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## International Journal of Rural Law and Policy

No 2 2017



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**Citation:** 'Thriving Through Transformation: Local to Global Sustainability'. (Abstracts: Papers presented at the 2015 ANZSEE Biennial Conference, UNE, Armidale, NSW, 19-23 October 2015) (2017) 2 *International Journal of Rural Law and Policy* <http://dx.doi.org/10.5130/ijrlp.i2.2017.5581>

ISSN 1839-745x | Published by UTS ePRESS | <https://epress.lib.uts.edu.au/journals/index.php/ijrlp>

## ABSTRACTS

### Thriving through transformation: Local to global sustainability

<http://dx.doi.org/10.5130/ijrlp.i2.2017.5581>

## 2015 ANZSEE Biennial Conference

The conference themes centred on ideas for transforming to a sustainable human existence at all geographical scales, particularly at the local, regional, and remote scales, but also at the national and global scales:

- A. Place-based perspectives on sustainability & transformation
- B. Institutions for resilience & transformation
- C. Economics of equity & distribution in transformation
- D. Making the marginal mainstream: expanding horizons

*Special sessions: Indigenous Wellbeing; Wilderness; & Local Government*

UNE, Armidale, NSW, 19-23 October 2015

**DECLARATION OF CONFLICTING INTEREST** The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article. **FUNDING** The author(s) received no financial support for the research, authorship, and/or publication of this article

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## Changing places and shifting wilderness: Is place attachment and landscape preference a problem or a plus for biodiversity?

Robyn Bartel, University of New England  
Don Hine, University of New England  
Methuen Morgan, University of New England

The growing recognition of the ecological and social benefits of nature to humanity, alongside the accelerating demise of biodiversity due to human activities, is attracting increasing research attention towards the efficacy of traditional protection measures, as well as to human attitudes and behaviours regarding the environment. Wilderness preservation and biodiversity conservation have generally been thought of as mutually exclusive to human presence, and human activities antithetical to environmental objectives. This is due to the history of anthropogenic harms and concerns that place attachment and landscape preferences may act as barriers to preservation and restoration efforts. However, the idea of wilderness as human-free has undergone sustained attack, as have binarised and binarising conceptions of human-nature more generally. This case study of 300 urban residents in a highly modified area found that place attachment and landscape preference acted as supports rather than barriers to place-change. Positive correlations were found between place attachment and preferences for more ecologically functional landscapes and environmentally friendly behaviours, including place-changing restoration practices such as tree-planting. These results suggest that public participation and involvement in conservation may be valuable rather than antithetical for biodiversity, particularly where connections to nature are strong. Participation may also encourage the development of place ties and environmental awareness and appreciation, which may lead to further pro-environmental behaviours. Biodiversity projects supportive of public participation are likely to maximise gains in, and promote positive feedbacks between, pro-environmental attitudes and behaviours. Exclusion may undermine the potential for such benefits to be realised.

## Enduring community value from mining: Transforming remote communities through their resource lifecycles

Boyd Blackwell, University of New England, Ninti One Ltd/CRC REP  
Stuart Robertson, University of New England, Ninti One Ltd/CRC REP  
Anne Fordham, University of South Australia, Ninti One Ltd/CRC REP

Enduring community value from mining is a vexed issue for researchers and practitioners in delivering lasting value to communities across the globe. Indeed, ECVM is a necessary ingredient in transforming communities to alternative societal and economic structures after the dizzy heights of a mining boom are gone. ECVM is a term that has been developed by mining peak bodies and is associated with the concepts of Corporate Social Responsibility, Social License to Operate, and Mine Lifecycle Planning. These four elements will be discussed and analysed within the context of remote Australian mining regions, drawing on case studies from the Northern Territory, South Australia and Western Australia. The three presenters are funded through the CRC for Remote Economic Participation (CRC REO), managed by Ninti One Ltd, forming part of the 'ECVM team' and 'Regional Economies Program' and will present their recent findings around:

- Measuring the employment impacts of mine closure and considering issues for transformation
- Planning for the Mine Lifecycle and Creating Enduring Value for Remote Communities
- Corporate Social Responsibility: Towards a Framework that Provides for Lasting Value

Each of these separate talks is summarised in the three attached abstracts. Please refer to these for more detail. Other presenters are welcome to join the session. NB: This session links with ANZSEE Indigenous Participation Sponsorship provided by Ninti One Ltd.

**Acknowledgements:**

We are grateful to Ninti One Ltd and the Universities of New England and South Australia for funding to support this research. We are also grateful to Ninti One Ltd for providing an Indigenous Participation Sponsorship to ANZSEE for the 2015 conference.

## **Invasive animal management**

**Tanya Howard, University of New England**  
**Paul Martin, University of New England**  
**Don Hine, University of New England**  
**Patty Please, University of New England**  
**Lyndal Joy Thompson, University of New England**

Invasive species in Australia have economic, environmental and agricultural impacts. Invasive species take hold in landscapes that are segmented by land tenure boundaries, suffer fragmented governance and short-term planning cycles. Management and control approaches are informed by technical expertise in species ecology; however successful implementation also requires sustained and coordinated collective community action. Ongoing investment of human and financial resources is necessary to transform current strategies, and this has implications for equitable distribution of economic impacts across the Australian landscape.

This paper reports on a current multi-disciplinary research program that integrates behavioural science, institutional analysis and community engagement scholarship to build more effective and equitable strategies for invasive species governance. The program seeks to augment technical and scientific knowledge of invasive species with applied research about the human dimension of invasive species management. The human dimensions approach aims to integrate legal and policy frameworks, behaviour change and motivations for collective action into a strategic approach to this complex problem.

This paper discusses how the research problem has been defined, the methods that are being used and early indications of strategic directions from this work.

**Acknowledgements:**

This research is sponsored by the Invasive Animals CRC: Program 4 - Facilitating effective community action.

## **Environmental justice in the ANZSEE region**

**Anitra Nelson, Royal Melbourne Institute of Technology (RMIT) University**  
**Lisa de Kleyn, RMIT University**  
**Victoria Kearney, RMIT University**  
**Lee Tan, RMIT University**

The term 'environmental justice' has only recently developed visibility in Australia, specifically in environmental campaigns, such as 'climate justice' (global warming) and 'nuclear racism' (uranium developments impacting on Indigenous peoples), and in legal spheres, such as class actions. In the US, Europe and the global South (especially in Central and South America and Africa) the term has had longer and broader yet contested and varied applications. This panel will discuss aspects of the concept and practical applications, especially in Australia.

Lisa de Kleyn explores the environmental justice approach emerging in Australia and its unique expression in the academic literature, non-government organisations and government bodies. Her doctoral research is an environmental justice analysis of the conflict over use and management of the Toolangi State Forest on the north-eastern margins of suburban Melbourne. She discusses concepts of Australian environmental

justice in the context of global variations as communities work within distinct histories, cultures, institutions, vulnerabilities and environmental pressures.

Anitra Nelson will introduce the recently initiated Australian Environmental Justice (AEJ) research project, a partnership between RMIT University and Friends of the Earth (Australia) – associated with the scholar-activist international Environmental Justice Organisations, Liabilities and Trade (EJOLT – <http://www.ejolt.org/>) research project centred on cataloguing the conflicts and analysing the cases of environmental injustice. EJOLT was initiated by past-president of ISEE Joan Martinez-Alier (UAB, ICTA) with EU funding. Anitra discusses the findings produced from more than 1500 cases worldwide on an online interactive atlas (<http://ejatlas.org/>), including the history, use and critical appraisals of terms such as ‘ecological debt’, ‘ecologically unequal trade’, ‘biopiracy’ and ‘water justice’, and the growth in legitimacy of specific methods such as ‘popular epidemiology’.

Victoria Kearney has uncovered environmental injustice in her professional work and doctoral studies on the connections between health, the environment and sustainable communities and their implications for education and public policy in Australia. Kearney will refer to a couple of case studies to analyse the policy challenges that environmental injustices present and offer some strategic ways of addressing such challenges.

Lee Tan focuses on environmental injustices arising from the establishment and workings of a rare earth minerals processing plant near Kuantan, Malaysia – owned and managed by Australian company Lynas Corporation. Pollution from the plant threatens the regional environment, and employment and health of residents. This case study reveals a typical global North-South dynamic. Malaysia’s laxer environmental standards, poorer enforcement of regulations and political corruption have made processing of rare earths from WA attractive to Lynas.

## **The art value chain: Aboriginal and Torres Strait Islander art enterprises in remote Australia**

**Tim Acker, Curtin University**

Aboriginal and Torres Strait Islander art has been a major cultural, creative and economic feature of remote Australia for more than forty years. Despite this importance, there has been only limited detail on the scope and the scale of the art businesses that are so prominent in remote communities. This presentation will highlight findings from the CRC-REP Aboriginal and Torres Strait Islander Art Economies Project. In particular, the value chain research that investigated the complexity, variability and detail of remote art business and identified trends that point to both challenges and opportunities for the future for artists and their art enterprises.

## **A systematic review and agenda for using alternative water sources for consumer markets in Australia**

**Sujana Adapa, University of New England**  
**Navjot Bhullar, University of New England**  
**Simone Valle de Souza, University of New England**

A systematic review of existing research in the area of alternative sources of water for consumer markets is presented. The researchers discuss the background of the importance of water as a precious resource to sustain human life; review relevant literature about the alternative sources of water, mainly recycled and desalinated water; and the issues surrounding centralised and decentralised water systems. Results are reported from the extant research in the areas of public acceptance, consumer satisfaction, contextual factors, demographic variables and perceived benefits and barriers associated with the intention to adopt,

adoption, and use of recycled and desalinated water. Findings presented highlight the knowledge gaps and limitations of prior studies and outline the strategic importance of a much needed marketing-related research for promoting the consumption and use of alternative water sources for consumer markets in Australia. The systematic review also highlights the need for local government councils, other government bodies and institutions to work cohesively with various stakeholders and embrace marketing-related information as a strategic tool for promoting alternative sources of water. The relevance of customer driven market strategy including segmentation, targeting and positioning aspects in influencing the awareness and uptake of alternative sources of water is discussed.

