 hotel guests including three and four-star, domestics and international hotels in Indonesia. Two-stage Structural Equation Modelling (SEM) was used to test the hypotheses.

The initial measurement model on the dimensions of brand loyalty showed that the model did not fit indicating construct reliability and validity problems. A modification to the model resulted in a suitable fit model where brand loyalty consisted of attitudinal loyalty and behavioural loyalty. This finding supports a traditional view of brand loyalty rather than multi-dimensional view of brand loyalty. Further testing identified relationships between brand loyalty and service quality, perceived value, customer satisfaction, and brand image indicating that all of these loyalty determinants were important drivers of brand loyalty. Additionally, the relationships between service quality, customer satisfaction, brand image and attitudinal loyalty mediated customer satisfaction.

## **BIO-PROTECTION RESEARCH CENTRE**

### **Paenibacillus spp.- Potential biocontrol agent for black rot of Brassicas?**

**Hoda Ghazali-Biglar**, John Hampton, Eline van Zijl de Jong, Alison Stewart

*Bio-Protection Research Centre*

Vegetable and forage brassicas are susceptible to black rot disease caused by *Xanthomonas campestris* pv. *campestris*. Currently, there is no effective control method for the pathogen, and therefore biological control warrants investigation as a potential control measure for the seed borne disease. The "Smart Seeds" programme aims to develop microbial seed treatments for vegetable and brassica crops to decrease the economic losses caused by black rot. Research in the first two years of the programme has focused on identifying bioactive microbes isolated from commercial cabbage and rape seed lots and this has already identified some potential biocontrol agents. The bacterium *Paenibacillus* gave good bioactivity in these early tests and this will be the focus of this PhD study.

The biocontrol activity of *Paenibacillus* isolates against black rot, their population dynamics in the soil and interactions with the plant roots will be investigated. In addition, the influence of abiotic factors on biocontrol performance will be determined, and potential mechanism(s) of action of *Paenibacillus* explored.

### **Understanding the survival, persistence, and bioactivity of the biocontrol agent *Trichoderma atroviride* LU132**

**Amir Daryaei**, Alison Stewart, Travis Glare, Kirstin Mc Lean, Jayanthi Swaminathan, and Craig Bunt

*Bio-Protection Research Centre*

Biological control using microbial antagonists has been identified as a promising method to control plant pests and diseases. *Trichoderma* is one of the most commonly used fungal biocontrol agents with several commercial products available. Researchers from Lincoln University have developed *T. atroviride* LU132 as a biological control agent for use against onion white rot and *Botrytis* grey mould of grapes. Previous studies have shown that *Trichoderma* growth and reproduction are heavily influenced by abiotic factors. Understanding the factors that influence the survival, persistence, and bioactivity of *T. atroviride* LU132 will be the focus of this study. In particular, the effect of culturing conditions on the viability, survivability and bioactivity of LU132 spores will be determined. Underpinning research to determine the cellular basis of fungal reaction to different growth and storage conditions will also be conducted.

## **Impacts of climate change on the summerfruit industry with respect to insect pest incursion**

**Karel Lindsay**, Susan Worner, Roddy Hale  
*Bio-Protection Research Centre*

New Zealand is constantly at risk from insect pest incursions that could devastate agricultural industries and its indigenous ecosystems. Many exotic insect pest species that have potential to cause severe economic and environmental impacts in New Zealand are currently prevented from establishing in the mostly temperate climate that characterises this country. Climate change may increase the probability that some of these insects not only arrive in New Zealand but establish a viable and damaging population. The summerfruit industry may be particularly vulnerable to climate change as it requires particular climatic conditions to ensure profitable yields. As well, climate change is likely to change the potential distribution of summerfruit insect pests currently established within New Zealand. An effective method to quantify the potential threat is to simulate the distributions of the most dangerous species using computer modelling programs. These programs can incorporate known species localities with climatic variables to create simulated distributions based on the assumption that a species distribution is determined by mainly climate. Other factors however can be incorporated. The increased risk of severe impacts on the summerfruit industry by exotic insect pest establishment can then be determined by simulated insect pest distributions under current and future climatic conditions.

