

InFoST August 2017 Edition

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A Message from the Executive Dean

The FoST year is now well into second semester and we are gearing up for Open Day (27 August) as our major marketing event. This year we add Berwick to the menu and thus are presenting at 3 campuses simultaneously, which will stretch staff resources but promises to build our brand in the growing southeast of Melbourne.

As a Faculty, we offer a range of programs which are proving attractive in the Berwick region including Information Technology, Veterinary and Wildlife Science and Environment and we will introduce Biomedical Science and the Engineering/IT fusion degree, Mechatronics from 2018. The strong industry focus in food processing and medical engineering in the southeast suburbs augers well for industry alignment with these degrees and we are already seeking partners for work integrated learning and teaching involvement. I will attend the Berwick Open Day in the morning before heading to Gippsland for an afternoon visit.

It has been a year of awards and acknowledgement with our new IT degree already recognised through the ACS digital disruptors award for the leader of the development of our new IT degree, Richard Dazeley. The ACS have now nominated Richard for the SEARCC International IT Educator of the Year award. Meanwhile we are in the finalists for the AFR Higher Education Awards in the Industry Engagement section for our relationship with IBM for over 20 years and the very successful co-development of the IT Professional Practice degree. IBM's recent recommitment to this degree and their generous scholarship of over 35,000 to each student is a landmark of this University's productive relationships not just with IBM but with all our industry partners.

The Faculty's national presence will grow further in a couple of months when the FedUni Brisbane campus opens and offers our Master of Technology program to international students. This is the culmination of 3 years' work and student interest is already strong in this new destination. The addition of Berwick and Brisbane as international locations is indicative of the Faculty's commitment to international students, which is also illustrated by our growing teaching presence in China and the regular arrival of students from partner universities at our Australian campuses. I will visit our Chinese university partners in September, concentrating on the Southern part of the country in this year's trip to welcome first year students to our programs.

Our research efforts are also bearing fruit with new collaborations and relationships being forged and new sources of funding tapped. Savin Chand's efforts in modelling hurricane generation in the Pacific under the effects of climate change have led to some productive collaborations with CSIRO and the Bureau of Meteorology. Of course, we also report in this issue on ET's success with an ARC Linkage grant, which is particularly pleasing.

Finally, I would like to record my personal thanks to Rae MacKay who has left us for a critical role as Latrobe Valley Mine Rehabilitation Commissioner. Rae has been central to developing our new support structures for research and analyzing our research effort at all levels of the Faculty. I have been more than grateful for his advice, assistance and avuncular presence for chats and reflections over many a coffee. Thanks and Good Luck, Rae.

Professor Mark Sandeman, Executive Dean, Faculty of Science and Technology

You can submit your article to InFoST by emailing l.musgrove@federation.edu.au. All articles, profiles and reports are welcome.

Retirements, Resignations and Replacements

May and June were big months for retirements and resignations, with the loss of Mani Naiker, Wendy Cloke, Tad Glogiewicz and Rae Mackay, and of course a warm welcome to Ben Long as Mani's replacement, who commenced 1 May.

Mani Naiker

Mani has been with us for 5 years and in that time has done a sterling job coordinating our chemistry teaching, especially in the food chemistry area. He has also assisted with the brewing courses from time to time and opened the Brewery in Pete's absence, all essential and welcome contributions to our staff and student welfare. Mani is off to warmer climes north of Brisbane to help ACU with their teaching pedagogies and develop a suitable Queensland lifestyle with his young family. We wish him all the best and are sure that his new job will be just as interesting, although the lack of a brewing facility may become an issue!

Wendy Cloke

Wendy has been a stalwart of the environmental sciences team for many years and has delivered pracs, plants and precision for the whole Faculty, and in fact the University, for most of that period. Of note was her role in maintaining the Rainforest Garden (Graeme Ambrose Memorial Garden) plus two other gardens near S building, as well as her assistance in the design and maintenance of the glasshouses, her input into the design of our new science and engineering building and her meticulous record keeping for all equipment and supplies within her ambit. If you wanted something, Wendy would know where it was- or more importantly, who had it! We will certainly miss Wendy but she deserves a break and we wish her all the best for her retirement.

