COLLABORATIVE RESEARCH NETWORK

SELF-SUSTAINING REGIONS RESEARCH AND INNOVATION INITIATIVE (CRN-SRRI)

Introduction

Regional areas in Australia face significant challenges. Changes in the environmental and economic structures of regions have transformed agriculture, undermined manufacturing and altered the social fabric of regional communities. Such changes have direct socio-economic consequences resulting in poor health outcomes; demographic change associated with selective outward migration of the young, skilled and educated; and increasing social disconnectedness. The net effect is a reduced state of social, economic and environmental "well-being" that undermines the resilience and sustainability of regional communities.

The impact of such forces on regional landscapes, regional industries and economies, and regional community well-being requires holistic, collaborative research that investigates:

- the optimisation of systems and processes to revitalise regional industry, manufacturing, health systems and related service delivery;
- the influence of environmental change on regional landscape use and enterprise; and
- the causes and consequences of social and educational disconnectedness and poor health in regional communities.

The University of Ballarat (UB), in partnership with Monash University (MU), The University of Melbourne (UoM), Deakin University (DU), will build an alliance of research excellence in the disciplines of regional landscape change; regional social and educational connectedness and health; and regional information use and systems optimisation. The ***Self-sustaining Regions Research and Innovation Initiative*** will explore new ways of strengthening regional “well-being” and driving regional rejuvenation.

The project comprises three major elements: Regional Science and Technology Innovation; Regional Landscape Change; and Regional Social and Educational Connectedness and Health Innovation.

These components will be integrated to focus on regional change drivers, impacts and solutions. Strategic collaborations for each element of the project will promote specialisation and develop capability in areas of current and emerging research strengths. This is in accord with UB’s mission to produce world-class research in support of renewal and innovation in regional Australia.

UB, on behalf of partner institutions, was awarded $6 million over three years in CRN funding to establish the ***Self-sustaining Regions Research and Innovation Initiative*** network. The CRN Initiative will employ 12 Postdoctoral Research Fellows initially for three years to work on jointly supervised projects within the CRN Elements. Six Fellows will be primarily located at UB and another six will be primarily located in partner institutions (DU, MU and UofM), two each at our partner institutions. However it is expected that Fellows will travel and use facilities across the CRN network.

In addition to these fellowships, UB is offering a number of Emeritus Professor Robert HT Smith University of Ballarat Postdoctoral Fellowships, and Higher Degree by Research scholarships for projects broadly related to the CRN Initiative.

Potential CRN Postdoctoral/Research Fellowships - Project Descriptions

The CRN is seeking applications from eligible, high-calibre candidates for Post-Doctoral/ Research Fellows to work on CRN-related projects. The following is an indicative but not exhaustive list of potential projects that may be supported by the CRN. It should not be assumed that all listed projects will be funded. Suggestions for other projects that broadly fit into one the three CRN Elements are also welcome. Other projects (not listed here) may also be considered for funding either by the *CRN-SRRI* or by the *Inaugural Emeritus Professor Robert HT Smith Post Doctoral Research Fellowship Scheme*

Element 1. Regional Science and Technological Innovation (through Information Analysis and Optimization of Systems and Technology)
Element Leader: Professor David Gao (UB)

1.1 Project: Metamodelling and Optimisation

UB Staff: *Professor David Gao (UB)*
CRN Partner Staff: *Professor Peter Hodgson and Professor Saeid Nahavandi (DU).*

Brief Description: Deakin University's event simulation-based meta-modelling capability, coupled with Ballarat University's optimisation knowhow will address systems optimisation and simulation challenges to provide solutions to regional decision-makers. This project aims to make low cost, decision support tools available to SMEs and other regional organisations. Regional industry faces challenging problems from the minimisation of inventory costs, to demand forecasting and adjustment, matching sales to capacity, production planning, and scheduling and environmental impact. The research challenge is in accurate estimation, time series prediction and the integration of effective optimisation methods. Such problems in most real world applications are large scale and they may involve nonsmooth nonconvex functions. In addition, they may involve dynamic components such as predicting and responding to variations in demand, or in the pricing and availability of supplies. The broad objective of this project is to develop and implement new methods which can be applied to such problems.

Time Frame: 3 years.