## **Distribution of rhizosphere competence within the genus *Trichoderma***

**Natalia Guazzone**<sup>1</sup>, Robert Hill<sup>1</sup>, Johanna Steyaert<sup>1</sup>, Gary E. Harman<sup>2</sup>, Alison Stewart<sup>1</sup>  
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Rhizosphere competence, the ability of an organism to grow and function in the rhizosphere of developing roots, is a key component of successful biocontrol. Rhizosphere competence has been observed in *Trichoderma harzianum* UV-mutants and protoplast fusants and these strains exhibited enhanced biocontrol ability compared with the wild-type and/or parent strains. This study asks whether rhizosphere competence is common to all *Trichoderma* species, and, if not, whether it is a species- or isolate-specific trait. We have selected 22 *Trichoderma* isolates from the Lincoln University culture collection which represent seven different biocontrol species (*T. asperellum*, *T. atroviride*, *T. hamatum*, *T. harzianum*, *T. virens* and *T. viride*) from diverse locations within New Zealand. Using previously established methods, we will assess the ability of these isolates to colonize the rhizosphere of developing roots of sweet corn (*Zea mays*) and develop endophytic relationships in non-sterile soil. Shoot and root lengths will be measured to assess growth promotion. Soil tests will be performed (total C, total N, biomass C and biomass N, dehydrogenase activity) to characterize the soil. *Trichoderma harzianum* strain T22 will be used as a positive control, as it has been proven to be rhizosphere competent and a very effective biological control agent. Unlike previous studies, all isolates have been identified on the basis of ITS1/2 and *tef1* sequence analysis. The outcomes of this study will contribute to a greater understanding of *Trichoderma* biocontrol systems, the improvement of commercial products and might lead to the identification of isolates with enhanced rhizosphere competence capabilities. Results of these studies will be presented and discussed in relation to the current knowledge on rhizosphere competence in *Trichoderma*.

## **Beetle cuisine and why is it important?: the taste and ambience test**

**Marie-Caroline Lefort**, Sue Worner, Karen Armstrong and Travis Glare.

*Bio-Protection Research Centre*

The past few decades have seen an explosion of interest in insect invasions and their consequences on both managed and unmanaged ecosystems. Understanding the multiple mechanisms that underpin the process of invasion is considered as a major future challenge. The research presented here is part of a larger study that is currently investigating several potential mechanisms that may drive the process of biological invasion of phytophagous insects. One involves the insect/host plant relationship. It is well known that plants exert selection on herbivore traits and, reciprocally, herbivores exert selection on plant-defense traits. An opportunity to study and understand some of these mechanisms is presented by native species that become pests. Any new focus on indigenous species that become pests raises new questions and this research aims to test a simple hypothesis that has never been proposed within the invasive species context. The experimental hypothesis in this study is that exotic introduced plants lack regulatory plant defenses against some native insect herbivores and therefore provide higher quality food that enhances fitness of the herbivore. Therefore, the increased availability of high quality food is one of the reasons that some native species become pests in their native range and then become troublesome elsewhere in the world. In this study, I investigated the fitness responses of two native congeneric Coleoptera species - one that has become invasive and a serious pest and one non-invasive. Several feeding treatments have been tested, involving different plants (exotic and indigenous) and different rearing temperatures (10, 15 and 20°C). After 14 weeks of treatment, our native invasive insect clearly does better when the ambience is cool and the food is exotic. While its non-invasive “relative” performs better eating indigenous food with a mortality rate almost twice as low when fed on New Zealand native grasses. According to these results, it is clear that not only the menu but the right food/temperature combination contribute to the success of native insect invaders.

## **STATISTICS NZ PRESENTATION**

### **The provision for researchers to access Statistics New Zealand's microdata**

**Kirsten Nissen**

*Statistics New Zealand*

Statistics NZ undertakes the collection and dissemination of economic, social and population surveys. Full utilisation of survey data collections is achieved when researchers are able to access confidential microdata and perform data analysis that can support and develop ongoing research. An overview of current options for researchers to gain access to existing micro-datasets will include a list of official statistics from micro-datasets available. The process of applying for microdata access and working with microdata to ensure confidentialised outputs are discussed.