## **Diversification and productivity in crop-livestock farming systems in the Forest Savannah Agro-ecological Zone of Ghana**

**Bright O Asante, University of New England**  
**Renato A Villano, University of New England**  
**Ian W Patrick, University of New England**  
**George E Battese, University of New England**

Agricultural diversification has been found to potentially lead to synergies in farm enterprises, and aid in spreading production risks and offering farmers with stable incomes. This paper investigates whether crop-livestock diversification is desirable among smallholders in the Forest Savannah Agro-ecological Zone of Ghana. An econometric analysis is used to examine the economies of scope and risks at the farm level. The results present evidence of scope economies in crop-livestock diversification and the risk effects were significant in determining diversification motives. Economies of scope were evident in producing crops, such as cowpea, groundnut and yam in combination with small ruminants, such as sheep and goats. Our results imply that to improve productivity and associated benefits from crop-livestock diversification; there is the need for policy makers to include strategies for enhancing the production of these crops in crop-livestock diversification systems among smallholders in Ghana.

### **Acknowledgements:**

We are grateful to the farmers in the Forest Savannah Agro-ecological Zone of Ghana for their time and patience in contributing to the data collection. We are also thankful for the financial support of the Australian Government through the Department of Foreign Affairs and Trade (DFAT), towards the data collection. The logistical support of the CSIR-Crops Research Institute of Ghana during the field work is also duly acknowledged. We are not aware of any conflict of interests.

## **‘Globalisation from below’: The value of ethnography in examining the lived experience of the power and politics of change**

**Claire Baker, University of New England**

This research aims to link ideas of the role of the social imaginary, expressed in and through dominant economic and political priorities, to the lived experience of change through the examination of an explicitly situated ethnographic case study of a small farming community in North-West NSW during the period 1945-2015. Characterised by soldier settlement post-WWII, the economics and social life of the area have been transformed during this period and, as such, provide a valuable example of a changed social and agricultural landscape. Established under particular policy priorities focusing on ideas of nation-building and heavy protection for agricultural production and government investment in infrastructure, the move to a neoliberal position has had a clear impact upon the community being looked at, including the loss of small-scale holdings and a move to hyper-productivist mono-agriculture. Thus, while having been established under a very different organising logic and orientation to definitions of growth and development, the community being studied sits at the nexus of economic and social outcomes of policy change. In this sense

this project seeks to integrate an account of the shifts in macro and meso contexts associated with neoliberalism with an examination of the impact those shifts had on what is conceived, perceived and experienced at the individual level.

Acknowledgements:

Supervisors: Professor Alan Scott, Professor Neil Argent, Associate Professor Adrian Walsh.

## **Scope for multidisciplinary approaches to the analysis of value addition for products in remote areas**

**Derek Baker, University of New England**  
**Emilio Morales, University of New England**

Value chain analysis has become a popular way of representing contributions to consumers' willingness to pay for a final product, along with the allocation of the associated costs and benefits to participants in the production, transformation and marketing processes. Value chains are often seen as the focus of business development, particularly for innovation issues such as market access and new product development. They also are often seen as instrumental in defining needs for skills, strategies and other elements of remote firms and communities in serving high value markets. However, standard analytical methods and performance metrics have not emerged to enable comparisons across commodity sectors, between social contexts, nor even within chains. Measures of environmental impact, and sustainability of benefit flows from interventions, are therefore difficult to bring to bear on the value chain. Small firms, diverse enterprises, primary industry and geographic remoteness all offer some analytical challenges. This presentation reviews economically-oriented methods relevant to these subjects, and then identifies opportunities for multidisciplinary contributions. The presentation maintains a focus on key research questions from the points of view of decision-makers.

## **Are natural environments restorative environments?**

**Navjot Bhullar, University of New England**  
**Elizabeth McAllister, University of New England**

Humans have an innate appreciation of close contact with nature, which can be in the form of urban nature, natural forests or wilderness. The biophilia hypothesis (Wilson, 1984) suggests that humans possess an inclination to affiliate with nature and other living things and therefore experience positive outcomes from experiencing this connection. Connectedness with nature is one of the mechanisms through which beneficial effects of nature are experienced. Evidence also suggests that the beneficial effect of contact with nature is due to restoration of attentional capacity in people as they recover from stress and attentional fatigue. This paper will present a case study employing an experimental design. This study examines the effectiveness of exposure to natural environments (wilderness vs. urban nature compared with a control condition) on human health and vitality. Implications and future research directions will be discussed.

## **Identifying strategies to increase the adoption of conservation programs and practices on farmland in the Northern Tablelands and Nandewar bioregions of NSW**

**Madeleine Black, University of New England**  
**Nick Reid, University of New England**  
**Graham Marshall, University of New England**  
**Julian Prior, University of New England**

Lack of financial capital, high opportunity costs and loss of management flexibility have been identified as potential reasons why farmers do not adopt conservation programs or practices in the Northern Tablelands and Nandewar Bioregions of New South Wales. This is important because these bioregions have a large proportion of biodiversity on farmland and high levels of biodiversity decline. Both bioregions are officially recognised as 'under-represented' in the Interim Biogeographic Regionalisation of Australia Framework (2014 edition). Moreover, there are low levels of conservation program and practice adoption on farms, compounded by a failure to engage a broad cross-section of the farming community in extension events (e.g. field-days) and programs. To address the problem of low levels of adoption and engagement, we identify strategies to increase adoption rates, specifically of remnant vegetation management and re-vegetation. To do this, we present the results of a systematic review of literature, specifically focusing on how financial considerations influence adoption. To conclude, we present practical strategies which may assist in increasing adoption rates on the Northern Tablelands and Nandewar bioregions.

### **Acknowledgements:**

We would like to thank the Brigalow Nandewar Biolinks Group for funding this research.

## **Enduring community value from mining: Measuring the employment impacts of mine closure for remote communities and considering issues for transformation**

**Boyd Blackwell, University of New England, Ninti One Ltd/CRC REP**  
**Jim McFarlane, University of New England**  
**Andy Fischer, University of Tasmania**

Tracking and mapping the employment impacts from mine shut-down forms an important element in planning for the economic transformation of remote communities and delivering enduring value from mining. This paper presents the results from two case studies of the employment impacts from mine closure: the Ranger uranium mine in the Northern Territory, and the Leigh Creek coal mine in South Australia. The impacts for both locations are significant, and link to a number of supporting industries, particularly construction, but also more broadly across other sectors of the economy. Because of modern day work commuting practices, the impacts are in the majority local, but are also felt more broadly at regional, state and national levels. Developing policy options for preparing for managing imminent mine closures require careful analysis of the structure of the local economy, yet within the context of a globalised world, to help identify transformation opportunities for these remote communities.

### **Acknowledgements:**

We are grateful to Ninti One Ltd and the University of New England for funding to support this research. We are also grateful to Ninti One Ltd for providing an Indigenous Participation Sponsorship to ANZSEE for the 2015 conference.

## **Mining wilderness, food and traditional peoples: How to transcend and transform the imbedded conflicts presented through multiple and sequential use of remote resources**

**Boyd Blackwell, University of New England**

This presentation reviews a number of remote and regional resource developments in Australia to reconsider the trade-offs involved in the multiple and sequential use of lands and cultures in the extraction of mineral resources. These resources have historically fuelled local, regional, national and, more recently, overseas globalised economies. In doing so, the sovereignty of local people is sold to overseas interests. Trade-offs involved in mineral extraction can therefore be potentially bought or sold, particularly to the detriment of public goods such as the conservation wilderness areas (e.g. National Parks), traditional lands and their people, and prime agricultural land. Improved legislative frameworks for constraining the market veracity for resource development are emerging. However, these instruments are very specific (e.g. CSG exclusion zones), tending to be less protective of the range of assets which may be eroded through the mining process. In contrast, broader protective mechanisms modelled on those from wilderness management (i.e. protected area management) could better meet local and national interests. Agricultural Protect Areas and Aboriginal Protected Areas (APAs) are therefore suggested as a 'new' instrument that can help conserve the essential needs of a nation to feed itself, and to protect its cultural heritage and traditional peoples.

## **The economic value of the social, cultural, environmental and financial impacts of a common-good institution operating in remote Australia: A decade of success in the improvement of remote people's wellbeing**

**Boyd Blackwell, University of New England**

**Mike Dockery, Curtin University**

This paper presents the results of an economic assessment of the impacts of a common-good\* institution operating in remote Australia since its inception in 2013. Social, cultural, environmental, and financial impacts are assessed by transferring values from the literature for the goods and services provided by the institution. Using an assets-based approach drawing on capital theory (e.g. human, natural), a representative sample of programs and projects are assessed and compared to their costs of delivery. The benefit-cost ratios are obtained and then used to estimate like program returns, giving a complete assessment of the benefit returns from the institution's entire operation.

Since its inception, the institution has generated an estimated \$239.2 million in economic and social benefits for remote Australia, and continues to generate around \$30 million per annum of benefits, delivering a return on money invested of 4.5 to 1.

Without institutions such as these, remote peoples, particularly Aboriginal and Torres Strait Islanders, would be considerably worse-off and more easily overlooked. Our framework is useful for similarly assessing other common good institutions across the globe, the results from which can be used to gauge the contribution made by any institution, corporate or otherwise, to society.

### **Acknowledgements:**

The work reported in this abstract was supported by funding from the Australian Government Cooperative Research Centres Program through the Cooperative Research Centre for Remote Economic Participation (CRC-REP). The views expressed herein do not necessarily represent the views of the CRC REP or Ninti One Limited or its participants (e.g. University of New England). Errors or omissions remain with the authors. The authors are grateful to Dr Steve Blake and Jan Furguson for their leadership and support of the project and to a number people who supported the collection of data from across the relevant institutions including: Ange Vincent, Judy Lovell, Andy Bubb, Slade Lee, and Russell Raggart.

## Positive psychology and Indigenous education

Simon Burgess, University of New England  
Anthony Dillon, Australian Catholic University

While positive psychology has been incorporated into educational programs provided at a number of elite Australian schools, it has not been explicitly incorporated into any programs to which many Australian Indigenous students have access. In fact some education scholars are sceptical about the suitability of positive psychology in Indigenous education. In this paper we consider the reasons for such scepticism. We then argue that the scepticism is misplaced and that positive psychology could give rise to initiatives in Indigenous education that are both distinctive and promising. In advancing this argument we choose to focus on the personal strengths of perspective, citizenship, forgiveness and mercy, gratitude, hope, and humour. The evidence suggests that these strengths, like all of those recognised in positive psychology's official inventory, are valued in all cultures. We focus on these particular strengths, however, because there are challenges associated with helping to cultivate them in young Indigenous Australians while also providing important lessons in social injustice, colonialism, racial and cultural oppression, and reconciliation. Without imagining that our suggestions provide 'the final word' on such matters, we sketch out certain ways in which these challenges might be met, while also calling upon others to contribute to the discussion.

