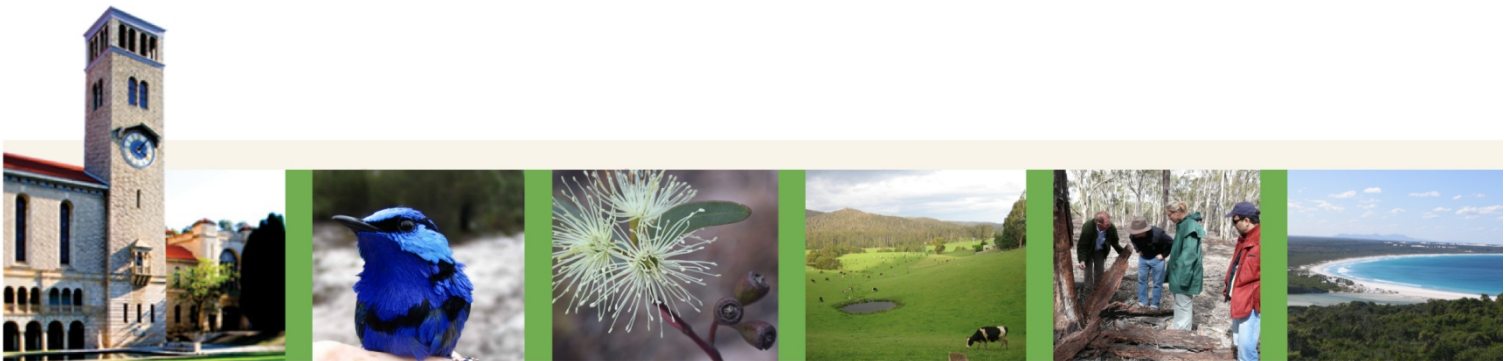




THE UNIVERSITY OF
WESTERN AUSTRALIA
Achieve International Excellence

Centre for Environmental Economics and Policy

Research Outline 2008-2012



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School of Agricultural and Resource Economics**

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Centre for Environmental Economics and Policy: Research Outline 2008-2012

1. Introduction

The Centre for Environmental Economics and Policy (CEEP) at the University of Western Australia effectively began at the start of 2008, when Winthrop Professor David Pannell commenced his ARC Federation Fellowship in the School of Agricultural and Resource Economics.

The primary aim of the Centre is to improve the management of Australia's environment through research that leads to more appropriate and effective environmental public policy. Staff in CEEP are predominantly trained in applied economics, but have track records of collaborating effectively with a wide range of disciplines. Since our inception, we have become a recognised resource for environmental economics and policy expertise by a number of Federal and State government departments and environmental organisations.

CEEP is located within the School of Agricultural and Resource Economics. The Centre currently directly employs (fully or partly) 11 researchers and one part-time administrative staff member, and includes seconded staff and PhD students from the School. Members of CEEP participate fully in the life of the School and have the benefit of many collaborations, inside and outside the University.

This is an updated version of a document that was originally created in August 2011. It provides an outline of the research work that has been achieved by the Centre to date, the new research that commenced in 2011, and our planned and potential research directions over the next couple of years.

David Pannell
6 June 2012

2. CEEP Staff and PhD Students



Louise Blackmore

Louise is researching the use of market-based instruments in biodiversity policy. She is currently working on a NERP-ED project reviewing the emergence of competitive tenders and biodiversity offset programs in Australian policy over the last decade. This work aims to derive lessons about when, where and how MBIs can best be used to restore and enhance biodiversity. She aims to commence a PhD in CEEP in 2013.



Morteza Chalak

Morteza is working on various topics in environmental economics. He develops bio-economic models to find cost-effective ways to deal with different environmental and agricultural issues such as invasive species, water management, biodiversity and land use change. The outcomes of his research help to answer key policy relevant questions related to environmental and agricultural issues.



Jonelle Cleland

Jonelle is interested in the prioritisation processes applied in natural resource management (NRM). Most recently, this has seen her collaborating on research that is investigating expert and public preferences for NRM outcomes in different geographical settings across Western Australia. She is working on an ARC Linkage project analysing preferences for environmental and social outcomes for the Swan River



Graeme Doole

Graeme has interests in computational economics and environmental policy evaluation. His research includes work on policies targeted at nutrient and greenhouse gas emissions from agriculture, regulatory instruments to restrict environmental damage from mining, and assessment of market based instruments for biodiversity conservation. Graeme is also a Senior Lecturer at the University of Waikato, New Zealand.



John Finlayson

John is interested in the economics of farming systems particularly in relation to technology evaluation and farming's impact on the environment. He is currently working on an NCCARF project to analyze the contribution of perennials to farmers' capacity to adapt to climate change.



Fiona Gibson

Providing better advice to decision makers on effective policy design and adoption is top priority in Fiona's research. She is currently working with the Bushfire CRC to assess the effectiveness of various fire management strategies in reducing bushfire risk to communities. Future research projects include designing optimal environmental policies and understanding community preferences for new drinking water sources.



Marit Kragt

Marit's research focuses on integrating biophysical science and economics. She has a particular interest in integrating socio-economic values of environmental goods and services into decision making. Current research topics include: ecosystem services tradeoffs on agricultural lands (for example from climate change mitigation actions); biodiversity offsets; and improving evidence-based policy making.