## **FACULTY OF ENVIRONMENT, SOCIETY AND DESIGN**

### **Participation in action: the role of the public in the regulation of Genetically Modified Organisms**

**Sarah Edwards**

*Faculty of Environment, Society and Design*

New Zealand has a history of involving the public in debate and decision-making over research into Genetically Modified Organisms (GMOs). Nevertheless, while it is obvious that the public is heard on this topic, critical analyses from the social sciences question whether or not they are actually listened to. This has led many people to question whether or not the decision-making pathways employed by agencies such as the Environmental Risk Management Authority (ERMA) are adequate for dealing with such a highly contentious issue. Prior studies that have focused on public participation in GMO regulation tend to adopt the boundaries of formal decision-making pathways as the boundaries to their own analyses. What this approach fails to do, however, is consider the multitude of decisions that are made throughout a programme of GMO research. Actor-Network Theory (ANT) provides a framework within which these many decision-making pathways can be considered without any a priori assumptions of where they are found or who is involved in them. ANT rejects the notion that a GMO is a self-contained object; instead, it is conceptualised as the outcome of a series of negotiations made between actors as they seek to interest others in their goals. Using the recent development of genetically modified “tearless” onions as a case study, I will discuss how a number of key actors – the New Zealand Government, scientists, their employers, and industry partners – are involved in the co-creation of a GMO. If the relationship between each actor is considered as a decision-making pathway, it becomes obvious that the public is participating in GMO decision-making in more than just the space created by ERMA. In particular, it appears that they are directly influencing the relationship between scientists and their employers, which has had huge ramifications for the outcomes of the tearless onion project.

### **Rainforest Alliance Certification of Kenyan tea farms: Does it make a difference?**

**Benard Ochieng**

*Faculty of Environment, Society and Design*

An Environmental Management System (EMS) is a set of guidelines that organisations can use to structure their management to prevent or minimise adverse environmental and social impacts. Rainforest Alliance Certification (RFC), one example of an EMS, was adopted by a number of Kenyan tea farms in 2007 to promote sustainable tea production. It addresses the three pillars of sustainable development (environment, economic and social) and as such is suited to tea farming which is characterised by job insecurity, strenuous work conditions, child labour and environmental resource degradation.

As numbers of EMSs and pressures on organisations to adopt them increase, it is imperative to evaluate their contribution to achieving sustainability. In this study, a mix of methods - qualitative interviews with farm managers and government officials, quantitative interviews with farm workers, biophysical observation, and secondary data - were used to compare agri-environmental and socio-economic indicators between certified and non-certified tea farms.

Analysis of the results indicates that the RFC brings some important social and environmental benefits, for example, improved work conditions and to a limited extent, natural resource conservation. Employees from certified farms have more opportunities to participate in environmental activities than those from non-certified farms. Their monthly income level is also higher than their counterparts. However, there were no significant differences in some aspects including: employees’ housing conditions, asset ownership and terms of employment. Although there are important benefits from adopting the RFC, more efforts are still needed to achieve sustainability.

## **Effect of whole body vibration training on jump height: meta-analysis**

**Nuttaset Manimmanakorn**, Mike Hamlin, Jenny Ross

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Whole body vibration (WBV) is a new tool widely promoted in commercial gyms as a means of improving strength and losing weight. However, the effect on muscle strength and performance is equivocal with some reporting improvements while others finding no performance benefit. MEDLINE, Web of Knowledge, Scopus, Google Scholar and SPORTDiscus databases were searched by using keywords: whole body vibration, vibration platform, randomized controlled trials, muscle strength, muscle performance and jump height. For studies to be included in the analysis they were required to be randomized controlled trials comparing the effect of whole body vibration exercise or no additional exercise (controls) on jump height. Standard mean difference (SMD) was calculated and combined with a random effects model by using RevMan5 statistical program. There were 9 randomized controlled trials which meet our criteria. Compared to controls the overall effect of whole body vibration training on jump height was a positive mean standardised mean difference of 0.79 (95% confidence interval 0.48-1.10). We found that vibration exercise consisting of higher frequency (> 30 Hz, 0.95, 0.58-1.31), higher amplitude (> 3 mm, 1.01, 0.45-1.57) and longer duration (> 10 min/session, 1.02, 0.56-1.47) had greater benefit for jump height improvement than lower frequency (< 30 Hz, 0.33, -0.19-0.85), lower amplitude (< 3 mm, 0.62, 0.30-0.93) or shorter duration (< 10 min/session, 0.57, 0.27-0.87). We conclude that vibration training produces a moderate to large positive effect on jump height performance. Vibration protocols with higher frequencies, higher amplitudes and of longer durations per session are suggested for enhancement of lower limb muscle power.