1.2 Project: FEA optimisation + Visualisation
UB Staff: *Professor David Gao (UB)*
CRN Partner Staff: *Professor Saeid Nahavandi and Professor Peter Hodgson (DU).*

Brief Description: The study of constitutive laws and physical behaviours of advanced materials, from organs and skin to nano surfaces, needs to consider non-smoothness and multi-scale effects. Modelling, design, and simulation of these advanced material must deal with nonconvexity and large-scale deformation, which produce fundamental challenging problems in both theoretical analysis and scientific computations. Nonconvex / nonsmooth mechanics is a rapidly developing, multi-disciplinary field of research, embracing modern mechanics, mathematical analysis, material science, geomechanics, and scientific computation. The main aims of this program are to model complicated materials with reasonable constitutive laws, to study multi-scale and large deformation phenomena of modern materials/devices, to develop a unified methodology, theory, algorithms, and the associated finite element methods and software for solving large-scale nonconvex / nonsmooth finite deformation mechanics problems with extensive applications for vehicle light weighting. This will be coupled with advanced visualisation for effective communication and analysis.

Time Frame: 3 years.

1.3 Project: Modelling and Optimisation of Complex Systems with Applications to Machine Learning, Information Technology, Revitalise Regional Industry, and Manufacturing
UB Staff: *Professor David Gao, Professor John Yearwood and Professor Peter Gell (UB).*
CRN Partner Staff: *Professor Mark Wallace and Professor Kate Smith-Miles (MU).*

Brief Description: Research of complex systems is a multidisciplinary field of science and engineering. It studies the modelling, analysis, simulation, optimization, and control of multi/large-scale systems in nature, society, engineering, and science. More specifically, it is a framework by which one can analyze and/or describe any group of objects that work in concert to produce some result. This could be a single organism, an organization or society, an economy, bio-electro-mechanical or informational artefacts, communication and transportation, networks, artificial intelligence frameworks, industrial systems, energy generation and distribution, water distribution systems, ecosystems, health delivery, safety and security systems, manufacturing processes, minerals exploration and minerals exploitation, etc. Due to the complexity of the systems, theoretical and computational studies and simulation will play a fundamental analytical role. Deakin University's meta-modelling capability, coupled with Ballarat University's global optimisation knowhow and Monash's combinatorial optimization and constraint-based optimisation expertise will address challenging problems in complex systems to provide solutions to regional decision-makers.
Ballarat –Methodology and theory for modelling and simulation of complex systems, Nonconvex /nonsmooth analysis and global optimization in large-scale systems. Information Analysis, Optimisation and Visualisation of Complex Systems, Machine Learning, Network Optimization, Scheduling.
Monash – Constraint-based Optimisation, Algorithms, Novel Control Architecture, Combinatorial Optimisation, Optimization and Control for Chaotic dynamic systems.
Deakin – Discrete event simulation based-meta-modelling. Outcomes: This project aims to make low cost, decision support tools available to SMEs and other regional organisations including industrial/manufacturing management, transportation, network communication, internet security, health systems, etc.

Time Frame: 3 years.

1.4 Project: Development of biodegradable/biocompatible green packaging from starch, chitosan and other natural biopolymers by harnessing 'Lotus Effect'
UB Staff: *Dr Benu Adhikari (UB)*
CRN Partner Staff: *Professor Qipeng Guo (DU).*

Brief Description: The purpose of this project is to develop a *predictable* hydrophobic surface architecture on hydrophilic starch/chitosan polymers through tailored molecular bridge created through appropriate surfactants. Polysaccharides such as starch, chitosan, cellulose and alginate are known to form flexible films which can be converted into 'stand alone' packaging. The green packaging developed from these polymers has the potentiality of replacing the ubiquitously polluting petroleum-based packaging. However, technologically the strong hydrophilicity and high water vapour transmission rates prevailing in these films have limited their application as stand-alone packaging materials. Professor Qipeng and Dr Adhikari will collaborate in this project to innovate the best way to bring desired hydrophobicity and water vapour resistance in films developed from these natural biopolymers. We will adapt the biomimicking procedure for this purpose. We will exploit 'Lotus Effect' commonly seen in aquatic plants such as lotus or colocasia. We will design plasticizer-surfactant complex that would act as a bridge between the hydrophilic polymer and hydrophobic nano-crystalline wax. The structure/function relationship in naturally occurring super-hydrophobic surfaces such as lotus and colocasia leaves are reasonably well understood now through the advent of nanotechnology. We will use/harness these insights to our advantage.