Caroline Mitchell

Caroline is responsible for the day-to-day administration of the Centre and its finances. Caroline co-ordinates the Centre's marketing activities, research funding reporting and events held by CEEP. She contributes to a range of research projects.



Ram Pandit

Ram has research interest in applied economics with a particular focus on forest management and biodiversity conservation. His current research focuses on valuing urban green space; ecosystem services from forested landscapes; and threatened species conservation including biodiversity offsets.



David Pannell

David is Director of CEEP, and contributes to many of the projects listed here. He has particular interests in improving the planning and prioritisation of environmental projects, and the adoption of conservation practices by land and water managers. He co-leads the INFFER project (Investment Framework for Environmental Resources), which aims to link socio-economic and bio-physical research to real decision making.



Maksym Polyakov

Maksym's research interests include bio-economic modelling to support natural resource management decisions, economic analysis of natural resource policies, and economics of land use change. Currently he is working on optimising ecological restoration in agricultural landscapes to improve biodiversity, and valuation of native vegetation.



Abbie Rogers

Abbie's key interest is promoting better integration of choice modelling into NRM policy and decision-making processes. She is currently working on an ARC Linkage project analysing expert and public preferences for environmental and social outcomes for the Swan River. Future projects include non-market valuation of marine biodiversity.



Steve Schilizzi

Steve's research explores issues surrounding environmental policy. He has a particular interest in the use of experimental economics techniques. He is involved in two projects in the NERP-ED Hub: an assessment of lessons learnt from Australia's experience with market-based instruments, and measurement of equity outcomes of environmental projects.



Donkor Addai (PhD candidate)

Donkor's research is on adaptation to climate change by broadacre farmers in Western Australia. He is adapting the MIDAS model to examine possible impacts of different climate-change scenarios, quantifying the impact of adaptation options that are available or could become available to farmers, and quantifying the impacts of climate policy on farmers' incomes and optimal farm management strategies.



Katrina Davis (PhD candidate)

Katrina's research is exploring how economic tools like Payments for Environmental Services schemes can be used to motivate private actors to conserve their marine environment, while allowing for development and extraction activities to take place. She is working on a case study in Chile that involves a co-management marine regime.



Veronique Florec (PhD candidate)

Vero is studying the economic analysis of bushfire management programs with the south-west of Western Australia as a case study. The principal aim of her project is to determine the optimal allocation of resources for bushfire management and gain improved understanding of trade-offs between available options, taking into consideration objectives of environmental/biodiversity conservation and human assets protection.



Martijn van Grieken (PhD candidate)

Martijn's study explores the relation between landholder heterogeneity, transaction costs and natural resource management by developing a bio-economic mathematical model that incorporates these factors and represents uncertainty. It will be used to explore the implications of heterogeneity (bio-physical and business) for cost-effective policy design and the effects of policy on a heterogeneous farming community.



Christine Kershaw (PhD candidate)

Christine's is researching investment decision processes within regional NRM organisations. Essentially, this research investigates human behaviour, which includes complex, intangible and irrational aspects, through both qualitative and quantitative data analysis. She is also looking at why decision support tools have not been more widely adopted by regional NRM organisations.



James Skurray (PhD candidate)

James's thesis is on the management and transfer of groundwater use: institutional impediments, hydro-economic aspects, and the limitation of third-party impacts. He has researched transaction costs, management challenges, and potential strategies for limiting environmental impacts arising from a groundwater market. Further work will assess the potential for collective action for Perth's Gnangara groundwater system.



Tas Thamo (PhD candidate)

Tas is researching costs and benefits of different options for Western Australian farmers to mitigate greenhouse gas emissions. He is using biophysical and bioeconomic modelling to analyse the viability of sequestering carbon in soil or vegetation, growing feedstock on farms for the production of biochar or renewable biomass energy. His work provides insights for both practical agriculture and climate policy.



Alison Wilson (PhD candidate)

Alison's research is on tradeoffs between environmental outcomes and agricultural productivity in the context of declining groundwater availability and climate variability, with a case study from the Namoi River catchment in New South Wales. Alison is evaluating the use and value of on farm management changes and technological adaptations to facilitate a better understanding of the value of water in this region.

3. Research that has been completed or is well advanced

Over its first four years, the Centre's major funding sources were the Australian Research Council (ARC) Federation Fellows program (\$1,766K over 5 years), ARC Discovery Program (\$130K over two years), the Future Farm Industries Cooperative Research Centre (FFI CRC) (\$577 over three years plus several PhD scholarships), the National Centre for Groundwater Research and Training (NCGRT) (\$290K over 5 years), and the Department of the Environment, Water, Heritage and the Arts (DEWHA) (\$1,301 over three years). The University of Western Australia provided substantial funding to support the Federation Fellowship grant.