## **How the others plan: informality of planning practices in the Philippines**

**Rhodella A. Ibabao**, Prof. P. Ali Memon, Dr. Suzanne Vallance

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This study is concerned with the dynamics through which informal urban planning practices in Third World cities may get embraced and eventually institutionalised into formal planning systems. As the process of inclusion does not follow a smooth path, it is proposed that certain enabling factors facilitate the inclusion while other factors create barriers /tensions in the process of institutionalisation of informal planning practices.

This research used three qualitative case studies of informal planning practices in Iloilo City, Philippines with semi-structured interview as the primary technique and a 6-month data collection process. Participant observation, secondary data and photographs were also used to substantiate and validate the results. Drawing on the experiences of three civil society groups which practice informal planning: HPFP (Homeless People's Federation of the Philippines-Western Visayas), Gabriela (General Assembly Binding Women for Reforms, Integrity, Equality, Leadership, and Action-Panay) and JASAC (Jaro Archdiocese Social Action Center), it is argued that formal and informal planning are not binary opposites but are conflated. The fusion of planning practices leads to outcome which may advantage or disadvantage particular interests. The conflation of planning can be facilitated by enabling factors such as social learning, social networking/alliance-building and spaces of citizenship.

Furthermore, it is argued that the transition of practices from informal to formal planning creates barriers/tensions which can be explained by the governmentality and hegemony concepts.

The study concludes that the whole planning system is constantly modified through social learning, social networking/alliance-building and renewed spaces of citizenship.

## **Understanding ecotourism from visitors' perspectives**

**Lhakpa Tenji Lama**

*Faculty of Environment, Society and Design*

Ecotourism has become a popular tourism concept in many countries. However, the debate continues about what exactly ecotourism means as different stakeholders in tourism may define and understand this concept differently. Visitors' environmental values, perspectives, and involvement are crucial in implementing the ecotourism concept. This study examined the effects of education on environmental values, and the relationship of pro-environmental worldview on the ecotourism activities of travelling visitors. The visitor survey (n = 30) was conducted in Christchurch Cathedral Square using a random sampling technique. Self-administered questionnaires were used to assess: demographic information, environmental values, travel characteristics, ecotourism knowledge and definitions, and ecotourism activities of visitors. Environmental values were measured using the NEP scale (Dunlap et al., 2000). Data were analysed using correlation, ANOVA, t test, chi-square, and multiple regression analysis. No statistically significant effects were found in the results. This indicates that education may not always influence developing a pro-environmental view. Individuals with pro-environmental views may have good intentions but not necessarily put them into practice. Other factors may have influenced these variables.

## **An overview of the nature based tourism stakeholders' perception of vulnerability to climate change**

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Climate change is one of the highest environmental risks for the mountain destination areas of Nepal. In lower Mustang, a key mountain destination area within the Annapurna Conservation Area (ACA) of Nepal, its nature based tourism (NBT) supply system is being subjected to multiple stressors, bringing significant challenges in the sustainable tourism development in this region.

This paper presents an overview of the research conducted to understand NBT supply system's vulnerability to climate change from the tourism stakeholders' perspectives. Using the vulnerability assessment framework and a multi-methods qualitative approach, the potential impacts of these stressors and the adaptive capacity of the NBT supply system was assessed to understand the vulnerability of the system to climate change.

This study found that the NBT supply system is exposed to climate variability and change. Impacts of climate variability are perceived to have affected all three key assets (tourism, human and natural) of the NBT supply system. However, it was also evident that climate change is occurring amidst a number of other socio-economic and political changes. The Beni-Jomsom (new) road and changing tourism dynamics intertwined with the issues of the ongoing political instability are important vulnerability issues for the system and its management.

The study shows that the contexts for stakeholders' perception on vulnerability to climate change are multidimensional and that they are shaped by non-climatic stressors. In turn, these perceptions are likely to influence the NBT supply system itself and its vulnerability to climate change.