## Strength, authenticity, and Aboriginal identity

Simon Burgess, University of New England  
Anthony Dillon, Australian Catholic University

This paper relates research in psychology to some difficult issues confronted by many Australians of Aboriginal ancestry. Most importantly, we draw upon research concerning the value of authenticity and the vital role that processes of exploration, support and commitment can play in the development of an authentic sense of self. Many people of Aboriginal ancestry have long faced scepticism about their Aboriginal identity. In connection with this, we discuss some of the challenges associated with cultural loyalty and identity politics. We then outline four suggestions concerning how these challenges may be met. First, we emphasise the importance of support for social norms and cultural expectations that forbid or discourage abuses of cultural loyalty. Second, we urge the adoption of a deflationary view about the importance of cultural loyalty. Third, we reject the assumption that genealogy determines identity. Our fourth suggestion is to celebrate the valuable and well established role that humour and irony can play as people go through the process of exploring the possible forms that their identities may take.

## Social, cultural and empowerment indicators from the Interplay Wellbeing Framework for Aboriginal and Torres Strait Islander people in remote Australia

Sheree Cairney, Flinders University  
Tammy Abbott, Ninti One Ltd/CRC REP  
Byron Wilson, Ninti One Ltd/CRC REP  
Stephen Quinn, Swinburne University  
Oanh Nguyen, Flinders University

Quality of life (e.g. wellbeing) can be severely affected for cultural or social minority groups when available mainstream services are incongruent to their needs. Governments can struggle to engage these populations in empowering ways towards the delivery of appropriate services and consequent wellbeing gains. Wellbeing frameworks are increasingly used to understand, monitor and guide the progress of societies. The top-down nature of national frameworks can mean they neglect the needs of cultural and

social minority groups. A collaborative and capacity development approach was used to develop an Interplay Wellbeing Framework to genuinely and accurately represent wellbeing for Aboriginal and Torres Strait Islander people in remote Australia. Culture and empowerment were identified as key elements of wellbeing. The framework aims to represent cultural and community values objectively to understand their impact on wellbeing. Indicators were therefore developed and validated to measure empowerment and cultural factors including language, land and kinship, and these will be presented.

## **Travelling stock routes: Public farms or threatened species homes?**

**David Carr, University of New England**  
**Rachel Lawrence, University of New England**

Travelling Stock Routes and Reserves (TSRs) are Crown Lands reserved in NSW for the movement of stock. They provide a reserve of grass for drought when many landholders take to ‘the long paddock’ to feed their stock. Under such a policy TSRs have been grazed for short periods of time followed by long periods of rest, a management regime that has preserved the species diversity of those vegetation communities, which include many Threatened Ecological Communities. Responsibility for the management of TSRs has recently passed from the Livestock Health and Pest Authority to a new government department: Local Land Services. Local Land Services now view the TSRs as a means of raising revenue, a change that has seen them move to leasing TSRs for grazing for five-year periods. This arrangement is likely to place the significant environmental assets they support at risk of degradation. At the same time, the Office of Environment and Heritage, another government department, is planning to spend \$100 million over five years to protect Threatened Species and Communities, many of which depend on TSRs for survival. We will present a case study that highlights the threat posed to these endangered communities under such a leasing arrangement.

## **Sacred ground is all around: Health, well-being and the environment**

**Julie Collins, University of New England**  
**Warlpa Kutjika Thompson, Wilcannia Public School**

The theme for this year’s National Aboriginal and Torres Strait Islander Day of Celebration (NAIDOC) was ‘We all stand on sacred ground: Learn, respect and celebrate’. It was both universal and singular: it reflected the sacredness of landscape: rivers, lakes, coastal areas, deserts, forests and mountain ranges to all Indigenous Australians, but it also commemorated the handover of Uluru to the Pitjantjatjara and Yankuntjatjara traditional owners, thirty years ago. The significance of this theme was the juxtaposition of the local with the global, which had implications for how we all relate to country, whether Indigenous or non-Indigenous. Implicit is the recognition that all land is sacred and should be cared for in a sustainable way, it nourishes us all; but there is also acknowledgement that wherever we are, there are specific Indigenous groups for whom country has special spiritual significance. Indigenous well-being is intimately connected to the health of environment and community; this is not only holistic in the sense of referring to the whole body but also to cultural well-being. This paper will explore a strengths-based approach to Indigenous health, recognising the significance of family, culture and land in delivering better health outcomes to Indigenous peoples.

## Ecological footprints and wellbeing in Australian cities

Christopher Ambrey, Griffith University  
Peter Daniels, Griffith University

This study investigates how the per capita ecological footprint of an individual's household may determine an individual's wellbeing and how this relationship may differ for individuals that reside in Australian cities. The approach employed is quite novel matching detailed and disaggregated data from the Household, Income and Labour Dynamics survey to ecological footprints (or embodied greenhouse gas emissions) obtained environmentally extended input-output analysis; specifically, the Eora MRIO database. The findings of this study indicate that cities are not more sustainable and happier places. Further, the environmental impacts captured by ecological footprints suggest that the direct and indirect effects of individual's lifestyle consumption choices have a detrimental impact on an individual's wellbeing, reflecting an implicit psychological cost associated with consumption decisions which involve higher ecological footprints.

### Acknowledgements:

This paper uses unit record data from the Household, Income and Labour Dynamics in Australia (HILDA) survey. The HILDA Project was initiated and is funded by the Australian Government Department of Social Services (DSS) and is managed by the Melbourne Institute of Applied Economic and Social Research (Melbourne Institute). The findings and views reported in this paper, however, are those of the authors and should not be attributed to either DSS or the Melbourne Institute.

## Contrasting the collective social value of outdoor recreation and the substitutability of nature areas using hot spot mapping

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Steven Broek, Flemish Institute for Technological Research (VITO)  
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Leo De Nocker, Flemish Institute for Technological Research (VITO)  
Jos Van Orshoven, University of Leuven  
Liesbet Vranken, University of Leuven

This paper investigates one specific cultural ecosystem service: outdoor recreation. We present a methodology to map the collective social value of outdoor recreation and identify the substitutability among nature sites within a specific spatial context. This methodology is applied to the province of Antwerp, Belgium. We propose an indicator of substitutability among nature areas, contrasting unique but poorly substitutable sites (hot spots) with highly substitutable sites (cold spots). Using a combination of survey information, public participation GIS (PPGIS) and kernel density mapping, we produce density surfaces representing the distribution of the collective social value attributed to outdoor recreation. We also compute Getis-Ord  $G_i^*$  spatial statistics to identify local outdoor recreation clusters. In addition, we explore how recreational behaviour affects substitutability. Our results suggest a duality between the social value of outdoor recreation and the level of substitutability among nature sites. Highly substitutable sites tend to be found near areas of higher population density, which are as well sites of higher social value. Individual-specific parameters such as the type of recreational activity appear to substantially modify substitutability patterns among nature sites. We conclude by discussing the methodological and policy-related implications of this research.

### Acknowledgements:

We are grateful to Professor Greg Brown (University of Queensland) for his insightful comments that greatly improved our spatial analysis. We are thankful to Dr Marije Schaafsma and Professor Mike Christie for their valuable comments on early versions of this paper. Thanks as well to Alistair Beames for reviewing the use

of English. This study was carried out in the context of a PhD research project funded by the Flemish Institute for Technological Research (VITO). Additional research was carried out within the ECOPLAN project funded by the Flemish Agency for Innovation by Science and Technology (IWT).

## **Valuation and mapping of cultural ecosystem services: A case study of outdoor recreation in Flanders, Belgium**

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**Liesbet Vranken, University of Leuven**

This paper introduces a methodology to better understand the role played by different site characteristics in influencing people's choice of outdoor recreation destinations. Contrary to prior studies, we do not restrict the scope of this analysis to specific natural sites but intend to encompass various landscapes, including production landscapes (e.g. arable lands) and natural landscapes (e.g. heathlands, forests). Our experiment looks into a large diversity of landscapes that are depicted using photomontages. We use a discrete choice experiment (DCE) that propose respondents to choose among hypothetical destinations described in terms of eight site characteristics. We study the trade-offs made by different profiles of respondents among those site characteristics, which lead to different destination choices. An important innovative aspect of this research is that the DCE attributes are spatially-explicit so that we are also able to represent the observed recreational patterns in the form of suitability maps, using Geographic Information Systems (GIS). We conclude the paper by pointing to the implications of this research for land management policy-making.

### **Acknowledgements:**

This work was funded by the Flemish Institute for Technological Research (VITO) and in the context of collaboration between VITO, KU Leuven and the University of Ghent. Additional research was carried out within the ECOPLAN project funded by the Flemish Agency for Innovation by Science and Technology (IWT). We are thankful to Prof. Mike Christie, whose expertise was of great help to design this experiment. Huge thanks are also due to Kelian De Valck who shot all the landscape photos and composed all the different photomontages used in this experiment.

## **Natural resource management agencies as learning organisations**

**Katrina Dickson, University of New England**

Natural resource management (NRM) agencies are faced with increasingly complex environmental, economic and social issues, while perversely, public funding is declining. Past research and its practical application have prioritised technical solutions. An increased focus on the human dimensions aspects of continuous learning, that is the 'social' component of 'socio-ecological,' including communication, collaboration and change management, has the potential to improve the adaptability and resilience of NRM agencies, and the multi-stakeholder networks with which they work; and on-ground outcomes, through improvements to learning in the technical practices of NRM. Building on adaptive management principles and social learning insights, embedding continuous learning in organisational structures, strategies, policies and cultures, could potentially improve the effectiveness and speed of response to external and internal changes facing NRM agencies. This paper will elaborate on a case study being conducted in South African National Parks to identify and evaluate their strengths and weaknesses as a learning organisation, and potential principles, processes and practices which may be considered in other NRM agencies to enable the

institutionalisation of a systematic approach to continuous learning. The case study is a component of a PhD which is part of the Invasive Animal Co-operative Research Centre's Program 4 'Facilitating Effective Action.'

Acknowledgements:

Dr Robyn Bartel (Principal Supervisor), Professor Theodore (Ted) Alter, Dr Guy Ballard, (Co-supervisors)

## **Willingness-to-pay for healthy waterways in South East Queensland: Evidence from a contingent valuation survey**

**Christopher Ambrey, Griffith University**  
**Jim Binney, MainStream Economics and Policy**  
**Christopher Fleming, Griffith University**  
**Jim Smart, Griffith University**

South East Queensland's catchments, lakes and coastal waters are valuable natural assets that provide multiple economic, social and environmental benefits for communities. They provide clean drinking water, underpin agricultural production, enable the disposal of treated waste water, and sustain tourism and fishing industries. However, with a rapidly growing population and increasingly unpredictable climate, the region's waterways are under increasing pressure from threats such as soil erosion, storm water run-off, litter and land clearing. This paper employs data from the Healthy Waterways Limited Report Card and an online contingent valuation survey of SEQ residents to assess their willingness-to-pay to prevent a decline (or achieve an improvement) in waterway health in the region.