Topic	Investment Framework for Environmental Resources (INFFER). Developed framework with several tools to assist environmental managers and policy agencies to make better decisions about public investment in environmental projects and programs. Includes tools to assist with (a) project prioritisation (using a streamlined Benefit: Cost Analysis), (b) selection of policy tools, and logical consistency of project design.
Researchers	David Pannell, Sally Marsh. <i>Key external collaborators:</i> Anna Roberts, Geoff Park, Jennifer Alexander
Funders	ARC Federation Fellowship, UWA, DEWHA, and FFI CRC
Comment	Winner of ARC Eureka Prize for Excellence in Research by an Interdisciplinary Team, 2009. Winner of AARES award for "Quality of Research Discovery" to Dave Pannell for Public: Private Benefits Framework, a component of INFFER. INFFER has been trialled and or adopted by 20 of Australia's 56 regional Natural Resource Management bodies, and by the Victorian State Governments. It has been used for research purposes in Italy. It is undergoing piloting with governments in two Canadian provinces and there is interest from two more. The Public: Private Benefits Framework has been widely applied nationally and internationally. Its 2008 paper has been cited 31 times.
Publications (including for SIF3, precursor to INFFER)	<i>Journal:</i> Pannell et al. (2011), Pannell (2008), Pannell (2009), Pannell and Wilkinson (2009), Roberts and Pannell (2009) <i>Conference:</i> Marsh et al. (2010), Marsh et al. (2011), Pannell et al. (2010), Roberts and Pannell (2009), Roberts et al. (2012), Ridley and Pannell (2008), Park et al. (2012) <i>Reports:</i> Pannell and Roberts (2008a), Pannell and Roberts (2008b)

Topic	Economics of biodiversity. Maksym's project focuses on determining the optimal spatial allocation of effort to re-establish native vegetation in order to provide the most valuable mix of habitats for various species of woodland-dependent birds in northern Victoria. John's work with Bathgate looked at economics of achieving multiple environmental outcomes from farm management.
Researchers	Maksym Polyakov, David Pannell, John Finlayson
Funders	ARC Federation Fellowship, UWA, DEWHA
Comment	
Publications	<i>Conference:</i> Polyakov et al. (2010), Polyakov et al. (2011), Polyakov et al. (2012), Bathgate et al. (2009)

Topic	Capacity for effective environmental decision making and management. Research into capacity constraints of environmental management bodies, particularly in relation to planning and prioritisation. Some of the work focuses on institutional capacity for use of modelling tools.
Researchers	Sally Marsh, David Pannell, Christine Kershaw (PhD student), Marit Kragt
Funders	ARC Federation Fellowship, UWA, DEWHA, FFI CRC (Kershaw)
Comment	Marit's work builds on UWA student learning grant research that looks at the modelling tools used by natural resource managers
Publications	<i>Journal:</i> Alexander et al. (2010), Marsh et al. (2011), Roberts and Pannell (2010), Pannell (2010b), Roberts and Pannell (2009), Roberts et al. (2011), Seymour et al. (2008) <i>Conference:</i> Alexander et al. (2008), Marsh et al. (2008a), Marsh et al. (2008b), Marsh et al. (2010), Park et al. (2008), Seymour et al. (2008)

Topic	Economics of weed, pest and disease management. This area of work includes analysis of control of environmental weeds, agricultural weeds and prevention of weed spread.
Researchers	Morteza Chalak, David Pannell, Jessie Beltran (PhD student), Graeme Doole
Funders	ARC Federation Fellowship, UWA, DEWHA, AusAID
Comment	Prize for the Best Article in the <i>Australian Journal of Agricultural and Resource Economics</i> 2008 to Graeme Doole for the analysis of weed management issues in Australian cropping systems. Assistant Professor Morteza Chalak won the AARES Heading East Award for his paper "Economics of controlling invasive species: a stochastic optimisation model for a spatial-dynamic process"
Publications	<i>Journal:</i> Beltran et al. (2012a), Beltran et al. (2012b), Beltran et al. (2011a), Chalak and Pannell (2012), Chalak and Pannell (2011), Chalak et al. (2009), Doole (2008), Doole (2009), Doole and Hertzler (2011), Doole and Pannell (2008a), Doole and Pannell (2008b), Doole and Pannell (2009), Doole and Revell (2010), Doole et al. (2009c), Gibson et al. (2008), Llewellyn and Pannell (2010) <i>Chapter:</i> Doole (2008) <i>Conference:</i> Beltran et al (2012), Chalak and Pannell (2010), Chalak et al. (2009), Davis et al. (2012)

Topic	Economics of managing agriculture to reduce nutrient and pesticide flows that damage off-site water quality. This includes work on spatial optimisation of dairy management in New Zealand, optimal strategies to reduce nutrients in the Gippsland Lakes, reduction of nutrient and sediment loads from the Avon Richardson and Avoca catchments (Victoria) and a study of riparian management in Germany.
Researchers	Graeme Doole, David Pannell, Anna Roberts (DPI Victoria)
Funders	ARC Federation Fellowship, UWA, DEWHA, Department of Sustainability and Environment (for Roberts)
Comment	Agricultural Economics Society (UK) prize essay competition 2010 to Graeme Doole for analysis of water quality policy issues.
Publications	<i>Journal:</i> Doole (2010), Doole and Kingwell (2010), Doole and Pannell (2011a), Doole and Pannell (2011b), Doole et al. (2011), Roberts et al. (2012),