## **Community-based ecotourism and empowerment of indigenous people in Cambodia: the case of Yeak Loam Community-based Ecotourism**

**Bunly Bith**, Grant Cushman, Stephen Espiner  
*Faculty of Environment, Society and Design*

Community-based ecotourism is advocated as an effective form of sustainable tourism. It is often promoted as a significant tool for empowering local communities, and in particular indigenous people, to control the goals, the processes, and the desired outcomes of the tourism industry. This study evaluates the potential of the Yeak Loam Community-based ecotourism development for empowering indigenous people, namely Tampeun, who live adjacent to the Yeak Loam Protected Area, Ratanakiri, Cambodia. The research design uses mixed methods, combining quantitative and qualitative approaches. The findings indicate that the Yeak Loam Community-based Ecotourism is perceived as an important tool for enhancing psychological, social and political empowerment of indigenous people although the capacity of Yeak Loam Community-based Ecotourism to contribute economic benefits to Tampeun people is limited. Furthermore, the hypothesis that a high degree of Tampeun community participation in the Yeak Loam Community-based Ecotourism development leads to enhanced effectiveness of the Yeak Loam Community-based Ecotourism in facilitating economic, psychological, social and political empowerment of Tampeun people is supported. It is concluded that community-based ecotourism can be an effective form of sustainable tourism for empowering indigenous people who live adjacent to protected natural areas.

## **The ecotourism species concept: the manipulation of taxonomy to advance conservation and tourism development**

**Roland Foster**  
*Faculty of Environment, Society and Design*

Taxonomy has a fundamental role to play in setting conservation priorities because population sizes and distributions of a given species are only accurate if the taxonomy is correct. Taxonomy, can, however, be misused to elevate particular taxa in order to increase conservation funding, or to act as a proxy for landscape conservation, which has become known, colloquially, as the 'conservation species concept'. Extending these ideas, this paper reports a case study of penguin taxonomy, conservation and ecotourism on Banks Peninsula, Christchurch, New Zealand. It reveals how a phylogenetic study of the white-flipped penguin (*Eudyptula albosignata*) appears to have been influenced by a proposal to develop a 'penguin parade' in which penguin chicks are translocated to establish a new predator-proof fenced colony in a highly valued and contentious landscape that is more accessible to tourists. I argue that while ecotourism can support conservation initiatives, the use of taxonomic science, and a resultant 'ecotourism species concept', to pursue the development goals of ecotourism promoters has the potential to adversely affect the work of both taxonomists and nature conservationists.

## **A journey among Devotees, Compliers and Opportunists; exploring tourism businesses motivations for incorporating the 'Responsible Tourism-Qualmark' accreditation**

**Raviv Carasuk**, Susanne Becken, Ken Hughey.

*Faculty of Environment, Society and Design*

The New Zealand Ministry of Tourism has identified the need for improving the sustainability of current tourism industry practices. The addition of a green certification component to the already existing quality ranking scheme, Qualmark, is one approach to achieve this. In response, this research studied why tourism businesses incorporate sustainable practices. Examination of exogenous and endogenous pressures (e.g., Regulatory and Business Environment; Legitimacy and Altruism) was used as the basis for the conceptual framework for this research.

Semi structured qualitative interviews were conducted with 24 Responsible Tourism Qualmark accredited business around New Zealand; 22 were randomly selected, and two were sampled using a snowball method.

This study found that all well-known exogenous and endogenous pressures are represented in the sample. However, while specific exogenous pressures correlate to specific endogenous values, the cause and effect are mixed: it can be that respondents only relate to the specific exogenous pressures that are associated with their endogenous values; it can also be that the respondents' endogenous values are determined by specific exogenous pressures. Thus, the exogenous pressures may be causing the endogenous ones or vice versa. In order to separate between cause and effect, respondent environmental awareness was considered. This was done with the development of a new typology: (1) Devotees, who are those holding high environmental awareness; (2) Compliers, who are those having some environmental awareness; and (3) Opportunists, who are those holding little environmental concern. Each respondent's environmental awareness was found to shape their endogenous values, which then relate to a specific exogenous pressure. This research has also looked into the constraining and facilitating factors that respondents encounter during the process of implementing sustainability. Finally, this research developed an enhanced framework by integrating the exogenous and endogenous pressures with the environmental awareness typology and the constraining and facilitating factors.

