

# INNOVATION



## News from the Primary Industries Innovation Centre

### No. 1: March 2009

#### About PIIC



Professor Bob Martin (left) is Director of the Primary Industries Innovation Centre (PIIC). The Centre was established in 2007 to facilitate co-operation between the University of New England and the New South Wales Department of Primary Industries.

The highlight of 2008 was the establishment of PIIC as a leader in rural greenhouse gas research. In July 2008, the NSW Minister for Primary Industries, Ian Macdonald, announced that a National Centre for Rural Greenhouse Gas Research (NCRGGR) would be established under the PIIC banner to foster synergies in climate change research.

UNE and NSW DPI have agreed to co-fund a Director for the Centre representing an investment of \$1.25 million over five years. UNE has committed \$2.0 million of capital funding for refurbishment of facilities to create state-of-the-art Soil Carbon laboratories. In addition, UNE has committed \$900,000 and NSW DPI \$500,000 to purchase new equipment for these laboratories.

We would like to farewell the inaugural PIIC Board of Management Chair, Professor Peter Flood (right) who retired at the end of 2008. Peter played a significant and visionary role in developing the PIIC concept and partnership. We wish Peter all the best in his retirement.



The Chair of the PIIC BoM rotates between UNE and DPI each year and we would like to thank Dr Nick Austin, DPI Deputy Director General Science

& Research for his contribution as Chair of the BoM during 2008.

We welcome Professor Ray Cooksey as Chair of the PIIC BoM 2009. Other members of the PIIC Board of Management are Professor Margaret Sedgley Pro Vice-Chancellor and Dean of the Faculty of Arts and Sciences UNE, Renata Brooks Executive Director, Science & Research, NSW DPI, Helen Scott-Orr Director, Health Sciences and Strategic Alliances, NSW DPI and Professor Bob Martin Director of PIIC.



Professor Cooksey (left), Acting Pro Vice-Chancellor, Research, provides strategic leadership for all aspects of the University's research activities and oversight of the University's Research Management Plan.

Ray holds a PhD in Psychology and has held positions in the disciplines of Education, Psychology and Business/Management - a diverse set of experiences that informs his research. His research is focused mainly in the areas of decision making and cognition, chaos and complexity theory, organisational and behavioural systems theory, cause mapping and multivariate statistics.

#### Research Coordination Group 2009

The Research Coordination Group (RCG) advises the Director and oversees the progress, direction and development of the Centre and consists of the Director (chair) and representatives of UNE and NSW DPI.

The RCG facilitates the establishment of new projects and monitors project implementation, review and evaluation. It advises the Board on potential collaborative projects; allocation of staff and resources; funding services for projects including government funded research grants.

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The RCG advises on dissemination and adoption of research outcomes; reviews general methodology and task performance of research and extension projects; assists in the development of an annual plan; facilitates science communication and extension of the work of the Centre; advises on the integration of training, research and extension activities; and provides an annual performance appraisal of the Activities of the Centre to the Board.

The membership of the RCG in 2009 is:

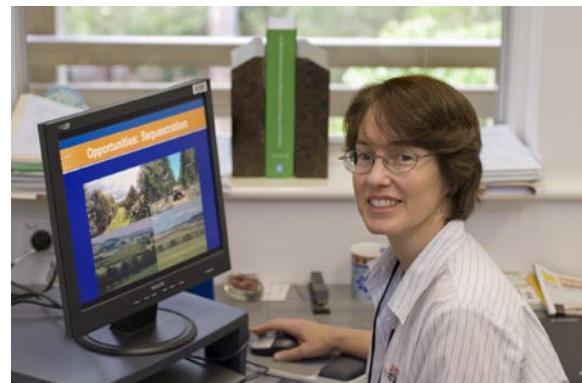
- Professor Paul Martin, Director Australian Centre for Agriculture and Law, UNE
- Professor Iain Young, Head, School of Environment and Rural Sciences, UNE
- Professor John Gibson, Director The Institute for Genetics & Bioinformatics, UNE
- Associate Professor Nick Reid, School of Environmental and Rural Sciences, UNE
- Associate Professor Geoff Hinch, School of Environmental and Rural Sciences, UNE
- Dr Philip Thomas, Principal Research Fellow, Innovation and Adoption, UNE
- Mr Rob Young, Director Resources research, NSW DPI, Orange
- Ms Pam Welsh, Regional Director Northwest NSW, NSW DPI, Tamworth.
- Dr Peter Parnell, Research Leader Beef Genetics and Improvement, NSW DPI, Armidale
- Dr David Herridge, Principal Research Scientist, NSW DPI, Tamworth
- Dr Mike Sissons, Senior Research Scientist, NSW DPI, Tamworth

### **Professor Annette Cowie appointed as Director, National Centre for Rural Greenhouse Gas Research**

The National Centre of Rural Greenhouse Gas Research (NCRGGR) is a new jointly funded initiative of the University of New England and the NSW Department of Primary Industries and will be administered through PIIC. Annette Cowie is highly qualified to be the first Director of NCRGGR and will commence in the position on May 4.