	Doole and Paragahawewa (2010), Sieber et al. (2010), Doole (2012b), Doole et al. (2012) <i>Chapter:</i> Kragt (2012) <i>Conference:</i> Stott et al. (2012)
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Topic	Salinity. Economics of salinity at farm and catchment scales. Economic value of salinity mitigation. Assessment of salinity policy program.
Researchers	David Pannell, John Finlayson, Tennille Graham (PhD student) , Graeme Doole (from when he was a PhD student)
Funders	ARC Federation Fellowship, UWA, FFI CRC
Comment	New work on salinity has not been a primary focus of CEEP, but outputs have continued building on a lot of past research in this area.
Publications	<i>Journal:</i> Bathgate et al. (2009), Beverly et al (2011), Doole and Pannell (2009), Finlayson et al. (2010), Graham et al. (2010), Nordblom et al. (2010), Nordblom et al. (2011), Pannell and Roberts (2010), Pannell and Roberts (2009), Repacholi et al. (2008), Roberts and Pannell (2009) <i>Chapters:</i> Nordblom et al. (2011a), Nordblom et al. (2011b), Nordblom et al. (2011c), Doole (2011). <i>Conference:</i> Alexander et al. (2008), Beverly et al. (2008), Ferdowsian and Pannell (2009), Pannell (2010a), Pannell and Ridley (2008) <i>Reports:</i> Cresswell et al. (2009), Nordblom et al. (2009)

Topic	Adoption of innovations by farmers. This focuses largely, but not exclusively, on adoption of conservation practices. The work includes development of ADOPT (Adoption and Diffusion Outcome Prediction Tool), and on the role of extension as a policy mechanism.
Researchers	David Pannell, Sally Marsh
Funders	ARC Federation Fellowship, UWA, FFI CRC
Comment	CEEP organised two major national workshops on this topic: one in Melbourne in Nov 2008, with 400 delegates, and one in Perth in July 2009, with 150 delegates. A 2006 review paper by Pannell et al. has accumulated over 100 citations. CEEP maintains a web site on this topic, www.ruralpracticechange.org .
Publications	<i>Book:</i> Pannell and Vanclay (2011a) <i>Chapter:</i> Pannell and Vanclay (2011b), Pannell (2011), Pannell et al. (2011a), Pannell et al. (2011b), Marsh et al. (2011) <i>Conference:</i> Kuehne et al (2011a), Kuehne et al (2011b), Marsh (2010), Pannell (2012a)

Topic	Environmental policy. Evaluating the effectiveness and impacts of environmental policies. Includes the nexus between environmental research and policy, and the costs of environmental policy, including transaction costs..
Researchers	David Pannell
Funders	ARC Federation Fellowship, UWA
Comment	
Publications	<i>Journal:</i> Pannell and Roberts (2009), Pannell and Roberts (2010), Pannell (2012) <i>Conference:</i> Pannell (2008a), Pannell (2008b), Pannell (2008c), Pannell (2009)

	<i>Chapter:</i> Pannell (2008) <i>Reports:</i> Pannell (2008), Pannell (2011)
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Topic	Climate change and carbon. Various research on climate change, climate policy and carbon, including: optimal adaptation to climate change by farmers; impacts of past and predicted climate change on wheat yields; farm-level economics of carbon sequestration in agricultural soils and implications for climate policy; and public preferences for mitigation strategies in agriculture.
Researchers	Marit Kragt, Donkor Addai (PhD student), Tas Thamo (PhD student) , David Pannell, Michael Robertson (CSIRO)
Funders	ARC Federation Fellowship, UWA, FFI CRC (for Addai), CSIRO (for Kragt), GRDC (for Thamo)
Comment	Marit plans to conduct a choice experiment study looking at people's perceptions of different mitigation options and their potential co-benefits.
Publications	<i>Journal:</i> Asseng and Pannell (2011), Kragt et al. (2011) <i>Conference:</i> Kragt et al. (2011), Pannell (2010b), Kragt and Robertson (2012), Nordblom et al. (2012c) <i>Report:</i> Kolikov et al. (2012)

Topic	Forestry economics. Including economics of agroforestry and of water use by forests.
Researchers	Maksym Polyakov, John Finlayson
Funders	UWA, FFI CRC
Comment	Activity on this topic is largely through Maksym and John maintaining their links with past collaborators.
Publications	<i>Journal:</i> Majumbar et al. (2009), Polyakov et al. (2010), Zhang and Polyskov (2010) <i>Chapter:</i> Majumdar et al. (2010), Pannell (2009), Polyakov and Zhang (2010) <i>Conference:</i> Nordblom et al. (2010), Nordblom et al (2011), Polyakov et al. (2009)

Topic	Groundwater management and policy. Institutional barriers to a trading system for groundwater. Economics of reducing groundwater availability in a cotton irrigation district.
Researchers	James Skurray (PhD student), Alison Wilson (PhD student), David Pannell
Funders	NCGRT (in turn funded by the ARC and the National Water Commission), Cotton CRC (Wilson)
Comment	We are partners within the NCGRT.
Publications	<i>Journal:</i> Skurray and Pannell (2012), Skurray et al. (2011a), Skurray et al. (2012) <i>Conference:</i> Skurray (2010) <i>Report:</i> Skurray et al. (2011b)