Tad Glogiewicz

Tad is another with a long sentence and whose experience has been invaluable to the Faculty for the whole period. As an electronics and electrical technician, he has in fact kept a fair bit of what we do running. His devices have protected sensitive equipment from power drop outs and surges, he has repaired equipment that we could not replace or commercially repair but still needed, and has also produced new equipment including building an atomic force microscope from a kit! His skills will be sorely missed even in these days of plug-and-play. In fact, Tad's skills may well be required again and thus we may have to call for him on occasion, with suitable recompense for disturbing his retirement. All the best Tad, and thanks for all your skill, humour and can-do approach to anything we threw at you.

Farewell Rae Mackay

After six years at the Gippsland Campus, Rae Mackay stepped down as Associate Dean, Research and Director of GHERG.

The entire faculty congratulates Rae on his significant contributions and achievements within both of these roles, which include establishing GHERG as the premier geotechnical research organisation in Victoria and amongst the best in Australia.

The legacy of Rae's time in the position of Associate Dean, Research has been the development of productive research teams, positive changes in research output and the reformation of research structures and support networks to cultivate an environment which encourages and nurtures a high standard of research.

Rae will now be applying his years of experience as a practising engineer, hydrogeologist and academic to the position of the first Latrobe Valley Mine Rehabilitation Commissioner. Appointed by the Victorian Government, this position will involve Rae advising the Government on mine rehabilitation and the development of the Latrobe Valley Regional Rehabilitation Strategy.

Amongst those to congratulate Rae on this appointment was Federation University Australia Vice-Chancellor Helen Bartlett, saying that Rae's appointment to this high-level position was a reflection of the high quality of researchers working at Federation University.

"Rae was a leading academic and researcher at our Gippsland Campus for many years. He will bring invaluable industry expertise as well as local knowledge to this influential new position," Professor Bartlett said.

FoST staff join with Professor Bartlett and all of Rae's colleagues, both internal and external, in wishing Rae all the best in his new position.

Dr Ben Long, Lecturer, Chemistry



Last but not least, Ben Long joins us to take on Mani's responsibilities. Ben hails from Deakin, where he has been lecturing, researching molecular bonding and looking for a more permanent position not too far away. He has now achieved the latter and we hope he will continue to do the former with the skill and enthusiasm already

in evidence at Deakin. Notably, he has a weekly slot on Ballarat radio explaining science to the masses which he is now doing from the local Uni, and we hope that he works in some good references to his new home and its wonderful science and technology programs! We welcome Ben and look forward to hearing more about his research and helping him develop his collaborations in teaching and research across the Faculty.

Graduate Certificate in Tertiary Teaching

Congratulations to Jo-Ann Larkins, Kim Dowling, Julien Ugon and Yutang Wang, who all recently received their Graduate Certificate in Tertiary Teaching.

Andrew Barton appointed to Editorial Board of Journal of Water and Climate Change



It has recently been confirmed that Associate Professor Andrew Barton has been appointed as a full member of the Editorial Board for the prestigious Journal of Water and Climate Change (see <http://jwcc.iwaponline.com/>).

The journal is published by the International Water Association based in London and is recognised as the pinnacle for dissemination of knowledge and practice in sustainable water management. This appointment is not only fantastic recognition of Andrew's standing as an engineering researcher but also reflects well on the University's credentials in water and climate change research.

We congratulate Andrew and recognise that achievements like this help to further enhance the reputation of the School as a University leader in research performance.

University leading the field in metallurgy science

Secondary school students now have the opportunity to experience hands-on, real industry metallurgy science through a ground-breaking new program run by Earth Ed and Federation University Australia.

Recent co-operation led to the development of a four-hour program for Year 10 students about mining, geology and metallurgy.

The first offering of the program to students and teachers focused on the importance of minerals and metals to our everyday lives.