Annette is currently a Senior Research Scientist in DPI's Science and Research Division. She leads the New Forests research program in the Forest

Resources Research Unit. The New Forests program demonstrates and quantifies environmental services from planted forests, particularly in the areas of carbon sequestration, salinity mitigation and land rehabilitation.



Annette Cowie (above) has a background in soil and plant science and her personal research program focuses on key aspects of greenhouse science: documenting greenhouse mitigation benefits of forestry systems for carbon sequestration and production of biofuel; management of soil carbon, including soil amendment with biochar to sequester carbon and enhance productivity; and development of greenhouse accounting systems for emissions trading.

Annette is the Australian National Team Leader for the International Energy Agency (IEA) Bioenergy Task 38 "Greenhouse gas balances of biomass and bioenergy systems", and has recently become Co-leader of the International Task Group.

Annette's research interests include: greenhouse accounting for forests, wood products and bioenergy; soil carbon management; emissions trading in the forest and agricultural sectors; and biochar as a soil amendment.

### **Climate Change Research Program**

The federal Department of Agriculture, Forestry and Fisheries Climate Change Research Program is funding research projects and on-farm demonstrations to help prepare Australia's primary industries for climate change and build the resilience of the agricultural sector into the future. The program involves projects that provide

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practical management solutions to farmers and industries.

Projects are focussing on:

- reducing greenhouse gas emissions such as methane, nitrous oxide and carbon dioxide.
- improving soil management and determining the potential of sequestration of carbon in agricultural soils – in a variety of soil types, locations and under differing management practices.

The following UNE-DPI projects have received funding in the Climate Change Research Program:

- Land – the Carbon Bank – Professor Annette Cowie.
- Genetic Improvement of Beef Cattle for Greenhouse Gas Outcomes – New South Wales Department of Primary Industries – Dr Roger Hegarty.
- Novel strategies for enteric methane abatement – Dr Roger Hegarty.
- Mitigating nitrous oxide emissions from soils – Dr Graeme Schwenke.

### Land – the Carbon Bank

The Federal Department of Agriculture, Forestry and Fisheries recently announced funding for projects in the national Soil Carbon Research Program. The PIIC application “Land the Carbon Bank” received \$1.05 million over 3 years to measure monitor and determine the viability of sequestering carbon in agricultural systems in NSW. The project also received \$400,000 in funding from the Grains Research & Development Corporation (GRDC).

The purpose of this project is to assess the impacts of changes in agricultural management on soil carbon in NSW. It is part of a national integration project that has been established under the Climate Change Research Program. This will provide national coordination and consistency of approach in providing data on changes within the separate pools of soil carbon under various management regimes and under a range of defined environments.

This project will focus on attaining new data and particularly to ‘fill the gaps’ in knowledge on how adoption of best management practice or new practices may change soil carbon fractions under NSW agricultural systems (including cropping / pasture rotations / systems, reduced / no tillage crops, irrigated crops and high intensity cropping).



Members of the soil carbon research team from left: Dr Brian Wilson (DECC, Dr Melinda McHenry, Dr Subhadip Ghosh and Professor Heiko Daniel.

### Mitigating ruminant methane emissions

Dr Roger Hegarty, (right), located at NSW DPI’s Beef Centre at UNE, has secured \$1.58 million in funding from the Federal Government’s Climate Change Research Program.



A study of genetic variation in beef cattle herds that differ in methane production has received \$1.04 million to evaluate the potential for breeding cattle with reduced methane emissions, without compromising animal performance. Another \$540,000 will be used to investigate techniques to reduce methane production in ruminants by eliminating microscopic organisms called protozoa from the rumen and through the use of dietary supplements. Meat and Livestock

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Australia will supplement both studies with a further \$60,000 for each project.

In Australia there are more than 31 million beef and dairy cattle, 85 million sheep and three million farmed goats belching methane into the atmosphere as food is digested in the rumen. It is estimated that each cow could produce greenhouse gas emissions equivalent to around 1.5 tonnes of carbon dioxide per year. The goal of these projects is to reduce the output of emissions while maintaining quality and productivity in Australian livestock production.

### Mitigating nitrous oxide emissions from soils

Soil Scientist at DPI's Tamworth Agricultural Institute, Dr Graeme Schwenke (right) will lead a research project to investigate options for mitigating nitrous oxide emissions from cropping soils in North-West NSW. The project will receive \$400,000 in funding from GRDC.