Acknowledgements:

The authors would like to acknowledge the assistance of Healthy Waterways Limited staff (particularly James Udy, Naomi Soustal and Paul Maxwell) and Graeme Curwen from Griffith University's Australian Rivers Institute in developing the survey. All errors and omission remain our own.

## **Corporate social responsibility and long term community value: Views from mining company employees in selected Australian jurisdictions**

**Anne Fordham, University of South Australia**

This study examines how the corporate social responsibility (CSR) programs of resource companies within Australia align to the concept of creating long term community value (i.e. 'enduring community value from mining'). In-depth interviews were conducted with 30 resource company employees across the resource sector within South Australia, Northern Territory and Western Australia. Most employees saw the ideal of creating lasting value/benefit as integral to their CSR practice. This was associated with other CSR philosophies such as creating a long term social license to operate (SLO), becoming integral to the community and facilitating social change. Employees also planned and implemented their CSR strategies with a long term view in mind. However, such sentiments were primarily driven by employees' personal ethical values rather than company values. Employees also drew upon a range of backgrounds and experiences to facilitate the creation of CSR and long term value. Despite employees being able to map approaches and pathways for achieving long term value, it was difficult to achieve due to barriers such as industry contractions, community capacity and availability of agreed strategies going forward. In most cases, areas where companies created long term value intersected with business needs and company capacity; however, there were examples where employees went beyond compliance/SLO and were able to envisage and support futures well away from the mine.

## Use of the Sustainable Livelihood Framework as a tool for tracking CSR outcomes in the resource sector

Anne Fordham, University of South Australia

Corporate Social Responsibility (CSR) in the resource sector is a complex concept reflecting the need to mitigate negative development impacts but also achieve positive benefits to regional communities. This study examines these issues through linking companies' CSR programs in Australia to wider community development outcomes using a Sustainable Livelihood Framework. This framework comprises five key interacting capitals: natural, human, social, physical and financial. Through our analysis it has become increasingly apparent that this framework is incomplete and requires a further capital to be added: cultural capital. This will acknowledge the importance of valuing and preserving Indigenous culture, particularly Aboriginal and Torres Strait Islander culture.

Our study found that cultural capital was a significant component of CSR practice and was both a consequence and requirement to build the other forms of capital. Companies demonstrated a capacity in some cases to reveal inherent cultural capital in unique and profound ways for Indigenous communities.

The primary focus of resource companies was on building financial and human capital which led to a range of tangible benefits to communities, including major projects, community investment programs, skills and training, local employment, and business development. Opportunities to develop this capital were restrained by limitations on existing community capacity, lack of knowledge on how to transition to opportunities, and lack of strategic support and participation by at times corporations, government and other participating organisations.

Resource companies also demonstrated a capacity to support the conservation of natural capital and in some cases to contribute to wider strategic NRM outcomes. Resource companies were also able to improve social capital for communities primarily by connecting them to new expertise and opportunity and through encouraging them to define their own directions and future visions. However, there was limited opportunity for communities to participate in corporate decision making and communities relied on key agents within companies to translate their messages. Furthermore, particularly in remote contexts, companies were able to support communities through the provision of some shared infrastructure such as roads, telecommunications, water and health infrastructure. Finally, SLF proved a valuable framework for examining the wider contribution made by resource companies to regional communities.

## The security of water resources

John Greenway, University of New England

In considering the security of water resources two concerns arise. Firstly, how water is envisaged seems to strongly influence water management decisions. Water resources being framed chiefly as inputs into economic production and urban water supply drives the dominance of dams and pipes. This perspective denies water has value and functionality beyond utility as an economic and social input. Water resources are multi-functional within interconnected socio-environmental-ecological spheres. Therefore, the second concern relates to how water resources are managed so as to develop the conditions for water security. In this context, water resources as an entire entity, recognising the multi-functionality of water resources, requires protecting to stimulate conditions of water security. Protecting water resources, it is argued, requires reflection on current processes and a re-defining of water management criteria. This is the challenge for policy makers. This paper reviews the water governance literature to evaluate emerging 'new water paradigm' approaches, such as the water soft path, in the context of developing water security.

### Acknowledgements:

Dr Robyn Bartel, Associate Professor Graham Marshall and Dr Judith McNeill provided helpful comments to previous drafts of this abstract and paper to follow.

## Working less to save the planet? The contributions of working hours, consumption trends and policy choices to reducing environmental pressures

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In recent decades, Australians have quietly shifted towards shorter average working hours and experience oriented consumption, raising the possibility of a consumer driven decoupling of economic activity from environmental pressure. We explore this through quantifying recent shifts in consumption trends (from 1999) and working hours (from 1979) and using scenario modelling to assess the impact of these trends continuing to 2050, in the context of different potential trends in energy and water efficiency, rural land use, and greenhouse gas abatement effort. Results are analysed using input output analysis to provide environmental footprint and national production indicators for energy, greenhouse gas emissions, water extractions, and agricultural output. We find that consumption and leisure trends contribute to net reductions in environmental pressures, with the effects of shorter working hours outweighing those of increased expenditure on (energy and emissions intensive) vacations. We find voluntary choices to implement water and energy efficiency options also reduce environmental pressures, contrary to concerns about 'rebound' effects, and make a larger difference when policy settings are less stringent. Overall, however, we find that collective policy choices offer the greatest potential for achieving reductions in environmental pressures. We conclude that while individual consumer choices make a difference, our collective policy choices as citizens matter the most in promoting sustainability.

Note: The findings outlined in the abstract are preliminary, and subject to change.

## Another walk on the wildside: a phenomenology of rewilding and edgelands

Stephen Harris, University of New England  
Fiona Utley, University of New England

The recently popularised call to 'rewild', considered a practical modeling of an ethical relationship with nature, promises the expansion and flourishing of species and habitats and, potentially, a re-connection with nature. Some of the implications of 'rewilding' follow those of other models for understanding our relationship with nature, including the sense that we can return to/reclaim a 'wildness', and so, by implication, a form of authenticity and a fundamental state of wonder or awe. Thus, 'rewilding' asks again that we re-visit the logos of radical division and transcendence as species. The notion of wilderness as pristine or pure nature has supported a radical separation between humans and nature—this is well recognised in a range of disciplinary literature. Largely through Thoreau's pivotal essay "Walking", wildness became synonymous with wilderness and has profoundly influenced the way we see and negotiate this sense of otherness, and sparking what has been called a 'cult' of wilderness. In this paper we take up an eco-phenomenological approach to exploring the spaces of contact between humans and nature. While the concept of wilderness itself implies a radical spatial separation, 'wildness' is not necessarily or only 'out there', away from civilization/urbanity/modernity, but exists/thrives in the interstices – the 'interzones' in urbanity, where intensely localised 'wild places' come into existence; drains/highway culverts – the

‘edgelands’ of which British poets/writers have celebrated in recent years. The desire to experience a fundamental wonder also implies the possibility of a reconnection through an intertwining with nature, as source, and its ‘more natural’ rhythm within the flow of time; such temporality must also be questioned and explored. Using Merleau-Ponty’s notions of reversibility, depth and chiasm/intertwining, in this paper we interrogate these spatial and temporal intertwinings in order to further develop ways of seeing and negotiating our relationship with nature.

## **Closing system-wide yield gaps to increase food supply and mitigate GHGs among mixed crop-livestock smallholders in Sub-Saharan Africa**

**Ben Henderson, CSIRO**  
**Cecile Godde, CSIRO**  
**Daniela Medina-Hidalgo, CSIRO**  
**Mark van Wijk, CSIRO and ILRI**  
**Silvia Silvestri, ILRI**  
**Sabine Douchamps, ILRI**  
**Elouise Stephenson, CSIRO**  
**Brendan Power, CSIRO**  
**Cyrille Rigolot, CSIRO**  
**Mario Herrero, CSIRO**

In this study we estimate yield gaps for mixed crop-livestock smallholder farmers in seven Sub-Saharan African sites covering five countries and we assess their potential to increase food supply and reduce the GHG emission intensity of livestock production, as a result of closing these yield gaps. We use stochastic frontier analysis to construct production frontiers for each site. Sizeable yield gaps were estimated to be present in all of the sites from each of the five countries. Expressed as potential percentage increases in outputs, the average site-based yield gaps ranged from 28 to 167% for livestock products and from 16 to 209% for crop products. The emission intensities of both livestock and crop products registered substantial falls as a consequence of closing yield gaps.

The relationships between farm attributes and technical efficiency were assessed to help inform policy makers about where best to target capacity building efforts. We found a strong and statistically significant relationship between market access and performance across most sites. We also identified an efficiency dividend associated with the closer integration of crop and livestock enterprises.

## **Introducing compliance-based inspection protocols to Australia's biosecurity system**

**Susie Hester, University of New England, Centre of Excellence for Biosecurity Risk Analysis**  
**Anthony Rossiter, Victorian Department of Treasury and Finance, Centre for Market Design**

As the volume and range of products traded globally continues to expand, managing the spread of invasive species becomes more challenging. Each year the Australian government spends significant amounts of money on its biosecurity inspection regime in order to reduce the likelihood of biosecurity hazards entering Australia. The Australian government has recently replaced full inspection on several plant-product pathways with an adaptive-sampling protocol where the sampling frequency is based on an importer's inspection history. The new inspection protocol may also provide impetus for behaviour change and may decrease the likelihood of biosecurity hazards being present in consignments. This paper discusses the potential for compliance-based inspection protocols to increase efficiency of Australia's biosecurity inspection system, focusing on several case-study pathways.

Acknowledgements:

Centre of Excellence for Biosecurity Risk Analysis, University of Melbourne

## Green infrastructure economic framework for local government

John Symons, Victoria University

Roger Jones, VISES

Celeste Young VISES

This presentation discusses the economic aspects of valuing green infrastructure at the local government scale. Green infrastructure includes parks and reserves, backyards and gardens, waterways and wetlands, greenery on streets and transport corridors, pathways and greenways, squares and plazas, roof gardens and living walls, sports fields and cemeteries. Green infrastructure benefits include economic, social and environmental benefits. The project explores the multiple benefits of green infrastructure in order to develop an understanding of potential returns on investment by adapting urban environments at the local government scale. Conventional economics is not well suited to valuing green infrastructure, but there are many different views within the literature and practice about how this should be carried out. Existing local government infrastructure investment processes were mapped and adapted to incorporate comprehensive economic value (an extension of total economic value) and various valuation approaches to create an economic framework that examines values at the individual, community and institutional level. Due to the organic nature of green infrastructure, suitable discount rates are also examined. The goal of the project is to put investment in green infrastructure at the local government level on a more even footing with investment in grey infrastructure whereby green infrastructure investment becomes the norm.