"Using metallic copper as an example, students were introduced to how the metal is won, from discovery of ores, to mining, processing and electrowinning stages, and then finally to the metal in end-use applications," Larissa Koroznikova, the University's lecturer in Metallurgy, said.

"Using equipment in the Earth Ed laboratory, students were able to experience real life metallurgy processes via a variety of chemical reactions, and science and engineering activities related to the world of producing materials they use in their homes, phones and computers.

"The aim is to provide regional students currently undertaking Year 10 with the opportunity to discover the diverse range of careers, education pathways, and employment available across Australia, with a focus on metallurgy."

Earth Ed works on developing partnerships with industry and their various associations, such as the Australian Institute of Minerals and Metallurgy (AusIMM).

"Earth Ed is also building relationships with University Science and Engineering Schools and have formed one with the University's Geology Department," Ms Koroznikova said.

"Earth Ed is a network of six Victorian Science and Mathematics Specialist Centres which engage students and teachers across the state in contemporary, experiential science, technology, engineering and mathematics."

The Earth Ed Ballarat team at Olympic Avenue, Mount Clear, welcomes schools to engage in learning and teaching science in new and creative ways.

The team gives students the opportunity to access equipment and study areas unavailable in a standard classroom, while visiting teachers are exposed to new teaching techniques to take back to the classroom.

The program's aim is to have a positive effect on students, inspiring them to take up STEM studies and careers.

Earth Ed's primary programs start in Years 1 and 2 with a hands on play experience that teaches the kids about force and gravity.

"In later years they experience basic things about geology, chemistry, energy, and learn to appreciate why maths is important in all things technological," Ms Koroznikova said.

Ean Ooi receives ARC Linkage Grant

Hearty congratulations to Dr Ean Ooi (ET) on his involvement in a successful ARC Linkage Grant application.

ET has partnered with UNSW, Melbourne Water Corporation, The Murray Darling Basin Authority, Goulburn-Murray Rural Water Corporation and Sunwater Limited to win a \$350,000 grant to study Seismic Analysis of Cracking and Deformations in Concrete Gravity Dams.

This is a great acknowledgement of the quality of ET's work and further enhances our national reputation in Civil Engineering research.

FoST Engagement 2017

The Faculty's Science, Technology, Engineering and Maths (STEM) Engagement and Outreach staff have been kept busy this year, delivering a range of teaching, learning and engagement activities for secondary school teachers and students.

Collaboration with various bodies has resulted in hosting Mathematics Association of Victoria professional development for teachers, facilitating chemistry and biology workshops for VCE students and holding a very successful *Day of Physics and Chemistry*.

A highlight has been welcoming Sir Martyn Poliakoff from the University of Nottingham to our Gippsland and Mt Helen campuses. He talked to captivated students about how his childhood interest in science catapulted to his well-known research in green and sustainable chemistry. Famed for his rather distinctive hair Sir Martyn also takes his chemistry enthusiasm to [YouTube!](#)



Sir Martyn Poliakoff explores his first scientific observation, made as a young child growing up in the UK

The Hartung Youth Lecture is held each year and is supported by the Royal Australian Chemical Institute. Vallarat schooled Dr Jodie Bradby of ANU was our Australian Institute of Physics guest speaker for this year and enthralled her audience with tales of high pressure work with diamonds.

Maths is the theme for Terms 3 and 4 for Years 7-9 students and plans are underway for the annual 3 day event – the ConocoPhillips Science Experience held every September on both campuses.

The Faculty is pleased to welcome schools from Berwick and surrounds, and is developing plans to deliver selected activities on the Berwick campus.



School students Jeremy Coad and Jeremy Klauber from St Patrick's College enjoy a chat with Sir Martyn Poliakoff after his presentation

FoST major contribution to successful Year 10 experience day

FoST made a major contribution to inspiring young minds to pursue an exciting career in STEM at the two-day Year 10 Experience organised by the FedUni Marketing Team at the end of May.

Approximately 730 year 10 students representing 14 different schools from Ballarat and western Victoria attended the two-day event for two hours each.