Topic	Water management and policy. Including trade-offs between competing water uses, institutional design and public acceptance of recycling.
Researchers	John Finlayson, David Pannell, Fiona Gibson
Funders	FFI CRC, ARC Federation Fellowship, UWA
Comment	
Publications	<i>Journal:</i> Roberts et al. (2011), Roberts et al. (2012), Nordblom et al. (2012a)

	<p><i>Chapter:</i> Nordblom et al. (2010), Nordblom et al. (2011a), Nordblom et al. (2011b), Nordblom et al. (2012b)</p> <p><i>Conference:</i> Gibson and Burton (2011), Nordblom et al. (2012c), Tran et al. (2012)</p>
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Topic	Marine issue. Financial benefits to Palau from declaration of a protected zone for sharks, resulting in increased shark-based tourism.
Researchers	David Pannell, Sally Marsh. <i>Key external collaborators:</i> Jessica Meeuwig, Gabe Vianna, Mark Meekan
Funders	ARC Federation Fellowship, UWA
Comment	A small project on sharks in Palau, as our first foray into the marine area.
Publications	<i>Journal:</i> Vianna et al. (2012)

Topic	An analysis of the efficiency of environmental bonds for the Western Australian mining sector
Researchers	Ben White, Graeme Doole, David Pannell
Funders	ARC Discovery
Comment	This project compares the efficiency of bond instruments with other market-based instruments for the reduction of land degradation arising from mining activity.
Publications	<i>Conference:</i> White et al. (2009) <i>Journal:</i> White and Doole (2011), White et al. (2012), and Doole and White (2012)

Topic	Environmental values and valuation. There have been two strands of this research: Eloise's sociological research in the community's "held values" for environmental assets, and Abbie and Fiona's economic research on non-market valuation, which they are preparing for publication.
Researchers	Eloise Seymour (PhD student), Abbie Rogers, Fiona Gibson
Funders	FFI CRC (Seymour), ARC Federation Fellowship, UWA
Comment	
Publications	<i>Journal:</i> Seymour et al. (2010), Seymour et al. (2011a), Seymour et al. (2011b), Gillespie and Kragt (2012), Kragt and Bennett (2012) <i>Conference:</i> Rogers (2011), Rogers (2012)

Topic	Agricultural systems economics.
Researchers	John Finlayson, Graeme Doole, David Pannell, Andrew Kennedy (PhD student)
Funders	ARC Federation Fellowship, UWA, FFI CRC, CSIRO (Doole), Sheep CRC (Kennedy)
Comment	CEEP is mainly concerned with farm economics as it relates to environmental outcomes: what is the farm-level cost of particular environmental practices, or of achieving certain environmental outcomes. Nevertheless, due to collaborations, PhD students, or spin-offs from that work, some of the following publications are mainly focused on agricultural production, rather than the environment.
Publications	<i>Journal:</i> Doole and Weetman (2009), Doole et al. (2009a), Doole et al. (2009b), Gandorfer et al. (2011), Monjardino et al. (2010), Pannell et al. (2008), Pech et al. (2009), Thomas et al. (2010), Doole (2012a), Finlayson et

	al. (2012a), Finlayson et al. (2012b). <i>Chapter:</i> Doole and Pannell (2008) <i>Conference:</i> Finlayson et al. (2010), Finlayson et al. (2011), Gandorfer et al. (2010), Addai et al. (2012), Doole (2012c), Finlayson et al. (2012), Robertson et al. (2012).
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Topic	Auctions as policy instruments for conservation programs. Auctions – or competitive tenders – are one way government agencies can get private landowners to provide public environmental services, such as land conservation, biodiversity enhancement or water quality management. This research program investigates when and under what conditions auctions are better than alternative policy instruments for resource conservation.
Researchers	Steven Schilizzi, Uwe Latacz-Lohmann
Funders	FFI CRC, UWA, CAU (Germany)
Comment	This is an international collaboration with CAU, the Christian-Albrechts University in Kiel, Germany. It involves economic lab experiments run in both countries for purposes of comparison and robustness testing. A new collaboration on this topic is being initiated with the London School of Economics (UK).
Publications	<i>Conference:</i> Breustedt et al. (2008), Schilizzi & L-Lohmann (2009), Schilizzi et al. (2010), Schilizzi & L-Lohmann (2011), Schilizzi (2012) <i>Working Papers:</i> L-Lohmann & Schilizzi (2011), Schilizzi et al. (2011)

Topic	Divergence between public and expert valuation of environmental assets. Identifies differences between public and expert preferences for environmental assets within various systems that capture differences in scale and setting.
Researchers	Abbie Rogers, Jonelle Cleland
Funders	CERF (funding ceased in 2010), CEEP (funding commenced in 2011)
Comment	Project initially part of the Environmental Economics Research Hub (Theme D – Valuing Environmental Goods and Services). Ongoing research and reporting supported by CEEP.
Publications	Plans to complete research report on Southwest Australia Ecoregion. Produce journal articles from Environmental Economics Research Hub Research Reports 79, 80 and 91. Write journal article that reports on findings across case studies, including the Swan River (on which there is a project in the next section).