## Risk perception

Shalini Lata, University of New England

The complex nature of climate change is an impediment in achieving sustainable solutions to the issue. The past two decades have witnessed a good shift of research focus from discipline confined research to a more holistic or interdisciplinary focus. Research on the human dimensions of climate change due to this shift has gained momentum in the past two decades; however, research concentration has been confined to the 'geographical north'. This shortfall in research is being realised in the southern hemisphere. Research into the social, economic, institutional realm is slowly strengthening in Australia, New Zealand and other developing countries.

In Pacific Island countries, for a sustainable future, climate change adaptation is an imperative. The equity dimensions of climate change, again is complex, with the burden of impacts being disproportionate across the society. The physical characteristics of Pacific islands make them vulnerable, no doubt, but disparities in vulnerability across the society also exist (coastal dwellers, natural resource dwellers, the poor, the aged, and disabled for instance). The question of how to achieve sustainability the in Pacific Island countries in terms of climate change adaptation is different from the developed countries; coastal management for instance in the Pacific will have to be focused on people rather than on structures as being focused in resource-rich countries.

This study looks at the role of perceptions of people in Fiji (a small island state in the South-west Pacific). The people of Fiji and other Pacific Island countries traditionally have had a direct relationship with their environments, governing resources, and finding solutions for issues. With recent global challenges, perceptions are important to understand how adaptation can be mainstreamed into communities and embedded into current national policies and planning. Results from a pioneer empirical social survey measuring public risk perception conducted in Fiji (n = 420) will show the role of psychological and situational variables in influencing climate change adaptation and policy support. Overall, the findings of this research are applicable to the wider Pacific region, where social structure/capital needs to be

balanced with science to help improve environmental management, policy development and also risk communication, and risk perceptions will inform this.

### **Managing livestock grazing in a changing climate: Potential for improved biodiversity and landscape function outcomes with highly planned rotational grazing management**

**Rachel Lawrence, University of New England**

**Nick Reid, University of New England**

**Romina Rader, University of New England**

Climate change models predict that the New England slopes and tablelands will experience rainfall patterns with increased variability and longer periods between large rainfall events compared with historical rainfall patterns. This unpredictability has major implications for the viability of commercial grazing operations as well as the conservation of endangered plant communities. Some livestock managers in this region have adopted grazing management systems that allow adaptability to unpredictable rainfall patterns through careful pasture monitoring and proactive stocking and destocking of livestock based on rainfall. These graziers commonly rotate stock intensively, are aware of the benefits of biodiversity in their pastures and value native plants as an important part of their feed-base. Research on grazing properties under this alternative style of management has documented improvements in three measures of landscape function, increases in perennial grass cover and increases in insect diversity. Several native grass species that characterise endangered box-gum grassy woodland communities and are also of high grazing value, may persist or even increase under these grazing regimes.

Acknowledgements:

Wal Whalley, David Tongway, Farmers whose properties we have been working on.

### **Evaluation of financial mechanisms to enhance the long run supply of ecosystem services at different stages in the investment cycle**

**Laura J Levetan, University of Melbourne, CSIRO Land and Water Flagship**

**Lauren T Bennett, University of Melbourne, CSIRO Land and Water Flagship**

**Ian S Ferguson, University of Melbourne, CSIRO Land and Water Flagship**

**Neville D Crossman, University of Melbourne, CSIRO Land and Water Flagship**

The financial gap between funding needed for ecosystem conservation and that provided by the public and private sectors remains wide. Innovative financial mechanisms that scale-up the flow of funds and broaden the supply beyond the traditional public sector and philanthropic sources are required. This paper examines the ecological and economic properties of selected market-based conservation finance mechanisms according to a set of criteria at consecutive stages in the investment cycle. The criteria for evaluation are proposed in three groups: policy goals and context, property rights, and market structure. Four types of mechanisms are assessed: carbon taxes, conservation concessions and easements, environmental impact investment, and non-securitised and securitised environmental impact bonds. The potential is assessed for these mechanisms to address part of the conservation finance gap whilst providing wealth preservation or a return on investment to investors and the owner/s or lessee/s of ecosystem assets and their associated ecosystem service flows.

Acknowledgements:

The University of Melbourne scholarships for PhD candidature.



## **Do farmers value soil information for soil health management? Exploring farmers' motivations in collecting and using soil information in agriculture**

**Lisa Lobry de Bruyn, University of New England**

Soil health is a critical requirement of a sustainable agroecosystem that can function effectively, with some functions easier to determine than others such as crop production versus nutrient cycling. Participation by farmers in gathering soil information at the farm and paddock scale has been examined over the last two decades by reviewing their use of farm planning, and participation in soil testing. The premise is that with good quality, local soil information on soil types and their soil health status, farmers can determine the best course of action to either improve soil productivity or stem the flow of land degradation by better matching of land use to land quality at the farm scale or at the paddock scale to rectify any nutrient deficiencies or toxicities. However, the level of participation in farm planning or soil testing has remained static, with only 25% to 30% of landholders participating nationally. Also, making the link between the use of soil information embedded in farm plans and collected with soil testing to improved soil management, and ultimately the capacity for soil health improvement is difficult to determine. The difficulty in establishing such causal links is because the survey data cannot be interrogated to establish the relationship between farmers' actions, such as soil testing to certain land management practices, which could improve soil health.

## **Co-management in restricted protected areas in Brazil inhabited by non-indigenous traditional populations**

**Marcia Leuzinger, Centro Universitario de Brasilia**

Brazil has a very complex system of protected areas, composed of three different types: conservation units, areas under specific protection and protected areas *stricto sensu*. This paper will focus on the types of conservation units that are classified as IUCN I, II and III categories, and do not allow direct use of natural resources within its boundaries. In those cases, any human population, including non-indigenous traditional groups, will have to be removed from the area when the conservation unit is created and sent to another place as agreed with the competent environmental agency. But the problem is that those traditional groups maintain a very specific relation with the land they and their ancestors have been living in for many generations, and removing them means violating their cultural fundamental right to the land and also the loss of valuable traditional knowledge. Therefore, studies about the impact they cause to the ecosystem that will be protected by the creation of the conservation unit should be mandatory and only when their activities are able to cause a major damage it would be possible for the government to remove them from their homeland. On the other hand, if this is not the case, co-management, as used in Australia with Aboriginal populations, could be a solution.

## **The Central Queensland local government infrastructure backlog and climate change adaptation**

**Peter Lock, University of New England**

**M de Souza, University of New England**

**Brian Dollery, University of New England**

**Michael Kortt, Southern Cross University, UNE Centre for Local Government**

In common with comparable countries, local government infrastructure in Australia exhibits a significant infrastructure backlog. The Commonwealth 'Hawker Report' (2004) Rates and Taxes and the PWC (2006) National Financial Sustainability Study established that local infrastructure deficits were common in all Australian local government jurisdictions. A nation-wide review undertaken by PWC (2006) estimated monetary values for infrastructure restoration at around \$15.3 billion. This underinvestment in

infrastructure is further exacerbated by global climatic change. For instance, the Queensland Government 2013/14 budget estimated approximately \$2.1 billion was required for post-flood local government infrastructure reconstruction. Against this background, this paper seeks to quantify the infrastructure backlog in Central Queensland. In addition, it assesses the methods employed to evaluate the expected costs of infrastructure renewal in Central Queensland in the light of a disaster-resilience infrastructure plan designed to cope with the challenges of climate change, such as more frequent flooding and more intense cyclones.

## **The role of reputation in explaining wine clusters: A spatial analysis of Hunter Valley wine producers**

**Peter Lock, University of New England  
Stuart Munter, University of New England  
Euan Fleming, University of New England  
Jonathan Moss, University of New England**

Wineries are often located in close proximity to each other. Obvious reasons include geographic features and climate, or the terroir of a region. However, other factors may also be important such as determinants of geographical concentrations of wineries because of the spatial dependencies or ‘spillover’ effects arising from cluster specific resources. In this paper we apply spatial analysis techniques on 72 wineries in the Hunter Valley wine growing region of New South Wales to assess cluster formation and to examine the spatial relationships among them. In particular we explore the role of winery reputation in geographic clustering and discuss the ‘clustering’ benefits that may result.

## **A social-ecological systems framework for food systems research: Accommodating transformation systems and their products**

**Graham Marshall, University of New England**

The social-ecological systems (SES) framework was developed to support communication across the multiple disciplines concerned with sustainable provision and/or appropriation of common-pool resources (CPRs). Transformation activities (e.g. processing, distribution, retailing) in which value is added to resource units appropriated from CPRs were implicitly assumed in developing the framework to be exogenous to the SES of focal concern. However, provision and appropriation of CPRs are nowadays often closely integrated with the market economy, so significant endogeneity exists between many CPR provision/appropriation activities and the activities in which appropriated resource units are transformed into the products ultimately marketed. This paper presents a modified version of the SES framework – in which ‘transformation systems’ and their ‘products’ are included as additional first-tier attributes of a focal SES – that is designed to better account for transformation activities and thus be more suitable for diagnosing those sustainability problems where it is inappropriate to define all such activities as exogenous to the SES of focal concern. The need for such modification was identified in the process of designing a research project examining the challenges faced by Cambodian cattle-owning smallholders in accessing value chains for premium-priced beef. This case was used in an illustrative exercise to highlight how the modifications to the framework can broaden the search for factors potentially affecting SES performance, and thereby strengthen diagnosis of reasons for underperformance.

## **Polycentricity, subsidiarity and adaptive efficiency in environmental governance**

**Graham Marshall, University of New England**

Polycentricity and related concepts have become central to calls for adaptive environmental governance. However, a number of issues have arisen in interpreting these concepts that could lead to miscommunication both within the research community and between this community and political, policy and practitioner communities. These issues include: (1) Does polycentricity refer to the de jure or de facto structure of a governance arrangement? (2) Is polycentricity a property only of polycentric governance arrangements that function as a system? and (3) Does coherence in a polycentric governance system imply effective adaptive governance?