All faculties offered interactive events with at least 12 available, from which students selected 3 or 4 to attend within a 60 minute period.

FoST provided six different activities for students to choose from over the two days, with 15 staff members and 28 postgraduate and undergraduate students volunteering between one hour and 2 days to run FoST activities.

The FoST contribution was highly significant and very well received by students. At any one time:

- 32% of the students on campus chose to visit the virtual reality activity and attempt to rescue the stranded kitten from a very precarious predicament.
- Although maximum capacity was 6-10 students at a time, 21% of students chose to visit at least one, and mostly two, of the three engineering activities on offer.
- Biological sciences were popular with 32% of students on campus selecting to spend time exploring life under the microscope.
- A treasure hunt through the rock, fossil and mineral collection attracted 34% of students.

We hope that their brief encounter with FoST was sufficient to inspire these students to visit us again to find out more about this amazing, generous, active, fascinating and diverse faculty.

Work Experience Report by Nina, Year 10

During my week at FedUni I got to see what goes on in the Science faculty, and the large diversity of courses that the university offers to students in the science field.

On my first day I met Nimesha who showed me her research on invasive plant species in Lake Wendouree, done out in the greenhouse as well as in the lab.



Nimesha checks the growth of Lake Wendouree plants under controlled conditions

I assisted with these experiments, before I went to meet another ecologist, Penny. She is an expert on Collembola, a small type of bug. I was amazed at her ability to identify these tiny bugs with one glance under a microscope. I assisted Penny in the lab as well, watching the processes that are needed for scientific research.

On my second day, the Outreach program for high school students was on. Over 400 students were there, and I had to help give tours of the Y Building, where all of the labs were. Two guest speakers came in, one was Martyn Poliakoff, who is a chemist specialising in Photochemistry, and Jodie Bradby, who is a physicist who uses diamonds to test other materials. Their talks were really interesting, giving insight on pathways to becoming a scientist.

Later that day I met Mark and Scott, who teach Biomedicine, Ben, who teaches Chemistry, and Kamal, who teaches food science. I learned about different pathways into careers in science and how diverse science really is.

My two days at FoST were the highlight of my time on Work Experience and I really got to know what careers a love for science can lead to. Thanks to all at FoST who made these exciting days possible!

Hebei University of Science and Technology Joint Program Students Study Tour

From 12-21 July 2017 Federation University Australia was visited by 26 students and 2 staff members involved in the environmental science joint program at Hebei University of Science and Technology (HUST).



During their 10 day stay, Dr Simon Cook organised many interesting activities, giving students the opportunity to experience our lectures, laboratory sessions and Australian landscape and culture.

Starting in 2015, this joint program was approved by the Chinese Ministry of Education and had 88 and 96 students in 2015 and 2016 intakes respectively. Four courses have already been taught, with students doing very well.

Students in this program may complete the degree in 4 years at HUST, or 2+2 (2 years at HUST and 2 years at FedUni) or 3+1 (3 years at HUST and 1 year at FedUni). Three students will come to study with us for 2 years from Semester 2, 2017, with more students expected in 2018 and future years.

Many people have contributed to the success of the study tour and their effort is much appreciated.

FoST Student Awards Ceremonies

FoST hosted its 2017 Student Awards Ceremonies in Gippsland on 27 June and Mt Helen on 30 June, in recognition of outstanding student leadership, community engagement and involvement, and academic achievements.

Students from the School of Engineering and Information Technology, and the School of Applied and Biomedical Science were eligible for awards, with a total of 57 awards presented to 84 recipients from the Gippsland and Mt Helen campuses.

Special awards presented included the Pitman Benjamin Prize for Engineering Sustainability, the A.E.Stohr Medal Award, the Clarence Claude Fisher Award and awarded for the first time in 2017, the FoST Student Engagement Award, generously provided by the Deputy Vice-Chancellor (Engagement).

Industry sponsors included Telstra, IBM Australia, AGL Loy Yang, MMG Maintenance, Hydro Australia, AusIMM, Australian Steel Institute, ASIC and SAGE Technology, Engineers Australia, Australian Paper and VicRoads.