This project involves innovation in packaging technology which has the potential of transforming the entire packaging industry. The flexible packaging industry is worth $6 billon in Australia. The flexible packaging without any exceptions is derived from non-biodegradable petroleum sources. Due to their widespread use, the landfill sites are shrinking and pollution of land and water sources by the non-biodegradable packaging is already at critical stage. Because of this reason, this project will also constitute an important innovation in the CRN's Project Element 3: Regional Landscape Change as well. Outcomes: We will not only create a hydrophobic layer in bioplastics but also modify the glass transition temperature to bring about appropriate flexibility in the films for packaging/coating applications. This will revolutionise the applicability of amylose biopolymer in today's $40 billion flexible packaging market. When successfully implemented, the starch and chitosan both from naturally abundant sources will be used to manufacture flexible packaging films. This will value-add the agriculture products and utilise the waste (chitosan is derived from shells of crustaceans). This will boost the economy of primary producers and their primary industries which are involved in producing starch from various sources such as corn and chitosan from fish and crustacean waste. Specific outcomes include: Technology and underpinning science providing insights on interactions between plasticizer-surfactant, biopolymer-plasticizer/surfactant that are critical in developing stand alone packaging films from (starch, cellulose, alginate and chitosan) polymers; Off-the-shelf type (prototype) packaging derived from the above biopolymers with tailored hydrophobicity and water barrier properties; Strong scientific/technological capital to be used to successfully apply for Discovery and Linkage applications; Application of developed films or complexes in encapsulating bioactive materials used in pharmaceutical industries.

Time Frame: 3 years.

1.5 Project: Development of microencapsulation technologies for the delivery of unstable bioactive ingredients into food and beverage products

UB Staff: *Dr Benu Adhikari (UB)*

CRN Partner Staff: *Professor Colin Barrow (DU).*

Brief Description: Functional ingredients such as omega-3 oils, angiogenin, lactoferrin, vitamin E, vitamin C and many carotenoids require stabilisation to ensure their shelf-life in food and beverage products. Omega-3 oils are particularly challenging since they rapidly degrade to volatile aldehydes and ketones that have an "off" flavour even at low microgram levels. Spray-dried emulsion and complex coacervation are the two most widely used commercial technologies used to stabilise these ingredients for use in food and beverage applications. Both these technologies have limitations, particularly for omega-3 oil delivery. In this project we plan to combine the expertise of Professor Barrow in microencapsulation of omega-3 oils, particularly using complex coacervation, with Dr Adhikari's expertise in spray dried emulsion techniques and protein functionality to advance microencapsulation technology, using omega-3 oils as the model bioactive. The project has two core aims. These are: (1) To expand the use of complex coacervation beyond gelatine to other protein and carbohydrate shell materials. Gelatin will be substituted with soy protein, whey protein and amidated pectin as the cationic polymer. A range of anion polymers will be tested for their ability to form microencapsulated particles with the above cationic polymers, including polyphosphate, pectin, gum arabic and carrageenan. (2) To optimise the oil-water interfacial behaviour of omega-3 oils and their encapsulating shell materials to improve both complex coacervation and spray-dried emulsions processes. The appropriateness of proteins (whey protein isolate, soy protein or lentil proteins) for replacement of gelatin will be investigated from their comparative emulsion stabilising behaviour in oil-in-water interface and the surface charge of such emulsions. Outcomes: A variety of local and international companies have expressed interest in collaborating in the area of omega-3 stabilisation and delivery into food and beverages. These include ProGel (Queensland based alginate-based encapsulation start-up), Clover (Werribee based public omega-3 company interested in infant formula applications), ONC (ARC Linkage partner with Barrow interested in omega-3 in foods), Martek (Public omega-3 nutritional company recently purchased for $1.5B by DSM and interested in infant formula and foods), Fonterra (Large milk company interested in omega-3 in dairy applications) and Pepsi (Large multinational beverage and food company interested in omega-3 in semi-clear beverage applications). We anticipate that after the first year we will have enough preliminary results to file provisional patents and approach some of the above companies to establish collaborations toward both direct funding and ARC Linkage applications. Also, Dr Adhikari has ongoing research collaborations with Dairy Innovation Australia. As this project aims to use whey proteins, angiogenin and lactoferrin in quite new applications, this company would also be interested in outcomes from the current project. MG Nutritionals has also expressed interest in technology for the stabilisation and delivery of lactoferrin and so there is local commercial interest in applying these types of microencapsulation methods to ingredients other than omega-3 oils.

Time Frame: 3 years.

Element 2. Regional Social and Educational Connectedness and Health Innovation
Element Leader: Professor John Smyth (UB)

2.2 Project: What it means to be a young person in a regional community experiencing the effects of social and economic 'disadvantage'?