In respect of the third of these issues, it is argued that coherence in the behaviour of decision units within polycentric governance does not necessarily lead to well-performing adaptive governance, and that achieving 'good adaptive governance' is a complex exercise. The principle of subsidiarity is identified as an appropriate starting point in this exercise, at least when interpreted from a polycentric perspective which recognises the self-organising capacities of decision units at all levels.

Critiques of polycentric governance performance typically question its economic efficiency. These critiques have been based on the allocative-efficiency metric of mainstream microeconomics which is blind to the potential benefits of polycentric governance in strengthening robustness against shocks that arise from the positive-feedback dynamics of complex adaptive systems. Douglass North's adaptive efficiency metric accounts for such benefits and thus is appropriate for assessing the economic efficiency of polycentric governance.

## **Is technological unemployment in Australia a reason for concern?**

**Jim McFarlane, University of New England**  
**Boyd Blackwell, University of New England**  
**Stuart Munter, University of New England**

Technological unemployment refers to the loss of jobs associated with technological change and is far from being a new phenomenon. The fact that adjustments in structural employment occur in response to technological change is unquestioned however controversy exists as to whether long lasting unemployment is consequence of technological progress and the substitution of capital for labour. Two main schools of thought preside over this debate. One view is that productivity gains lead to higher incomes which in turn generates new jobs in response to greater demand for new goods and services. Hence, structural unemployment associated with technological change is short-term. Those harbouring the opposing view have been broadly labelled as 'Luddites'. Modern day proponents advocate that the rapid rate of technological progress is conducive to the possibility of long-term unemployment. Could the Luddites be right? Are we headed into a period of automation not yet witnessed? This paper explores whether technological unemployment is a concern for the Australian economy, and if so, which sectors of the economy appear to be most at risk. This paper provides an important contribution to economic theory in a sustainable ecological way by redirecting policy for building resilient regions.

Acknowledgements:

Rural Assistance Authority

## Assessing interventions for food security in mixed crop-livestock systems against the background of climate variability and change in Northern Burkina Faso

Cyrille Rigolot, CSIRO, INRA  
Peter De Voil, University of Queensland  
Sabine Douchamps, ILRI  
Di Prestwidge, CSIRO  
Mark Van Wijk, ILRI  
Philip Thornton, ILRI  
Ben Henderson, CSIRO  
Daniela Medina Hidalgo, CSIRO  
Daniel Rodriguez, University of Queensland  
Mario Herrero, CSIRO

Smallholder crop-livestock farming systems are important for food security in Sub-Saharan Africa, but they are vulnerable to the effects of climate variability and change. We tested the impacts of different interventions in two contrasting case study farms in Northern Burkina Faso, against plausible current and future climate scenarios. We developed a dynamic farm-household modeling framework around existing tools: crop and animal production models APSIM and LivSim, household model IAT and the climate generator Marksim. Baseline (2013) and a 2050 projection based on IPCC RCP 8.5 describe two climate scenarios (90 years) for comparison. Results showed that the maximum level of inputs increases farm energy production by 90% and 76% compared to the baseline for the small and the larger farm, respectively. Input levels maximising net incomes are moderate, though higher than those currently used in both farms. The inter-annual distributions of net income show that use of external inputs increase both upside and downside risks, because tested interventions are more effective at increasing highest yields than at preventing the low production levels of some years. We conclude that the best options for adapting mixed crop-livestock systems might be found in the synergies between components, rather than in single interventions.

### Acknowledgements:

The authors thank CGIAR Climate Change, Agriculture and Food Security research program (CAAFS CRP). PdV, DP, MH CR thank African Food Security Initiative AFSI project. CR thanks project FARMATCH (contract with Metaprogramme INRA-ACCAF).

## Macroeconometrics: a baseless unscientific approach

Samuel Meng, University of New England

Through scrutinising the conditions for applying the probability theory, analysing the problems and implications of the fitting-the-data approach, and demonstrating the performance of macroeconometrics through estimation of GDP identity, the paper demonstrates that, although it is believed that the probability theory provides the foundation for macroeconometrics, the condition for the theory – random experiments – does not hold in time series modelling. The entire macroeconomic modelling is thus based on an inappropriate assumption or false claim that the disturbance in a macroeconomic model is random. The paper further shows that the fitting-the-data approach is unscientific and unable to reveal the truth. On rejecting the fitting-the-data approach, it is suggested that the scientific way to do economic research consists of studying the economic phenomena, finding the truth or the driving forces behind the phenomena, forming a law (or theory) based on these driving forces, and using data to test the law.

## Creeks, cows and council mergers in the Northern Territory: From policy evaluation to policy ecology

Thomas Michel, University of Sydney

Evaluation has become an integral part of the modern public sector management cycle in Australia. Has a change process effectively and efficiently achieved its objectives? Can improvements be made? This managerial logic has informed a recent evaluation of the financial sustainability of the Northern Territory's local government sector, in the wake of a sweeping amalgamation reform in 2008. The assessment process of whether the reform had secured the sector's sustainability culminated in a voluminous private consultancy report in 2012 (with an addendum in 2013): the first of its kind for the Northern Territory.

The report was treated as a serious document in technocratic circles, and highlighted many pressing financial issues of the sector. Yet the report is notable for what it omitted: the trenchant unpopularity of the shires, the technological shortcomings, sedimented intercultural tensions, the vast geographic reach of the new council areas - all are relegated to outside the terms of reference. Can these omissions be excused for pragmatic reasons? Or are they symptomatic of the modern policy expert's malaise, whereby the political is rendered technical, the ecological is rendered linear, and the experts' delimitation of their field of expertise is the point of the exercise?

## Art and cultural value chains: Challenges and opportunities for regional Australia

L Emilio Morales, University of New England

Derek Baker, University of New England

Art and other creative industries represent an economic and cultural value for a country and its people. The contribution of artistic activities for the society exceeds the economic value that derives directly from their production and tourist attraction. Arts based on regional culture allow communities to promote their cultural beliefs, contribute to the regional and national identity, and influence other industries related directly and indirectly to the sector, including services and hospitality. Therefore, government support is required to preserve regional cultures and allow all Australians to learn and engage with Indigenous and regional communities.

Relevant creative segments for regional Australia include music, performing arts, films, publishing, designs and visual art, among others. According to Woodhead and Acker (2014), the estimated value of sold art craft products for regional communities reached \$52,702,676 for the period between 2008 and 2012. This value demonstrates the relevance of this industry for regional economies and local employment. A value chain analysis can be used as a tool to improve the performance of the chain as a whole with direct benefits for all agents that participate in the art and cultural chains. Through this analysis, there will be an increase in the understanding about the different channels used to marketing artistic products, the actors involved in each channel, sustainability of the channels, market opportunities and challenges for the industry.

The main opportunities for the industry include alternative points of sales, such as restaurants and tourist trips, production of a range of products aiming to different consumers, and cultural activities aiming to promote regional cultures that increase awareness and knowledge and, as a consequence, increase demand and willingness to pay for art products with a cultural background, which can be considered as an intrinsic value added to the artistic product. One of the main challenges the industry faces is the differentiation between Australian-made products and those that are labelled as 'Designed in Australia' that lack of identity and cultural background.

## **Title: Ecological economics and The Cosmic Bank**

**Joshua Nash, University of New England**

This critical essay is about exchange. It places my personal theoretical understanding of economics – the branch of knowledge concerned with the production, consumption, and transfer of wealth – into the practical context of working on my family’s rental property in Armidale, New South Wales, Australia. The theory of developing a rental property for the continuation of ‘good vibes’, for creating community connections, and for the ‘good of humanity’, namely those who come after us, and those who benefit from our evolving natural family environment, is argued using a personal theory of economics dubbed The Cosmic Bank. Accessing free and publicly available resources beneficial to gardening and urban land development, e.g. manure, cardboard, autumn leaves, coffee grounds, composting materials, is advanced to be not only a crucial element in increasing carbon loading when establishing garden beds and thus moving towards self-sufficiency in food production, but is essential to creating community connectedness and a belonging through natural and cultural forms of exchange. The position taken is that through beautifying one’s living environment, whether owned or rented, is a means of reconciling contemporary questions relating to lifestyle, health, wealth generation, sustainability, and links to community, nature, and the possibility of ‘the Good Life’. In conclusion, a resolution over antithesis aspects of time, effort, the fixation with wealth accumulation, belongingness, and the role in self-partner-nature-society dealings and interactions is posed to reach a synthesis between ecological conceptions of economics and The Cosmic Bank.

## **Economic reforms and environmental quality: Empirical evidence from European and Central Asian transition economies**

**Rabindra Nepal, The University of Queensland**

Global warming and other adverse climate change impacts induced by anthropogenic carbon dioxide emissions is a major public policy concern around the world. This paper examines the impacts of market-based economic reforms on per capita CO<sub>2</sub> emissions in the European and Central Asian transition economies where environmental degradation was pervasive prior reforms. A dynamic panel data model is employed for this purpose for 28 countries covering 22 years from 1990-2012. Our results suggest that reforms in competition policy and corporate governance are the significant driver of emissions reductions in the region. Therefore, advances in competition policy and governance reforms are desirable given the available scope to extend these reforms. The Kyoto Protocol had no significant effect in reducing emissions levels while the relationship between economic growth and emissions seems weak based on our results. The results indicate that reducing energy use by increasing energy efficiency and investments in renewable energy are necessary to reduce the carbon emissions level and mitigate the adverse impacts of climate change in the region.

## **A dynamic evaluation of a domestic emissions trading scheme on the Australian economy and the environment**

**Duy Nong, University of New England**  
**Mahinda Siriwardana, University of New England**  
**Sam Meng, University of New England**  
**Judith McNeill, University of New England**

This paper applies a modified MONASH model to examine the effects of a domestic Emissions Trading Scheme (ETS) on the Australian economy and the environment. The dynamic ETS scenario is designed for each year from 2015 to 2030 to enable Australia achieve emissions targets of 5% below 2000 levels by 2020 and 26% below 2005 levels by 2030. The database involves details of 24 energy industries, 10 household groups and 10 tiers of occupations. We found that the permit prices increase from A\$4.6 in 2015 to A\$12.7

in 2020 and A\$19.4 in 2030. The main sellers are high energy-intensive sectors due to their natural low marginal abatement costs. Australia's GDPs are 0.7% and 1.9% lower relative to the base case in 2020 and in 2030. The results lend strong support towards the transition to renewable energy and prices of natural energy resources such as coal may increase considerably with the ETS. Households' incomes are slightly reduced over years with increasing degrees and the welfare is significantly worsened relative to the base case from 2026.