Topic	Miscellaneous environmental and natural resource issues, including work on research methods
Researchers	David Pannell, Graeme Doole, Marit Kragt
Funders	
Comment	Several one-off pieces of work.
Publications	<i>Journal:</i> Dilly and Pannell (2009), Pannell (2010a) <i>Chapter:</i> Doole and Paragahawewa (2012) <i>Conference:</i> Pannell (2011), Kragt (2012a), Robertson et al. (2012) <i>Report:</i> Kragt (2012b)

4. New research

In 2011, CEEP was awarded several new research funding grants, from the ARC Linkage Program (166K over two years), ARC Centre of Excellence program (\$1,172K over 7 years plus \$711K from UWA), the Department of Sustainability, Environment, Water, Population and Communities (NERP program) (\$873K over four years plus \$175 from UWA), the Bushfire Cooperative Research Centre (CRC) (\$100K over one year, plus a PhD scholarship top-up), and NERP-marine (approximately \$400K over 3.5 years).

Within the **National Environmental Research Program – Environmental Decisions (NERP-ED) Hub**, a number of projects have commenced or will be undertaken.

Topic	Balancing efficiency and equity in environmental project assessment. Equity is usually not considered in assessment of environmental projects, but is often raised by community members as an important consideration. How can equity be appropriately considered in a systematic way in project assessment? Link to INFFER project.
Researchers	Steven Schilizzi, David Pannell
Funders	SEWPAC (NERP Program), UWA
Comment	
Planned outputs	A method to weigh up equity considerations systematically when assessing environmental projects. Examples of its application to real projects.

Topic	Improving evidence-based policy. Drawing on the experience from practical use of rigorous processes such as INFFER, how can sound, practical improvements be made to decision making in key programs?
Researchers	Marit Kragt, David Pannell
Funders	SEWPAC (NERP Program), UWA
Comment	Will involve detailed assessment of the INFFER experience. Will need to work with SEWPAC to work out how the outputs can best be useful to them.
Planned outputs	Report on lessons from application of INFFER in various contexts. Report on how INFFER could be used and/or adapted for use in particular areas of SEWPAC. INFFER training program delivered to interested SEWPAC staff. Ideas on how to institutionalise improved prioritisation. Understanding of factors limiting evidence-based policy approaches.

Topic	Balancing targeted, untargeted and landscape-scale approaches to biodiversity protection. Some in the community like government to support conservation actions in a relatively untargeted way, encouraging maximum participation. The government is also increasingly interested in landscape-scale approaches, such as corridors. Considering principles of risk diversification and project effectiveness, how should resources be allocated to this approach and to investment in specific environmental assets?
Researchers	Fiona Gibson, David Pannell
Funders	SEWPAC (NERP Program), UWA
Comment	

Topic	Market-Based Instruments (MBIs) for biodiversity conservation. This research attempts to derive lessons for biodiversity policy from Australia's experience with MBIs. It will also examine the uptake of MBIs by landholders (building on earlier work by Helena Clayton on crowding out of conservation effort by MBIs).
Researchers	Graeme Doole, Steve Schilizzi, research associate (Louise Blackmore)
Funders	SEWPAC (NERP Program), UWA
Comment	Methods: Review of published literature and reports. Interviews with experienced practitioners, including experts and environmental managers. For the study of uptake, interviews with farmers, landholders and catchment NRM officers.
Planned outputs	Written report outlining a range of experiences with MBIs, and drawing out lessons. Journal papers.

Topic	Economics of planning for joint carbon and biodiversity benefits. This looks at so-called "trade-ons" between carbon and biodiversity in government programs.
Researchers	Brendan Wintle (project leader, U Melb), Marit Kragt (UWA).
Funders	SEWPAC (NERP Program), UWA
Comment	

Within the **Centre of Excellence in Environmental Decisions**, there is a degree of flexibility about the projects undertaken. Some will depend on the ideas of scientist collaborators in the Centre. Projects that are currently likely to be undertaken include the following.

Topic	Environmental research prioritisation. Develop principles and a framework for evaluating and prioritising research proposals. Apply it to a set of projects.
Researchers	David Pannell, research associate (to be appointed). Collaboration with other researchers in the Centre.
Funders	ARC (Centre of Excellence Program), UWA
Comment	Will hold a workshop in Perth in 2012.

Topic	Metrics for environmental decision making. The first element involves The cost of errors in prioritisation of environmental projects. Further development by Fiona of David's analysis looking at the cost of using poor metrics to rank projects, and or using imperfect information. The second component, led by Marit, asks: What criteria are used to evaluate alternative environmental policy proposals? How do these criteria differ across policy departments and projects? To what extent are metrics based on scientific and economic data? What would be 'appropriate' metrics for project evaluation?
Researchers	Fiona Gibson, Marit Kragt, David Pannell
Funders	ARC (Centre of Excellence Program), UWA
Comment	Fiona has started work on this.
Outputs	

Topic	Evaluating the benefits of applying decision theory to environmental problems. Ecological modellers express frustrations about poor use of decision making processes by environmental managers and policy makers. In CEEP we have an existing project looking at why non-market valuation has had limited uptake in the policy arena. In this project we will take a similar approach to look at why decision theory has had limited uptake by environmental managers. This will complement other work on a similar theme by Mick McCarthy.
Researchers	Mick McCarthy (U Melb) will lead. Fiona Gibson, Abbie Rogers.
Funders	ARC (Centre of Excellence Program), UWA
Comment	Work planned for second half of 2012.