UB Staff: *Professor John Smyth, Professor Lawrie Angus, Dr Jenene Burke, Dr Nina Fotinatos, Tim Harrison (UB).*
Collaborating Researchers: *Professor Johanna Wyn, Director Centre for Youth Research, University of Melbourne*

Brief Description: There will be a strong focus on significant issues of youth engagement and social connectedness in two low-SES rural communities. This project also represents an important extension of the work of ADIEH researchers within the UB catchment region with a focus on two new low-SES communities, Beaufort and Ararat. It will link the research already conducted in the communities of Sebastopol, Delacombe and Wendouree West, with research in Horsham North. The project provides an opportunity for researchers from the Centre for Youth Research to extend their largely urban focus to include issues of rurality and regionality on the lives of young people.

The project will be a three year qualitative study of the lives of young people in the communities of Beaufort and Ararat with a focus on understanding how issues of youth engagement and social connectedness relate to important life situations for young people such as: educational engagement; perception of life chances; impacts on health and wellbeing. The study will be conducted using a qualitative social research approach positioned within the tradition of critical social theory. Methodologies such as critical ethnography will be used in the fieldwork and analysis. It is essential that the post-doctoral fellow appointment be made on the basis of someone with a strong commitment to, experience and expertise in, and a solid positioning within this methodological and theoretical context. The following research questions constitute and will drive the research objectives:

1. How do young people in regional areas designated as 'disadvantaged', experience and understand educational engagement/disengagement?
2. How do these young people envisage their educational lives and subsequent life chances, in relation to social connectedness within the communities in which they live?
3. What are the implications for young people's health and wellbeing in 'disadvantaged' regional locations?—and
4. How do all of these translate into informing different policy and practice approaches to young lives in these kinds of regional towns and communities?

The project aims to understand the lives of young people within the Beaufort and Ararat communities, and this understanding will form the basis of further analysis and theorising which will lead to a clearer understanding of the lives of young people within rural and regional Victoria. This project will particularly relate to issues surrounding educational engagement, employment, social connectedness and health and wellbeing. Outcomes: Establish a base of research 'evidence' to influence State and Federal government policy around issues such as: Youth engagement and social connectedness; Educational engagement; Heath and wellbeing of young people.

Time Frame: 3 years.

2.3 Project: Population health and chronic disease: EPIGENETIC CAUSES OF CARDIAC HYPERTROPHY AND FAILURE
UB Staff: *Dr. Fadi Charchar, Dr. Scott Nankervis (UB).*
Collaborating Researchers: *Professor Stephen Harrop, Professor Leanne Delbridge, University of Melbourne.*

Brief Description: The transformation from a normal heart to a hypertrophic heart can occur under neurohormonal and hemodynamic stress or spontaneously. No matter what the cause, cardiac hypertrophy is one of the most potent cardiovascular risk factors, associated with arrhythmia, heart failure and premature death. MicroRNAs(miRNAs) have been revealed as key controllers of gene expression and highly relevant to the molecular mechanisms for cardiac diseases. The miRNAs are also amenable to a new developing range of treatment strategies. To date there is no information about the precise miRNAs or their target genes for the common forms of primary cardiac hypertrophy that could explain inherently large hearts or exaggerated cardiac growth in response to stress. We have developed a unique model of human polygenic cardiac hypertrophy - the Hypertrophic Heart Rat (HHR) - in which the heart has a reduced complement of hypertrophied cardiomyocytes soon after birth. The HHR heart becomes hypertrophic during the hormonal and hemodynamic stresses of sexual maturity. Using second generation hybrids of the HHR and NHR we shall simultaneously acquire transcriptome-wide patterns of expression of miRNA and genes (mRNA) and genome-wide genotypes that we shall link with key phenotypes (the numbers, size and morphology of cardiomyocytes) in neonatal hearts. We shall build biological pathways and cascades from these coincidentally acquired data. We shall use validated genotypes from the linkage analyses to test their predictive capacity for adult cardiac hypertrophy. We shall also test brief early therapy against over-expressed miRNAs to determine whether the pathophysiological pathways can be inhibited and result in long-term normalisation of cardiac and cardiomyocyte characteristics.

Time Frame: 3 years.