**Acknowledgements:**

The authors would like to acknowledge funding from the Australian Research Council under ARC Linkage Project LP120200192. The project is also supported by the AGL Energy Ltd as the Linkage partner the University of New England Seed Grant scheme.

## **Buy, outsource or partner: The multiple role of actors in water 'collaborations'**

**Leonie Pearson, University of Canberra**

Recent efforts to manage water in Australia and the UK have prioritised the role of local collaborative water arrangements. These devolved governance arrangements are met with challenges such as lack of resources and uncertain roles and responsibilities amongst actors. This paper explores the multiple roles that actors (engaged stakeholders) can have in the local collaborative arrangements. It does this by operationalising a literature based framework exploring the multiple configurations of locally based water arrangements with two constructs; relationship structures (i.e. trust, reciprocity between the actors) and transparency (i.e. how clear and open is decision making of the arrangement). This framework delivers four unique arrangements; outsourcing, transactional, partner and unbalanced. Each of these arrangements has specific roles and expectations of actors. By situating these actor roles within the broader water collaboration literature and experience, it identifies that actor roles within water collaboration can vary across all four arrangements (i.e. buyers, sellers, outsources or partners) depending on the value that actors receive from the collaboration and the actual transaction costs required to engage. The innovation of this paper is to clarify that within any collaborative governance arrangements, actors secure multiple roles, not all of them collaborative.

## **The role of foreign direct investment in the reshaping of economic regions in Mexico: The case of the Santiago river basin**

**Salvador Peniche Camps, University of Guadalajara**  
**Alberto Arroyo González, University of Guadalajara**

In Mexico, the role played by foreign direct investment through NAFTA has been great, mainly for the economic integration of certain regions to the North American market. On the other hand, the question of water supply has become critical. The access to water is already a great limitation to growth in certain regions and, at the same time, the main incentive for multinationals to invest in Mexico.

The paper focuses on the impacts of water projects in western Mexico. By providing water to transnational corporations the Mexican government is reshaping the economics of important regions, promoting development in certain sectors and preventing others to develop or adapt to the new economic conditions in the hemisphere and the new international division of labour.

## Minimising social externalities of major resource projects: A way forward through shared value

Anya (Anna) Phelan, Queensland University of Technology  
Les Dawes, Queensland University of Technology  
Robert Constanza, The Australian National University  
Ida Kubiszewski, The Australian National University

As the size and complexity of major resource projects increases, so do their social and environmental externalities. This paper identifies key themes for evaluating social externalities of major resource projects and analyses them using a mixed-methods approach and structural equation modelling (SEM). A survey was conducted (n=428) in communities affected by coal seam gas (CSG) megaprojects in the Surat Basin in Southeast Queensland, Australia. Results reveal rising economic inequality, sense of uncertainty about the future, and impacts on the standard of living and social capital. For example the majority of the respondents reported being concerned about: rising cost of living in the area (83.4%), groundwater impacts (77.4%) environmental damage (71.8%), and how their community was being affected (77.3%). We found that perceptions of fairness and inequity weigh heavily on land owners and disrupt meaningful participation leading to negative psychosocial effects. Our analysis shows that unresolved concerns of community residents about environmental and social impacts contribute to lower life-satisfaction, inhibit the community to plan for the future, and lead to a weaker local economy. We conclude by discussing the role of inclusive development and shared value opportunities as a way of minimising social externalities.

## An investigation into households' expenditure and embodied energy consumption in Australian cities

Lavinia Poruschi, Griffith University  
Christopher L Ambrey, Griffith University

In a highly urbanised nation, there is a need to better understand the human dimensions associated with consumption of energy. Understanding the context in which the Australians consume energy either directly or embodied in goods and services can be relevant to understanding future trajectories of energy demand in cities. With the development of powerful new environmentally extended multiregional input-output tables with unprecedented geographic and sectoral detail and coverage it is possible to account for the supply chain and embodied demands of people's consumption and broader lifestyle choices. By linking data on household expenditure and embodied energy consumption or energy footprints (obtained from virtual Industrial Ecology lab (IELab) projects <http://www.isa.org.usyd.edu.au/ielab/ielab.shtml>) this study seeks to understand households' expenditure choices and their associated embodied energy. It is anticipated that the results of this study, by revealing key drivers of energy footprints will both, add to existing knowledge, and provide insights for decision makers regarding consumers' lifestyle choices and their attendant embodied energy consumption.

## Investigation of the Environmental Kuznets Curve for carbon emission in Indonesia: Does GDP per capita matter?

Yessi Rahmawati, Airlangga University  
Andiga Kusuma Nur Ichsan, Airlangga University

This study aims to look at the effect on GDP per capita - or the economic well-being (affluence) as measured by income per capita - and energy consumption of the environmental impact of CO<sub>2</sub>. This study will also examine whether the Environmental Kuznets Curve hypothesis U-shaped is relevant in Indonesia. In addition, this study tries to provide practical steps and strategies that depart from the proposed model.

The analysis in this study uses econometric techniques is Ordinary Least Squares (OLS). The data used is from 1973 to 2013. The results of the regression model estimation of independent variables, GDP per capita and energy consumption have partial significant (t statistics) and, simultaneously, (F statistics). Regression models also have a value of goodness of fit at 99.15% (R<sup>2</sup>). In other words, the model proposed in this research explains the CO<sub>2</sub> emissions that occur in Indonesia. This study also found that the Environmental Kuznets Curve hypothesis/EKC is applicable in Indonesia; this is evidenced by the coefficient GDPP2, which has a negative value.

## Visualising value: Construction and action across cultural boundaries

Paul Reader, University of New England, Arugula Aboriginal Corporation

The difficulty of establishing values across different cultures or epistemes is related to historical experience, cultural artefacts, reasoning and underlying discourse. Various fictions are constructed in order to gain or retain power, and these inform policy, decision-making and the exercise of power. This presentation seeks to visualise the different values that build on and cut across this fictive landscape; values that slip between science and reason, religion, art and pure fantasy. A particular example, the problem of constructing a case for the possible purchase of a Simpson Desert fringe pastoral lease by the Indigenous Land Corporation, is used as a starting point to explore this subject. In examining the indigenous and settler cultural dimensions, it aims to arrive at a different kind of evaluation, the case around future human and ecological wellbeing, a new vision and empowering resilient fiction.

## The social and infrastructure benefits and negatives of remote mining communities, Leigh Creek and Roxby Downs

Stuart Robertson, University of New England, CRC for Remote Economic Participation

The built infrastructure of remote mining communities can bring benefits and negatives to the surrounding area and neighbouring communities. Benefits can be increased availability of services and increased social amenity. Whereas, the negatives can be loss of existing services in neighbouring communities as the mine community becomes the major service centre. Numerous Australian studies have highlighted further negative impacts associated with mining developments including; increases in property prices, itinerant workforces and a gender imbalance in the resident population.

This paper presents the findings of research undertaken in the communities of Roxby Downs and Leigh Creek and their hinterlands. Through a survey respondents were asked their views on Roxby Downs and Leigh Creek with follow interviews delving deeper into the social and infrastructure benefits and negatives that both these communities have brought to the region. Whilst there have been many infrastructure and social benefits from these communities, there has been a decrease in services in the surrounding communities which has led to an increase in the dependency upon both Leigh Creek and Roxby Downs. This dependency has implications for ongoing service provision particularly in the case of Leigh Creek's planned closure in 2016.

Acknowledgements:

Dr Boyd Blackwell, Professor Neil Argent

## **Fijian women's role in disaster risk management for climate change**

**Priyatma Singh, The University of Fiji  
Manpreet Kaur, The University of Fiji**

Climate change is progressively being identified as a global crisis and this has immediate repercussions for Fiji Islands due to its geographical location being prone to natural disasters. In the pursuit for prudent preparedness before disasters, Fijian women's engagement is underpinned due to the socially constructed roles and expectation of women here in Fiji. This paper outlines through theoretical study of literature review exploring ways to better inform and engage women for climate change per se disaster management in Fiji. The focus of this study on disaster management is to outline ways in which Fijian women can be actively engaged in disaster risk management, articulating in decision-making, negating the perceived ideology of women's constricted roles in Fiji and unveiling social constraints that limit women's access to practical disaster management strategic plan. The empowerment of women is believed to be a critical element in constructing disaster resilience, as women are often considered to be the designers of community resilience at the local level. This study will advocate women articulation in disaster risk management, thus giving equal standing to females in Fiji and also identify the gaps and inform national and local Disaster Risk Management authorities to implement processes that enhance gender equality and women's empowerment towards a more equitable and effective disaster practice.

Acknowledgements:

Ministry of Women, Children, and Poverty Alleviation – Fiji Islands

## **Future transport policy developments for stronger remote regions**

**Bruno Spandonide, Flinders University, Ninti One Ltd**

The design of the current transport system is at the basis of a situation of structural inequality characterising the everyday lives of a majority of Aboriginal and Torres Strait Islander people living in remote areas: in many aspects of their planning and despite some gradual improvements over the recent decades, remote transport systems still ignore parts of the population they are supposed to be responding to. The findings of some recent transport and mobility surveys invite consideration of how future policy development for regional management of remote Australian communities and enterprises. The design of more sustainable transport systems would aim at leading to greater socio-cultural well-being and economic productivity in large remote communities as well as achieving high quality of lives for people living in very remote areas.

## **Sustainable remote Australian transport for living on country and going out bush**

**Bruno Spandonide, Flinders University, Ninti One Ltd.**

Both the domestic and international academic literature's analysis of links between transport and wellbeing focuses mainly on urban settings. While the relationship and the dependency between remote Australians wellbeing and travelling activities are evident, its complexity still remains an under-researched topic. In urban areas most research projects concentrate on vulnerable population groups including older people, people with health issues, socio-economically disadvantaged people, or people undergoing more frequent extreme climatic events. The lack of data and research covering these issues in remote locations sounds even more paradoxical when considering that extreme distances, high supply chain costs, limited access to services and to economic participation are well recognised obstacles for sustaining vibrant remote Australian communities. The latest accessibility-driven technological innovations emphasising multiple

outcomes in terms of wellbeing in both the digital and the sharing economies are highly topical in transport projects in urban agglomerations but a distant reality for remote Australia. Furthermore, what defines a good quality of life can sometimes be very similar and other times greatly differ between remote and urban contexts. In the light of some recent transport and mobility surveys, this paper analyses the specific links between future appropriate transport and increasingly resilient remote communities.