Use of fertiliser N in the agricultural sector accounts for 32% of N<sub>2</sub>O emissions or 5.2 Mt CO<sub>2</sub>-e per year. Of the 1 million tonnes of fertiliser N used annually in this sector, approximately 70% is applied to cereals.

Graeme's project proposes to mitigate emissions in cereal production systems of the North-West slopes and plains, through (i) partial substitution of fertiliser N inputs with biologically-fixed legume N, (ii) increasing nitrogen use efficiency (NUE) through strategic location of crop rows in relation to N fertiliser and prior crop residues using precision guidance technology, and (iii) modelling and development of effective extension packages for farmers. We also aim to develop real-world multiplier factors to replace IPCC default values used in calculating GHG emissions from fertiliser and legume use.

The experimental strategies will result in reduced inputs of fertiliser N, with direct consequences for both on-farm and off-farm emissions, as well as

economic benefits for farmers through reduced input costs and more efficient production systems. The cost of fertiliser N to farmers more than doubled in 2008. Graeme aims to model project outcomes and develop effective management tools that farmers can use at the paddock level to mitigate their emissions whilst maintaining farm productivity.

### Welcome to new PhD student Christine Kainyu

Kenyan forestry researcher, Christine Kainyu arrived at UNE with husband Martin and their young daughter Michelle in early March 2009. She will join the PIIC Soil Carbon Research Group. Christine's research program is supported by a Ford Foundation international fellowship. Her PhD studies will involve modelling the impact of on-farm management alternatives and land-use changes, on Soil Organic Carbon (SOC) sequestration. She intends to make use reflectance technology, remote sensing and GIS software in her studies.



**Christine Kainyu (above left) discusses research on soil amendments to improve soil health with farmers at Coonamble.**

Christine has been a Research Scientist (Soils) at the Kenya Forestry Research Institute since 2004. She has also carried out private consultancies to farm forestry projects, large scale private farms and for biofuel production on mining reserve land in rehabilitated quarries and on-farm soil diagnostic studies.

In addition to her extensive experience in forestry, Christine has worked with cropping systems, the subject of her Mphil thesis was 'The influence of

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'MBILI' and conventional (maize-legume) intercropping systems on nutrient uptake, yield and rooting characteristics of intercrops in Western Kenya'. Her BSc dissertation was on 'Responses of *Crotalaria grahamiana*, *Tephrosia vogelii* and beans to direct application of Minjingu Rock Phosphate for improved and sustained production in Western Kenya'.

No time was wasted in Christine's introduction to on-farm soil carbon management. Within a week of her arrival at UNE, she travelled to Coonamble with Heiko Daniel and Bob Martin to a farmer field day on Ray and Anne William's property 'Magomadine'. Anne, also a PIIC post graduate student, is studying 'Biological indicators and potential amendments to improve soil health, crop productivity and profitability for cropping soils in central western NSW'.

Christine's PhD supervisors will be Professor Heiko Daniel and Dr. Peter Lockwood from UNE, and Dr. Brian Wilson from DECC. Christine is located in the Agronomy and Soil Science Building and can be contacted by phone on 6773 3963 and email on [cwalela@une.edu.au](mailto:cwalela@une.edu.au).

### Welcome to new PhD student Nazma Begum

Nazma Begum (right), husband Md Khaled Nasimul Bari and son Ahnaf Intesar Bari also arrived at UNE in March. Nazma's project title is "Impact of pulse legumes on nitrous oxide emissions and cereal row placement on N recovery". Her supervisors are Dr Chris Guppy, Agronomy and Soil Science UNE and Dr Graeme Schwenke, NSW DPI Tamworth Agricultural Institute.



Nazma holds a Master of Science degree in Nematology from the University of Gent, Belgium. The title of her thesis was "Activation of transcription during hatching of *Globodera rostochiensis* and *Globodera pallida* after exposure to potato root diffusates from plants of

different ages". Nazma also has a Master of Science degree in International Horticulture from the University of Hanover. The title of her thesis was: "Genotypic differences in nitrogen use efficiency in maize (*Zea mays*) in relation to leaf senescence".

Nazma is located in the Agronomy and Soil Science Building and can be contacted by phone on 6773 3963 and email on [nbegum2@une.edu.au](mailto:nbegum2@une.edu.au).

### "Mustering Moisture"

**No-till farmers Nigel and Haydon Wass – 'The Plains', Nyngan**

A PIIC initiative, the book "Mustering Moisture: the Practice of No-till Farming in Australia" contains twelve case studies of farm families who have overcome a variety of obstacles and who have successfully adopted no-tillage and conservation farming innovations. These moisture-saving practices are not only critical for profitable crop production in a variable climate but are highly effective strategies for adaptation to climate change. "Mustering Moisture" is on sale at \$35 through the NSW DPI book shop (1800 028 374).



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