2.4 Project: Population health and chronic disease: EPIGENETIC CAUSES OF CARDIAC HYPERTROPHY AND FAILURE
UB Staff: *Dr. Mark Myers, Dr. Nina Fotinatos, Dr. Scott Nankervis (UB).*
Collaborating Researchers: *Professor Frank Grutzner, University of Adelaide.*

Brief Description: Species diversity provides opportunities for finding novel molecules and targets for development of new drugs. A classic example is the GLP-1 analogue exendin-4 from the lizard Heloderma suspectum (the Gila monster) in treating type 2 diabetes. Among many unusual characteristics of the platypus is the vestigial stomach that is small, lacks glands, and does not produce gastric acid or digestive enzymes due to inactivation of the genes involved (Ordonez, G.R., et al. Genome Biol 9, R81 (2008)). This raises many questions about the control of digestion in the platypus, in particular the hormonal regulation of gastric function and the enzymatic digestion of proteins. We have preliminary data showing that hormones involved in digestion and nutrient utilisation are highly divergent in amino acid sequence in platypus. This project aims to characterise pancreatic intestinal hormones and serine proteases using genomics and comparative histology and biochemistry. Endocrine pancreas morphology and hormone production will also be examined and compared to other species.

Outcomes: This will be the first comprehensive characterisation of the adaptive changes to a loss of gastric function and may lead to identification of new treatments of metabolic and dietary disorders including diabetes.

Time Frame: 3 years.

Element 3. Regional Landscape Change

Element Leader: Professor Peter Gell (UB)

3.1 Project: Decadal variations in climate proxy records

UB Staff: *Professor Peter Gell, Dr. Peter Dahlhaus, Dr. Keely Mills, Dr. Giri Kattel, Dr. Jessica Reeves, Haydn Swan, Rosie Grundell (UB).*

CRN Partner Staff: *Professor David Karoly, Dr. Joelle Gergis, Dr. Russell Drysdale (UoM).*

Collaborating Researchers: *Professor Peter Kershaw, Dr. Patrick Baker (MU); Professor Chris Turney, Professor Andy Baker , Dr. Scott Mooney (UNSW).*

Brief Description: This project will assemble the available decadel isotopic, climate proxy records (biological and sediment indicators) from Australian paleoclimate records to understand climate variations over the last two millennia. This evidence will be integrated into Australia's contribution to the International Geosphere Biosphere Program (IGBP) Past Global Changes (PAGES) AUS2K program. It will explore innovative uses of decadal climate proxies to direct a program of research for Australia to derive paleoclimate reconstructions from lake reconstructions, speleothem and other archives. Outcomes: Contribute to Australian temperature and rainfall reconstructions over the last 2000 years, relevant to Australia's National Framework for Climate Change Science and the International PAGES program. Capacity building may include the use of isotopes in reconstructing climate.

Time Frame: 3 years.

3.2 Project: Identification and analysis of climate sensitive sites: Human Impact on Australian wetlands and estuaries

UB Staff: *Professor Peter Gell, Dr. Keely Mills, Dr. Jessica Reeves, Dr. Jasmyn Lynch, Dr. Giri Kattel, Dr. Michelle Casanova, Rosie Grundell (UB).*

CRN Partner Staff: *Dr. Russell Drysdale (UoM).*

Collaborating Researchers: *Prof. Peter Kershaw , Prof. Jenny Davis, Prof. John Beardall, Dr. Patrick Baker (MU); Professor Chris Turney, Professor Andy Baker, Prof. Richard Kingsford, Dr. Scott Mooney (UNSW); Dr. Adam Pope (DU).*

Brief Description: This project will assemble the available paleoecological data from Australian wetlands and estuaries to generate a regional synthesis of the relative impact of climate and catchment change on their condition. This will be integrated into the Water theme within IGBP PAGES Focus IV headed by Gell and provide an historical state of the environment report for Australia's wetlands. It will identify spatial gaps in the Australian data base and initiate research projects in key areas with long term data sets (e.g. Swan Plain, W.A.) or of strategic importance (e.g. Barrier Reef catchments).

Time Frame: 3 years.

3.3 Project: Climate Change Adaptation – Fire, Carbon and Biodiversity

UB Staff: *Professor Peter Gell, Dr. Grant Palmer, Prof. Rob Wilby, Dr. Sophie Bickford, Dr. Jasmyn Lynch (UB).*
CRN Partner Staff: *Professor Rod Keenan, Dr. Alan York, Dr. Fiona Christie, Professor Mark Burgman (UoM).*
Collaborating Researchers: *Dr. Scott Mooney (UNSW); Professor Andrew Bennett (DU).*

Brief Description: This project will explore the risks and opportunities for fire management, carbon sequestration and habitat restoration and biodiversity under a changing climate. Changing climates will impact upon fire regimes and so forest ecosystems. Also, the capacity to manage and adapt to future fire regimes will be moderated by changing temperature and moisture regimes. At the same time forest restoration will influence the fuel load across the regional landscape and so may influence the risk from fire. This project will explore risks of adaptation and biodiversity restoration in terms of fire regime change, while at the same time explore the capacity to mitigate against climate change through carbon sequestration.