## **View from the edge: An edgework perspective on risk taking behaviour**

**Steele Taylor**

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Beck & Giddens (1992) have suggested that we live in a society that is increasingly aware of risks. According to Edgework Theory (Lyng, 1990), risk takers have evolved as a response to this "risk society". A study was conducted to examine whether or not a relationship exists between voluntary risk-taking behaviour and an individual's perception of societal-level risks. As well, an examination was conducted of whether or not rock-climbers met the criteria outlined by Edgework Theory in order to test the theory's criterion validity. Climbing and non-climbing participants (n=21) were selected using a random sampling procedure. These volunteer participants were then asked to complete a self-administered questionnaire that dealt with extreme sport participation, risk of sport involvement, risk propensity, and perceptions of risk. The latter measure included a risk sensitivity scale developed by Sjöberg (1998). Multiple regression, correlation analysis, and t-tests were conducted. No statistically significant results were found, suggesting that a general sensitivity to risk may not be related to behaviour. In addition, it was found that not all rock-climbers met edgework criteria; therefore greater rigour may be needed for defining edgework activities for future studies.

## **Applying theoretical models to develop an effective communication for changing undesirable behaviours of visitors in national parks of Thailand: A case study of feeding wildlife in Erawan National Park**

**Sunee Sakseau**, Stephen Espiner, Joanna Fountain  
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National parks and other protected areas are a fundamental aspect of Thailand's economy and culture. With increasing numbers of park visitors, there is potential for damage to natural resources and other visitor's experiences. In order to understand aspects of this problem, this study seeks to identify depreciative visitor behaviour, and explore mechanisms for reducing their undesirable outcomes through persuasive communication. This study aims to apply related theoretical models to create persuasive communication and test its effectiveness in the context of Thailand's national parks. According to the Theory of Planned Behaviour (TPB), human action is guided by three components: behavioural beliefs, normative beliefs, and control beliefs. Proponents of the theory have claimed that using persuasive communication can influence and convince people to complete or avoid a given action. Therefore, a research framework has been designed based on the assumption that changing people's beliefs through persuasive communication can lead to change in their actions. The study involves five steps: 1) depreciative behaviour survey; 2) belief elicitation interview; 3) belief measurement survey; 4) persuasive communication development; and 5) evaluation of effectiveness of designed communication. The first two steps were conducted in 2009. Wildlife feeding in the Erawan National Park was selected as the target behaviour. Using semi-structured interviews, 52 respondents reported their beliefs about feeding wildlife in the national park. Salient beliefs of three components resulting from the interviews will be discussed in the presentation. Beliefs will be selected to create a self-administrated questionnaire leading to the development of a persuasive message for testing at the study site later this year.

The study's results are expected to inform the literature on communication research, especially the perspective of non-Western countries, and assist with the reduction of impacts of depreciative behaviour in the protected areas of Thailand.

## **Effect of increasing microbial diversity on the stability of thermophilic anaerobic digesters**

**Rupinder Singh**  
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It has been hypothesized that increasing the diversity of an ecosystem makes it more resilient towards disturbances and hence increases the stability of that ecosystem. Anaerobic digesters are an engineered ecosystem whose function depends upon the concerted actions of different groups of micro-organisms. These groups include fermentative, acidogenic and acetogenic bacteria and methanogenic archaea to break down the organic matter into methane and carbon dioxide rich biogas. One of the factors governing the stability of anaerobic digesters is the balance between the microbial groups, particularly between the acid producers (bacteria) and the acid consumers (archaea). It has been frequently observed that changes in the environmental conditions or feed composition disturb the balance between acetogens and methanogens causing accumulation of intermediate products which leads to digester failure. In the current study we have attempted to increase the stability of thermophilic anaerobic digesters by increasing their microbial diversity. Two different ways were selected to increase the diversity; one is by taking inoculum from different sources and the second is by putting carbon fiber in the digester as a medium for microorganisms to stick and grow which may help to increase the microbial diversity. Inoculum was

selected from seven different places and was grown on autoclaved sewage sludge at 55°C in the incubator. Raw sludge in the autoclaved sludge served as control. SSCP based on 16S rDNA was used to compare the microbial populations between the test samples and the control. No significant changes were observed in the microbial population profiles from the test and control samples which could be due to the dominance of sludge organisms in the sludge. The second strategy of using carbon fiber worked fine as the digester with carbon fiber recovers more quickly than the digester without carbon fiber when fed with 25% fats in the feed sludge which may be due to the increased microbial diversity or growth on the carbon fiber.

