



## KEY CAPABILITIES 2017

# Sustainable Approaches to Environmental Waste

## FACULTY OF SCIENCE AND TECHNOLOGY

### KEY AREAS OF RESEARCH EXPERTISE:

- Assessment of water quality, heavy metal contaminants within sediments, nutrient fluxes, human health impacts;
- Dairy industry waste and domestic recycling;
- Domestic sewage re-use and recycling;
- Environmental Impact Assessments;
- Ecology of native vegetation and weed management;
- Microbiology;
- Optimization; and
- Sustainable resource management.

### OTHER RESEARCH CAPABILITIES:

- The role and fate of micro-pollutants, (pharmaceuticals and illicit drugs)
- Microbial population dynamics in the natural and built environment
- Bioremediation of persistent chemicals
- Energy recovery and the use of biosolids as a fuel source
- Analysis and treatment of nutrient-rich material for use as fertilizer or other fit-for-purpose uses

Federation University Australia, through its Faculty of Science and Technology is contributing to the challenge of meeting today's needs and requirements without compromising these opportunities in the future – by researching and teaching in the areas of environment, sustainability and natural resource management, and microbiology.

An important part of this work is building a strong profile in sustainable approaches to environmental waste management. Over the past ten years, the University has attracted significant amounts of external research grant funding both through national competitive grant schemes and working directly with industry partners to develop these fields.

Collaborative, multi-disciplinary research has been fostered between leaders in the areas of microbiology, bioenergy, sustainable practices, resource optimization and a range of specialized topics in relation to waste management, waste to energy and site remediation. In addition, strong research and development links have been forged with a number of Federal government agencies, and there is potential for collaboration and support from these sources.

In 2014, the Faculty of Science and Technology completed a major infrastructure upgrade with the Mt Helen Campus (Ballarat) with the commissioning of a new science complex housing state of the art research and analytical facilities. In addition, the Gippsland Campus (Churchill) has recently commissioned a \$2.4 million analytical facility, tailored to investigate the nature of complex materials at the molecular level (e.g. speciation of metals, ultra-trace organic analysis).





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## RESEARCH CENTRES AND TESTING LABS

- Centre for Environmental Management

## A SAMPLE OF CURRENT PROJECTS:

- Assessing the utilization of urban green waste and other forms of carbon (sugar/molasses) for weed control and long term reductions in soil nitrification to reduce weed dominance and improve competitiveness of indigenous species in grasslands.
- The use of green waste and other forms of carbon to control weed seed banks and reduce soil fertility through compost heat combustion and microbial activity for fast remediation of fertilized weedy pastures. Hydrothermal dewatering of biosolids to sterilise, enhance dewatering, removal of functional groups, and soluble metals all focussed on preparing a better fuel or carbon feedstock.
- The use of anaerobic digestion to process waste to energy and soil amendments. Dairy industry waste and domestic and Industrial effluents have all been included.
- Microbial dynamics of combined AD/MBR waste water treatment plant (GWF).

## ORGANISATIONAL PRACTICE

- Federation University Australia is an organisation committed to reducing its carbon footprint through sustainable waste practices and energy conservation.
- Since 2008, the University has reduced waste to landfill by 50%. In the period January to June 2014, University landfill waste decreased by 38%. The University currently recycles 39% of all waste.
- FedUni is 15 tonnes below the 2015 target of 424 tonnes of waste to landfill per annum.
- Greenhouse Gas Emissions have reduced by over 20% between 2013 and 2016 including a reduction of electricity consumption by 17% and fuel consumption by 19%. Paper consumption has also reduced by 36%.

## RESEARCH CENTRES AND TESTING LABS

- Impact Ecology Research Group
- Advanced Industrial Analytics Labs
- Seed Ecology Lab

## TEACHING EXPERTISE

### Course

Analytical Methods

Applied Geochemistry

Chemistry of the Environment

Ecosystems Conservation and Management

Environmental Microbiology

Hydrology

Land and Water Contamination Landscape

Evolution

Modelling the Environment

Molecular Biology & Biotechnology

Sedimentology

Sedimentology and Stratigraphy

Sustainable Earth

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