Time Frame: 3 years.

3.4 Project: Climate Change Adaptation – Water and Biodiversity

UB Staff: *Professor Peter Gell, Prof. Martin Westbrooke, Dr. Singarayer Florentine, Dr. Simon Cook, Dr. Grant Palmer, Dr. Ian Sluiter, Prof. Rob Wilby, Dr. Jasmyn Lynch, Dr. Andrew Barton, Dr. Michelle Graymore, Stacey Gowans (UB).*
CRN Partner Staff: *Professor Rod Keenan, Dr. Peter Vesk, Professor Mark Burgman (UoM).*
Collaborating Researchers: *Professor Ralph MacNally (MU), Professor Andrew Bennett (DU), Professor Richard Kingsford (UNSW).*

Brief Description: This project will examine the risks to water yield and quality, and waterway health, under changing climates and examine the adaptive capacity of human and natural communities. It will also explore means of insulating terrestrial ecosystems from the combined impacts of climate change and habitat fragmentation. Sub-projects include opportunities surrounding improved water management under the Grampians Wimmera Mallee Pipeline, biodiversity effects from the decommissioning of water tanks in the arid zone, allocating environmental flows for biodiversity benefit, riparian restoration for stream and terrestrial ecosystem management and ecophysiological impacts of changing climates. The project will be linked to the Victorian Centre for Climate Change Adaptation Research.

Time Frame: 3 years.

Potential CRN Higher Degree by Research Fellowships (3 years)

The CRN is seeking applications from eligible, high-calibre candidates for Higher Degree by Research to work on CRN-related projects. We seek expressions of interest from candidates wishing to undertake higher degrees by research in any of the above listed projects. Suggestions for other projects are also welcome. Up to six CRN HDR Scholarships are immediately available for projects based at UB.

In addition to CRN Scholarships, a number of *Inaugural Emeritus Professor Robert HT Smith Higher Degree by Research Scholarships* are also available to support research broadly aligned to the CRN objectives.

Project Descriptions

2.1 Project: What does it mean to be a young woman in a regional community engaging in behaviours considered risky?

UB Staff: *Professor John Smyth (UB), Dr Jenene Burke (UB).*
Collaborating Researchers: *Professor Johanna Wyn, Director Centre for Youth Research (UofM).*

Brief Description: This project represents an opportunity to explore an issue of social significance in and around the lives of young women and their understandings of, and participation in, behaviours which society deems risky. There will be a strong focus on the issue of aggressive behaviours being adopted by young women and its effect on their engagement and social connectedness within communities identified as disadvantaged. The project will be a three year qualitative study of the lives of young women in communities identified as disadvantaged. The focus will be on understanding how engagement with risk-taking behaviours, especially violent behaviours, impact on the following areas for young women within communities identified as disadvantaged: Their health and wellbeing; Their educational engagement; Perception of life chances and aspirations.

The study will be conducted using a qualitative social research approach positioned within the tradition of critical social theory. Methodologies such as critical ethnography will be used in the fieldwork and analysis.

The following research questions constitute and will drive the research objectives:

1. What does the everyday reality of life look like to young women from communities identified as disadvantaged?
2. What are young women's experiences of violence and of using violence?
3. How do these young women envisage their educational lives and subsequent life chances, in relation to the violent behaviours they engage with?
4. What are the implications for young women's health and wellbeing in 'disadvantaged' regional locations?—and
5. How do all of these translate into informing different policy and practice approaches to young lives in these kinds of regional towns and communities?

The project aims to understand the lives of young women, and the violent behaviours they engage with, within communities identified as disadvantaged. This understanding will form the basis of further analysis and theorising which will lead to a clearer understanding of the lives of young people within rural and regional Victoria. This project will particularly relate to issues surrounding educational engagement, social connectedness and health and wellbeing. Outcomes: Establish a base of research 'evidence' to influence State and Federal government policy around issues pertaining to young women such as: Youth engagement and social connectedness; Educational engagement; Heath and wellbeing of young people.

Time Frame: 3 years