Topic	Preferences for changing agri-cultural landscapes in Australia. Increasing policy focus on farmers as suppliers of biodiversity or carbon mitigation is likely to change agricultural landscapes. This study will assess the extent of changes in agricultural land use, vegetation, and cultural landscapes. Spatial models, and a nonmarket valuation experiment will be used to estimate the costs and benefits of landscape scale changes.
Researchers	Marit Kragt, student.
Funders	ARC (Centre of Excellence Program), UWA
Comment	This study would provide inputs into the discussion about costs and benefits of agri-environmental policies in an Australian context.

Topic	Efficiently valuing environmental assets for rapid project assessment. It is too time consuming and expensive to conduct non-market valuation studies for every one of the large number of environmental projects that needs to be assessed. However, consideration of values at some level is crucial for good decision making. How, practically, should valuation be approached to strike an appropriate balance between transaction costs, speed and theoretical rigour? What are the theoretical limitations of simpler approaches, and what are their other strengths? Also, how should the judgements of experts be combined with broader community preferences? The research aims to evaluate and improve the valuation approach used in INFFER.
Researchers	Fiona Gibson, Abbie Rogers, David Pannell
Funders	ARC (Centre of Excellence Program), UWA
Comment	Work planned for second half of 2013.

The following set of unrelated projects have individual funding sources.

Topic	Do scientist and public preferences diverge? Analysing expert and public preferences for environmental and social outcomes for the Swan River. A choice modelling study of non-market values for the Swan River.
Researchers	Abbie Rogers, Jonelle Cleland, Michael Burton, David Pannell. <i>Key external collaborators:</i> Jessica Meeuwig (Animal Biology), John Rolfe (Central Queensland University)
Funders	ARC Linkage (\$106K over two years), Swan River Trust (\$60K over two years)
Comment	Commenced January 2011
Planned	Report for Swan River Trust. Journal article.

outputs	
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Topic	Differences in scientist's preferences for environmental management options. To investigate whether experts apply scientific knowledge (on a particular subject) and/or scientific rationale (that can be universally applied) in providing information into a policy process.
Researchers	Fiona Gibson, Abbie Rogers, Jonelle Cleland, David Pannell
Funders	ARC Federation Fellowship, UWA
Comment	Commenced June 2011
Publications	Conference paper, possible Journal article

Topic	Integrated assessment of prescribed burning. A highly participatory research project, involving close collaboration with the Bushfire CRC and with fire agencies.
Researchers	Fiona Gibson, David Pannell, Veronique Florec (PhD student)
Funders	Bushfire CRC (\$100K over one year, plus a PhD scholarship top-up)
Comment	Commenced July 2011
Publications	<i>Conference:</i> Gibson et al. (2012).

Topic	The use and non-use of non-market values in policy decisions. A survey of researchers/consultants and decision makers to examine cases where non-market values have been used in policy decisions or ignored, and to understand reasons for their use or non-use.
Researchers	Marit Kragt, Abbie Rogers, Fiona Gibson, Michael Burton, David Pannell
Funders	
Comment	Commenced July 2011
Planned outputs	Journal article.

Topic	Hedonic analysis of home sale price and urban tree cover in Perth metropolitan area
Researchers	Ram Pandit, Maksym Polyakov, Rohan Sadler
Funders	UWA Research Development Award 2011
Comment	Builds on Honours project by Tim Moran, "Do Perth residents value trees? A hedonic property price approach"
Publications	<i>Conference:</i> Pandit et al. (2012)

Topic	Non-market valuation of marine biodiversity. What are the equivalent dollar values for the intangible environmental benefits from management of marine environmental assets?
Researchers	Michael Burton, Abbie Rogers, David Pannell
Funders	NERP-marine, UWA
Comment	Commencing in mid 2012.

Topic	Strategies to reduce greenhouse gas emissions from New Zealand dairy farms. Alfredo is using the IDEAS model developed by Graeme Doole and others to examine the economics of reducing GHG emissions from dairy farming in New Zealand.
Researchers	Alfredo Adler (Masters student), Graeme Doole

Funders	Funded by the Ministry of Agriculture and Forestry Sustainable Land Management and Climate Change Fund through DairyNZ.
Comment	This research aims to identify strategies that producers can use to reduce greenhouse gas emissions within the six primary dairy farming regions of New Zealand. Economists in CEEP are helping this research through the provision of advice and through model construction.