FoST is extremely grateful for the continuing support of industry sponsors, and their contributions toward recognising the achievements of the extremely talented students within the Faculty.



AGL Loy Yang Engineering Scholarship recipient Thomas O'Sullivan pictured with Paul Barrand of AGL (left)



Executive Dean's Award: Jessica Kelly



Academic Excellence in a First Year Applied & Biomedical Science program recipient Jessica Rosseland



True Foods Industry Award in Food & Nutritional Science recipient Edward Allen

Congratulations to all award recipients, with best wishes for their future studies and endeavours within their chosen fields.

The big ecological roles of small natural features

Ecologists and conservationists have long recognised that keystone species have major ecological importance disproportionate to their abundance or size. Think mistletoes, cassowaries and dingoes- species that keep an ecosystem balanced.

Similarly across landscapes the keystone concept of disproportionate importance extends to other ecological elements, such as salt marshes in estuaries and fire.

Now an international group of researchers, including FoST's Dr Grant Palmer, is exploring the disproportionate ecological importance of small natural features- unique environmental elements that provide significant ecological and economic impacts.

Riparian zones. Large old trees. Desert springs. Caves harbouring bat colonies. Rocky outcrops. Strips of natural vegetation edging agricultural fields. Small coral heads. Tiny islands.

These small natural features are often overlooked, relatively vulnerable yet environmentally mighty in their ecosystem. They also are at the opposite end of the spatial scale from the Earth's large conservation superstars- the Great Barrier Reef, the Serengeti, the Amazon and Yellowstone. Small natural features have big ecological roles, according to the 37 researchers from 11 countries writing in a Special Issue of the leading international journal in the discipline of conservation biology *Biological Conservation*. Sometimes they can provide resources that limit key populations or processes that influence a much larger area. Sometimes they support unusual diversity, abundance or productivity.

They also are small enough to efficiently maintain or restore, while traditional land-use activities continue in close proximity, such as forestry, fishing and grazing.



"Small natural features are an example of what can be termed 'The Frodo Effect,'" writes Malcolm Hunter, University of Maine Professor of Wildlife Resources and Libra Professor of Conservation Biology, in the journal introduction.

"In the 'Lord of the Rings,' the small and unassuming hobbit Frodo has more strength than any of his larger peers and saves Middle Earth with his brave actions," says Hunter.

“Gandalf and the rest of the fellowship of the ring go to great ends to protect him, because they know this.”

The July issue of *Biological Conservation* includes three synthetic reviews on small natural features and nine case studies. For each of the case studies, the authors explore three fundamental questions: Why are some small natural features far more important for maintaining biodiversity or providing ecosystem services than their size would indicate? What are the management challenges facing these features and what are some innovative approaches to conserving them?



“The importance of some of these small natural features, such as riparian zones, has long been recognised,” says Dr Grant Palmer, who co-authored the case study *Integrative conservation of riparian zones*, with collaborators from France, USA, Switzerland, Canada, Italy and Sweden. “In other cases, our recognition of their role is just emerging, such as caves that harbour large bat colonies known to effect widespread control of insect pests. We are also learning much more about the ecological significance of ephemeral features like temporary streams and pools that are dry much of the time but ‘blossom’ during limited periods.”

Recognitions and management of SNFs (small natural features) can be an efficient way to conserve biodiversity and ecosystem services. Most small natural features are defined physically, especially the presence of water or rocks. But some are biological entities. For example, trees large enough to harbour hollows and deep cracks in their bark provide a microhabitat for many species that cannot live on smaller trees.

The size of these natural features provide novel opportunities to conserve them. While small natural features are often underappreciated, undocumented, vulnerable to degradation and risk of destruction, they also can involve small-scale, cost-effective protection and be easier to restore.

“Ultimately, conservation of SNFs should be complementary to traditional forms of conservation by developing creative, constructive efforts that address previously unknown or underappreciated roles of some seemingly minor features – roles that may be critical in the function of their broader ecosystems and the fate of biodiversity,” the researchers write.