## **Elevator conversations to change minds: A modest proposal – kill all the bees!**

**Sharolyn J Anderson, University of South Australia**

**Paul C Sutton, University of South Australia**

We present a brief ‘elevator conversation’ as a proposed vehicle for change and invite the audience to critique the logic or effectiveness of the story and/or share their own ‘elevator conversations’. Our conversation is the following:

A modest proposal: Kill All the Bees!

It may come as a surprise to you but killing off the bees actually makes economic sense. This has to do with the dollar value of the ecosystem services provided by bees. Many people have difficulty wrapping their head around how one might put a dollar value on an ecosystem service. Insect pollination is a standard example of an ecosystem service. Insects pollinate our crops for free. If honeybees were to go extinct we would need to find some other way to pollinate honeybee dependent crops - perhaps armies of people wandering from plant to plant with small pollen covered paintbrushes. If bees were to go extinct and disappear it is very likely that many humans would be employed in the task of pollination. This would be a ‘win-win-win’ scenario from a strictly economic perspective: 1) it increases gross domestic product, 2) it creates jobs, and 3) it generates tax revenue. While there may only be a few economists that would seriously argue for this policy it must be recognised that if bees truly did go extinct it would increase GDP, it would create jobs, and it would generate tax revenue.

## **The ecological economics of land degradation: Impacts on ecosystem services**

**Paul C Sutton, University of South Australia**

**Sharolyn J Anderson, University of South Australia**

The magnitude of the global economic value of ecosystem services dwarfs the value of the global market economy. Changes to land cover in the past twenty years have reduced the value of the annual flow of ecosystem services by \$4-20 trillion per year. However, these losses do not account for reduced ecosystem function and its impact on the value of ecosystem services. Here we explore the use of a proxy measure of land degradation derived from maps of human appropriation of net primary productivity (HANPP) to estimate losses of ecosystem services due to land degradation. We use two proxy measures of land degradation as a measure of impact on ecosystem function. The first is a representation of the human appropriation of net primary productivity derived from population distributions and aggregate national statistics. The second is theoretically derived from biophysical models and is the ratio of actual NPP to potential NPP. Juxtaposition of these measures of land degradation with a map of ecosystem service values allows for spatially explicit representation of those lost ecosystem service values that result from land degradation. Our estimate of lost ecosystem services is \$6.3 and \$10.6 trillion per year using these two approaches respectively.

## Mapping and understanding bushfire and natural hazard vulnerability and risks at the institutional scale

John Symons, Victoria Institute for Strategic Economic Studies (VISES) Victoria University  
Professor Roger Jones, VISES  
Celeste Young, VISES

Current government spending on natural disaster response is more than 20 times spending on preparedness. Many climate-related natural hazards are increasing and the number of people living in hazard prone areas is also increasing. Large natural disasters can also cross domains, moving from the private to the public realm, and shifting from a local, to a state or national concern. This raises the potential of future, unmanaged risks.

The spending mismatch is well understood, but we also face potential deficits in important social and environmental values that may not be adequately compensated. If a risk is owned then we can assess the balance between preparedness and response. If the risk is un-owned, these values may be damaged and degraded, or lost. The project has undertaken a comprehensive review of disaster risk management ownership in Australia.

The project is also mapping a broad range of economic, social and environmental values and relating these to natural hazards across several case studies. The project explores who owns these values and what happens when they cross domains. A governance framework illustrating such strategies has been developed which will be used to explore how a range of alternative strategies may contribute to improved resilience by sustaining economic, social and environmental values in a changing environment

## Assessing risk and performance of agriculture in different agro-ecological zones of Botswana

Omphile Temoso, University of New England  
David Hadley, University of New England  
Renato Villano, University of New England

In recent years, agricultural growth in Botswana has declined, leading to a progressive increase in food imports. The increase in food imports has been attributed to low productivity caused by inefficiency and the small scale of farms, the semi-arid production environment in Botswana (i.e. poor soils, low and unreliable rainfall and high temperatures) and frequent outbreaks of the disease such as foot and mouth (FMD). This paper measures the importance of technical efficiency and production risk as the two possible sources of production variability in Botswana agriculture. A production function specification that accounts for the effect of inputs on both technical inefficiency and risk is employed to a panel data of traditional farms from six agro ecological regions in Botswana.

## Australian local government sustainability and transformation: The current fit for the future reform initiative in New South Wales

Ian Tiley, University of New England

In Australian local government, for decades sustainability and especially long-term financial sustainability, and transformation, primarily through structural and other reform, have constituted major issues and problems for the 'grass roots' third tier of Australian government. Usually the catalyst for change has emanated from state and territory jurisdictions which have imposed reforms. A brief history will be provided of Australian local government transformation in these jurisdictions over the past 25 years.

In NSW, since 2011, a structured process of dialogue and consultation has been ongoing in the local government sector with the objective of securing and implementing beneficial reform. The presentation will explain this process and particularly the current NSW Government Fit for the Future (F4F) process.

From the perspective of a long-term local government practitioner, elected representative, Mayor, and former member of the NSW Local Government Acts Taskforce, the presentation will critique the current NSW reform process and suggest options for successful transformation and future sustainability of the NSW local government sector as a possible model for other Australian and international jurisdictions.

## **How ideas of distributive justice play out in water planning: The illuminating case of the Murray Darling Basin Plan**

**Max Finlayson, Charles Sturt University  
Steve Vanderheiden, CSU, CAPPE, Colorado University  
Adrian Walsh, University of New England**

Water policy involves inter alia making decisions about the allocation of water between competing users and competing uses. Given the high-stakes at play, it should not be surprising that those disadvantaged by any outcome typically proclaim that it is unjust or unfair. What is surprising, however, in such debates is the lack of any systematic attempt to outline an account of what a fair distribution would look like. Even more surprising is that the debates are rarely understood as involving the concept of distributive justice.

In this paper we begin by outlining the central features of the concept of distributive justice. We argue that water policy cannot avoid normatively based choices between competing conceptions of human value. We then proceed to explore the water plan for the Murray Darling Basin and show the significant decisions that were made in the planning process. We take this as not only of intrinsic interest, but also to illustrate our claim that questions of justice are at the heart of water planning, and as important as the technical considerations that generally drive such planning.

Our work here builds on an earlier discussion of justice and water developed in: Lukasiwicz, A. (2014). "Fair water distribution". In: Opportunities for the Critical Decade: Enhancing well-being within Planetary Boundaries.

## **'Serf's up': Do divergent incomes create the illusion of macroeconomic energy efficiency gains?**

**James D Ward, University of South Australia  
Paul C Sutton, University of South Australia**

Aggregate national statistics on energy demand and GDP suggest that energy intensity is decreasing (i.e. GDP is rising per unit energy demand). Is this evidence that as we are growing richer we are dematerialising? What is happening at the individual level within the economy? We assume that the relationship between per-capita energy demand and per-capita income is non-linear. However, the non-linearity suggests that changes in energy demand are not symmetrical for declining versus rising incomes. We contend that as incomes increase for a relatively small, wealthy fraction of the population, the resultant increase in their individual energy demand may be offset by a decline in energy demand on the part of a (larger) fraction of less wealthy people, who are becoming marginally poorer. In this case of growing income disparity, the asymmetry means an aggregate net increase in income is observed while energy demand remains approximately constant. This raises questions around the collection and aggregation of income and energy demand data with implications for projections of economic wellbeing in the face of energy depletion and climate change mitigation. More data is needed on energy consumption at the individual level to test the assumption that energy intensity decreases with increasing incomes.

## The emissions trading experience: Factors associated with acceptance and emissions reductions

Neale Wardley, Victoria University

It is widely held that human activity has contributed to global warming due to a steady increase in the level of atmospheric carbon dioxide (CO<sub>2</sub>) and an enhanced greenhouse effect. This study sheds light on a market based response to the mitigation of the resultant climate change. The tradeable emission permit approach is also known as cap and trade greenhouse gas (GHG) emissions trading. Despite the strong academic support for GHG emissions trading it has not, as yet, matched the success of prior programs in achieving the required reduction in emissions.

Over the project evidence has been found for the factors that are important during the implementation of a tradeable permit program. There are indications that these factors are either associated with the acceptance of GHG emissions trading or emissions reductions but not both.

The various factors of scheme design have been compared to see how they that have affected performance. There is a trend observed in a group of design factors that are important to gain acceptance of GHG emission trading schemes. The data indicates that these factors may have an inverse correlation with the desired outcome of emissions reductions.

## Demystifying sustainability – why it isn't the same as 'sustainable development'

Haydn Washington, University of New South Wales

Twenty-eight years have gone by since 'Our Common Future' came out from the World Commission on Environment and Development, yet we have gone backwards in terms of sustainability. Why? Because the term has been buried under layer upon layer of academic jargon. At the heart of the problem is that sustainable 'development' has been co-opted to be based on endless growth. The UN means this by 'sustainable development', as did WCED. The 'endless growth myth' lies at the heart of our current unsustainability, the key denial that stops real change. This stops us either thriving today or transforming to a sustainable future. However, despite this, many continue to speak about 'sustainable growth' and 'green growth', both of which are actually oxymorons. UNEPs 'green economy' is based on this, as is the 'circular economy'. Both fail to properly consider either overpopulation or overconsumption, key drivers of unsustainability. It is time to demystify sustainability and accept that endless growth on a finite planet is not only impossible, it is the fundamental cause of the environmental crisis. The paper considers seven things sustainability cannot be, and then canvasses what a meaningful sustainability should be - the 'Great Work' of repairing the Earth.

## Towards evaluating post-disaster recovery

Roberta Ryan, University of Technology, Sydney  
Liana Wortley, University of Technology, Sydney  
Éidín O'Shea, University of Technology, Sydney

Natural disasters are an inherent part of the Australian landscape and impose a range of economic, social and environmental costs on governments, businesses and communities. Since 2009, natural disasters have claimed more than 200 lives, destroyed 2670 houses and damaged a further 7680, and affected the lives and livelihoods of hundreds of thousands of Australians (Productivity Commission, 2014a:3). Over the past decade, the Australian Government has spent around \$8billion on post-disaster relief and recovery (Productivity Commission 2014a, 2014b) and another \$5.7 billion is expected to be spent over the forward estimates for past natural disaster events (Australian Audit Office, 2015: 132). A key objective of this

investment is to increase the resilience of communities to future events. Despite the considerable resource input, there is currently no agreed national framework or indicators for evaluating the appropriateness, effectiveness and efficiency of recovery efforts, or whether these have led to more resilient communities. This paper responds to this gap by providing a detailed analysis of existing evaluation practice materials from post-disaster recovery programs both nationally and internationally. A typology was developed to categorise evaluations of natural disasters and to identify case studies that may inform the development of national evaluation framework.