Topic	Public preferences for mitigation strategies in agriculture. Proposal is to conduct a choice experiment study looking at people's perceptions of different mitigation options and their potential co-benefits. If funded, will form part of the work described earlier under Climate change .
Researchers	Marit Kragt
Funders	CSIRO (for Kragt). UWA Early Career Researcher Grant

Topic	Hedonic analysis of farm land values. Aim is to quantify environmental values reflected in land prices. The case study area is central Victoria. The study looks at both lifestyle farmers and larger property owners. As well as being of interest in its own right, it will allow improvement in the spatial optimisation of restoration for bird habitat.
Researchers	Maksym Polyakov
Funders	ARC Federation Fellowship, UWA

Topic	<p>Economic modelling and analysis for water-sensitive cities.</p> <p>The project includes three types of economic analysis, applied to five problems related to water-sensitive cities. The five problems are:</p> <ul style="list-style-type: none"> (a) the benefits and costs of investment in water-sensitive infrastructure; (b) the benefits and costs of alternative systems for combining portfolios of water from different sources, including recycled water, storm water, groundwater and dam water. (c) the relative benefits and costs of centralised and decentralised systems for water supply. (d) the economic viability of new technologies and systems being researched by the CRC, particularly in Program C (e) economic impacts of extreme weather events and the economics of options to reduce these impacts. <p>These issues will be assessed using:</p> <ul style="list-style-type: none"> (a) non-market valuation to estimate the values of environmental and social intangibles. (b) Empirical economic modelling to identify optimal investment and management strategies, and to estimate impacts (c) Integrated economic assessment (including benefit: cost analysis). <p>Technical, social, environmental and financial factors will be integrated.</p>
Researchers	James Fogarty, David Pannell, research associates
Funders	CRC for Water-Sensitive Cities
Comment	
Publications	<i>Conference: Pannell (2012b)</i>

Topic	<p>Economic incentives and instruments for water-sensitive cities. To design effective economic policy mechanisms, institutions and risk sharing strategies to encourage uptake of water-sensitive practices by individuals and organisations.</p> <p>To analyse the optimal mix of policy mechanisms (including regulatory, market, incentive and educative mechanisms) to promote uptake of water-sensitive practices in different situations and contexts.</p> <p>To develop appropriate funding mechanisms, including consideration of public and private benefits and who should pay.</p>
Researchers	Ben White, James Fogarty, research associate
Funders	CRC for Water-Sensitive Cities
Comment	

5. Potential future research

Topic	Heritage Investment Framework. Based on the successful Investment Framework for Environmental Resources (INFFER), this project will develop a framework for integrated assessment and prioritisation of heritage investments (projects and interventions). Developed in collaboration with end users, the framework will combine analytical rigour with practical usefulness, to support improved processes of transparent, evidence-based decision making in the heritage area.
Possible researchers	David Pannell, research associates

Topic	Quantifying financial and intangible values of heritage. This project uses non-market valuation methods to estimate Australia's culturally diverse heritage values for multiple case study locations and populations. Components: <ul style="list-style-type: none"> • The intangible values of indigenous heritage. • The value of European heritage landscapes in the peri-urban fringe. • Values of European built heritage in urban areas. • Values of European built heritage in peri-urban areas • Values of inaccessible European built heritage
Possible researchers	Marit Kragt, Abbie Rogers, Jonelle Cleland, Fiona Gibson, Michael Burton, Ram Pandit

Other potential research topics that are of interest to researchers in CEEP.

Topic	Modelling economic and environmental benefits of oil mallee plantings in WA wheatbelt. Spatial analysis of potential of mallee as a feedstock for electricity generation in WA wheatbelt. Oil mallees are native small trees (eucalypts) that are being developed as an alternative land use in the wheatbelt of WA. They have some environmental benefits (salinity and biodiversity habitat), they potentially provide renewable energy and carbon sequestration. There are quite large areas of them already on farms in some areas.
Possible researchers	Maksym Polyakov

Topic	Managing information/knowledge gaps. How to decide what to do about them
Possible researchers	David Pannell, Graeme Doole, Morteza Chalak

Topic	Revisit the Moore Catchment Management Strategy, ten years on
Possible researchers	Jonelle Cleland

Topic	Ecological monitoring: when to review, when to re-contract and when to terminate
Possible researchers	Ben White, research associate

Topic	Diminishing marginal returns to scale in environmental management: implications for policy and management. A small project, writing a synthesis paper on this topic, outlining the issue and its implications.
Possible researchers	David Pannell

Topic	Optimal balance between information detail/quality and transaction costs. Perhaps a Bayesian decision-theory based analysis. Could employ the same analysis tools as developed for the study of errors in the prioritisation process.
Possible researchers	

Topic	Understanding adoption. Relationship between relative advantage and lag to adoption. The learning/transition cost of adoption of a new practice. These are both highly relevant to the Public: Private Benefits Framework (Pannell, 2008). Aim is to collect evidence on these and publish an updated version of the PPBF.
Possible researchers	

Topic	Incorporating spatial complexity in valuing natural areas. A combination of various nonmarket valuation techniques to link revealed and stated preferences, and to develop novel methodological and analytical approaches to environmental valuation. If funded, will form part of the work described earlier under Environmental values and valuation.
Researchers	Marit Kragt, Jeff Bennett, Ian Bateman, research associate (to be appointed)
Funders	Have applied to the Australian Research Council

6. Publications to June 2012

Journal articles

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