Asset Management Networking Seminar at Gippsland Campus

An Asset Management seminar organised by Federation University in conjunction with Engineers Australia Gippsland Regional Group was held on 23 May at the Gippsland Campus of Federation University. More than 30 delegates from industry, professional bodies and FedUni attended the event and feedback received from delegates was outstanding.



Dr Gopinath Chattopadhyay, Post Graduate Program Coordinator for the Maintenance and Reliability Engineering Program at Federation University, welcomed delegates, introduced presenters and facilitated the panel session. Ray Beebe, former Lecturer of Condition Monitoring, presented a session on case studies ‘Must Condition Monitoring of Plant be a costly activity?’.



Harry Koller, Director of KPMG, also presented on ‘Megatrends and IoT in asset management’ and Tom Carpenter, Chief Executive Officer & Director, IQ-AM Pty Ltd, presented on ‘Asset Management Maturity: An Introduction to the AM Council’s maturity assessment tool.’ Panel sessions and discussion during the professional networking added further value for the delegates.

At the closing of the event Dr Gopinath Chattopadhyay thanked:

- The University for providing the venue and sponsoring the event, University staff including Annette O’Shea, Marketing and IT support teams for their valuable contribution.

- All presenters and professional societies including IPWEA, Risk Engineering Society and Engineer's Australia, Gippsland Group including Brendan Wilkinson and Ian Newnham for their kind support in promoting this event.
- All delegates and supporting industries were thanked for attending and their valuable contribution during question and answer sections and panel discussion. Gopi also thanked many others who helped to make this event a great success. It was achieved through outstanding teamwork from the University, professional bodies, industry and wider communities.

Impact Ecology Research Group Regional Research Forums

The Impact Ecology Research Group (FoST) recently held Regional Research Forums in Gippsland (20 June) and Ballarat (17 July). The events were attended by representatives of DELWP, catchment management and water authorities, forestry, mining industry, environmental consultancies, local government and environment groups.



The forums provided an opportunity to showcase the research capacity that Federation University has across both campuses in the areas of biodiversity conservation, disturbance and restoration ecology, sustainable waste management, water systems management, archaeology and cultural heritage and data visualisation. Afternoon roundtable sessions were handed over to the stakeholders, who discussed gaps in knowledge and priorities for future research. Discussions ranged from impact of deer, to management of legacy mine sites and processing of waste from dairy farms.

The Impact Ecology Research Group are planning targeted workshops on common areas of interest in future months.

For further information, please contact Assoc Prof Singarayer Florentine (s.florentine@federation.edu.au) or Dr Jess Reeves (j.reeves@federation.edu.au).

Outcome of 2016 CRN funding

As an outcome of the CRN (Collaborative Research Network) funding of \$5,000 given to Joarder Kamruzzaman and Gour Karmakar in 2016, they were able to complete part of their research works, which has now been accepted for

publication in the IEEE Communications Surveys and Tutorials, a computer science journal with an impact factor of 17.188. This journal has been the highest ranking journal in the computer science domain consistently for the last three years and one of the only two journals in CS domain that has an impact factor above 10. Publication in this high impact outlet is great publicity for Federation University.



The funding helped to support one of the co-authors, a former PhD student Rakib Hassan, to work further on this paper. Professor Bala Srinivasan from Monash University was a partner in this CRN funding, and CRN funding through both universities has been acknowledged in the paper.

Congratulations to Joarder, Gour and Rabik. A well-deserved recognition of the high quality research works you have all been carrying out.

Steve Wilcox elected Fellow of Engineers Australia

Engineers Australia is Australia's main engineering association, which represents over 100,000 engineering professionals across a range of specialisations and areas of expertise. The grade of Fellow with Engineers Australia is awarded to those who have displayed strong leadership within their industry and profession. Many congratulations to Steve on this well deserved achievement.



Professor Steve Wilcox, Discipline Head Engineering (Gippsland Campus) was elected a Fellow of Engineers Australia in June.