## **Community commodified: planning for a sense of community in residential subdivisions.**

**Peter Chamberlain**

*Faculty of Environment, Society and Design*

The last 20 years have seen dramatic changes in the provision of housing in New Zealand. In contrast to the days of active state involvement in urban design and development and the Town and Country Planning Act that heavily regulated urban form, increasingly, the actual planning, design and building of both houses and new neighbourhoods/subdivisions has been left to the private sector. As a corollary, there is a need to better understand ways in which some basic characteristics and attributes of housing and neighbourhood form have become commodified; 'community' is the example explored here.

An overview of land subdivision and house building rhetoric shows how important a sense of community has become in place promotion, but this is problematic. Private property development companies are claiming that their subdivisions deliver an inherent sense of community despite the traditional view of community evolving over time, difficulties with definitions, and controversy over the means by which communities might be built. Thus far, insufficient research has been carried out on the land developers themselves, their motives, intentions, and methods in regard to building communities.

This paper presents the results of research that explored Christchurch real estate developers' understandings of 'community' and how they go about incorporating it in their subdivisions. Observations of residential subdivisions were documented and developers' advertising material was examined. Developers' mechanisms and methods for building communities - such as physical design, advertising rhetoric, section prices and covenants - are discussed.

## POSTERS

### FACULTY OF AGRICULTURE AND LIFE SCIENCES

#### Systems biology approach to mastitis

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Bovine mastitis is the result of an inflammation in the mammary gland caused by a variety of bacteria and is a major cause of disease in the Dairy industry world wide. In the USA, mastitis has been estimated to cost the industry US\$1.7 billion annually. Despite extensive research, 30% of the cows are still affected by mastitis. Here we propose an integrated approach, a combination of mathematical modelling and molecular biology. Isolates of mammary epithelial cells were cultured and challenged with *E. coli* bacteria for 1, 3, 6 and 24 hours. Microarray analysis identified 1960 differentially expressed genes. Further analysis indicated the involvement of immune related genes operating in the NFkB signalling network with increased expression of the cytokine RANTES. The NFkB signalling pathway, a transcription factor for RANTES, was used to model gene network regulation (GNR) in bacterial mastitis. The proposed integrated approach identified RANTES and a parameter set for the model of *E. coli* mastitis. *In silico* simulations of the model increase understanding of qualitative and quantitative aspects of the immune system's reaction to the bacteria. The insights obtained can be used to refine the research question and identify biological experiments.

#### Nitrous oxide and carbon dioxide emission responses to litter incorporated in a grassland soil

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Recalcitrant forms of carbon (C) such as cellulose may have determinant effects on soil C and nitrogen (N) dynamics in terms of N<sub>2</sub>O emissions. Since cellulose is a recalcitrant form of C and litter is a complex nutrient source; we expected that at increasing rates of cellulose, N<sub>2</sub>O emissions would decrease. Clover (*Trifolium repens* L.) and clover + different proportions of cellulose were incorporated into soil and the nitrous oxide (N<sub>2</sub>O) and carbon dioxide (CO<sub>2</sub>) emissions were measured. Ground, dried clover shoots and cellulose were mixed to carbon: nitrogen (C: N) ratios of ~9 ('clover only'), 20, 30 and 40. Soil samples were incubated at a water-filled pore space (WFPS) of 86% and 20°C. Over 42 d, N<sub>2</sub>O emissions from the controls averaged 9 mg/kg soil (6 g total N/kg soil), indistinguishable from the 'clover only' (1.5 g N incorporated/kg soil) and 'C: N 20' treatments. Corresponding N<sub>2</sub>O emissions from the 'C: N 30' and 'C: N 40' treatments averaged nearly 50% greater ( $P < 0.05$ ) and these two treatment effects were indistinguishable. Over 42 d, CO<sub>2</sub> emissions from the controls averaged 4 g/kg soil. There was a linear C (incorporation rate) 'dose effect' on CO<sub>2</sub> emissions (0.15 g CO<sub>2</sub>/g C,  $R^2 = 0.80$ ) with no difference between clover and clover + cellulose. Over 145 d, CO<sub>2</sub> emissions from the controls averaged 17 g/kg soil and the C 'dose effect' was 0.38 g CO<sub>2</sub>/g C ( $R^2 = 0.98$ ). Incorporating different plant materials into soil affected the N<sub>2</sub>O and CO<sub>2</sub> emissions. The biochemical composition of plant litter is possibly the governing factor for N<sub>2</sub>O emissions and these results indicate that *in situ* experiments are warranted.

## Germination and survival of *Neofusicoccum luteum* after different storage treatments

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*Neofusicoccum luteum* is a widespread fungal pathogen of grapevines. The germination and survival of *N. luteum* conidia was tested following storage at different temperatures and times. The conidia ( $10^5$ /ml water) were incubated at 2, 8 and 20-23°C (ambient temperature) for 0, 2, 4, 24, 48, 72 hours, 1, 2 and 3 weeks. The conidial suspensions were then microscopically examined for conidial germination, adjusted to  $10^2$ /ml and 100 µl spread onto PDA to check for viability. At ambient temperature, 42% of conidia germinated after 2 hours and 73% after 72 hours. When held at 8°C, 23% of conidia germinated after 24 hours and the proportion gradually increased up to 55% in 2 weeks, while at 2°C, 4% had germinated after 48 hours increasing to 17% in 3 weeks. The maximum periods of viability of stored conidia (as determined by their ability to form colonies on PDA) was 48 h for ambient temperature, 2 weeks for 8°C and 3 weeks for 2°C. This research showed that *N. luteum* can germinate quickly at normal summer temperatures as well as at low winter temperatures, so can infect trimming wounds during summer and pruning wounds during winter.

## FACULTY OF ENVIRONMENT, SOCIETY AND DESIGN

### Effect of Resistance Training Combined with Hypoxia on Muscular Strength and Endurance

Apiwan Manimmanakorn, Michael J. Hamlin, Jenny J. Ross  
*Faculty of Environment, Society and Design*

Many endurance athletes use different forms of hypoxic training (HT) in an attempt to improve aerobic performance; however the use of HT to elicit anaerobic performance improvement is unclear. This study was conducted to determine the effect of normobaric hypoxic exposure combined with low-load resistant exercise on muscular strength and endurance in well-trained subjects. Twenty-one (untrained 7 and well-trained 14) males ( $33 \pm 6.7$  yrs, mean  $\pm$  SD) participated in a 5-week exercise training study of the knee extensor muscles, in which low-intensity ( $\sim 50\%$  1Repetition Maximum, 1RM) exercise combined with normobaric hypoxia ( $F_{iO_2}$  set to produce arterial oxygen saturations of  $\sim 85-87\%$  HT,  $n = 7$ ), low-intensity exercise combined with normoxia ( $F_{iO_2} = 0.21$ , NT  $n = 7$ ) and no exercise training (untrained control,  $n = 7$ ) were included. The exercise in the HT group was of the same intensity and amount as in the NT group. Two days before and 1-2 days after training all subjects performed isometric strength (3-s peak maximal voluntary contraction,  $MVC_3$ ) and endurance tests (area under 30-s force curve [ $MVC_{30}$ ], % drop in force over 30 s [fatigue], and total number of repetitions completed at 50% 1RM). Relative to the control group, the NT and HT groups increased  $MVC_{30}$  after training by  $4.7 \pm 10.5\%$  (mean  $\pm$  95% confidence interval) and  $22 \pm 9.4\%$  respectively. The change in  $MVC_{30}$  as a result of training was clearly higher in the HT compared to the NT group ( $14.8 \pm 10.4\%$ ,  $p=0.03$ ). In addition, compared to the NT group the HT group's fatigue was substantially less ( $-12.7 \pm 8.0\%$ ,  $p=0.02$ ) after training.  $MVC_3$  and the total number of reps at 50% 1RM showed positive, but unclear improvements in the HT compared to the NT group post-training ( $12.5 \pm 31.5\%$  and  $16.4 \pm 37.5\%$  respectively). The chances that the true effect of hypoxia in conjunction with low-load resistant exercise on subsequent 30-s isometric endurance performance was almost certainly beneficial, but the effects of such training on peak force were unclear. These results suggest low-load resistance training in combination with hypoxic breathing is very likely to be worthwhile for improving isometric endurance in well-trained males.

# *Invitation*

*Lincoln University Post Graduate Conference 2010 invites you to the Conference Functions*

◆ **MIX AND MINGLE**

Commerce Foyer  
Thursday 2nd September 6pm

◆ **CONFERENCE DINNER & AWARDS CEREMONY**

Landscape Architecture Building Foyer  
Friday 3rd September  
Drinks will be served from 5pm and dinner will start at 6pm.

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