Ironing out water quality problems

IT’S A well-documented scientific fact: every so often researchers setting out to solve one problem inadvertently solve another.

And that’s what happened to University of Waikato Associate Professor Alan Langdon and recently graduated doctoral student Hilary Nath.

They began by studying bore water on Waikato farms with the intention of trying to improve its quality. But their solution may have far-reaching benefits.

The bores in peat soil prevalent on many of the region’s rural properties often contain high levels of iron and manganese which give brown-orange water accompanied by an unsightly sludge. The water is generally undrinkable unless treated via a cumbersome combination of aerators, filters, ion exchangers and tanks, and even then it may still be cloudy and taste metallic.

Dr Langdon and Nath wanted to use electro-chemistry to treat the water and set about devising and trialling a simple method using two perforated electrodes which are placed side by side. Electric current passing between the electrodes turns the naturally occurring chloride ions in the water into chlorine, which not only oxidises and precipitates the metal contaminants but also kills any bugs that may be present. And all by using such low voltages that the whole unit can be powered by a car battery.

The success of their research lies in the use of specially treated titanium electrodes perforated with an optimised hole pattern. The electrodes can be placed together with the tiniest gap – less than 50 microns – between them. Water passes through the perforations and between the electrodes, generating enough chlorine to oxidise the iron.

“By bringing the electrodes closer together than anyone else has been able to we can reduce electrical resistance and consume less power. And because the flow path through the cell is very short we can achieve good water flow at modest pressure,” says Dr Nath.

Their system is known as PEFT – perforated electrode flow through – and patents for the system are pending. But for now the precise details are a carefully-guarded secret.

While the Waikato scientists’ research is great news for farmers, who may soon have a much more cost-effective way to treat contaminated bore water, there are far greater implications for their work.

Part way through last year Dr Nath noticed something intriguing about the PEFT cells. The closer together the two electrodes were positioned, the higher the electric field, the more potent the chlorine being produced.

The two together were so powerful they could kill bugs in the water at much lower chlorine levels than normally required – the electric field was able to puncture the membrane of a bug making it 100 times more susceptible to the chlorine.

“What this means is that you can disinfect water with chlorine levels much lower than can be tasted,” says Dr Nath.

It’s an extremely promising discovery that could have enormous benefit in developing countries where access to clean and affordable water is an increasing issue.

At slightly higher applied voltages the PEFT cell is able to kill bugs by the electric field alone, with no need to produce any chlorine. Dr Langdon and Nath can see huge benefits in this discovery for the food industry, particularly for cold pasteurising liquid food products without the need for costly heating and cooling units.

The science has now reached a critical stage between discovery and adoption. WaikatoLink, the University of Waikato’s commercialisation arm, is helping with the development and funding of a working prototype.

The Kiwi Innovation Network (KiwiNet), a collaboration focused on research commercialisation, is also providing support as well as investment from its PreSeed Accelerator Fund (PSAF) from the Ministry of Science and Innovation.

WaikatoLink is a founding member of KiwiNet.

The researchers will set up a prototype on a Waikato farm where they will monitor its effectiveness.

“We see new technology that is very clever nevertheless,” says Dr Langdon.

$10 – is this the price of your vote?

VOTER turnout was just under 74% in the November 2011 election – the lowest-ever recorded, sparking claims of growing citizen disengagement from the political process.

But according to new research by the University of Waikato’s Professor John Gibson and Dr Geuia Boe-Gibson, just $10 bucks could have made all the difference. Using data from the 2005 New Zealand Election Study (NZES), the researchers cross-referenced individual voter turnout with road distance from residential areas to the nearest polling station.

By combining travel time estimates from Google Maps with estimated wages for the survey respondents, they calculated the opportunity cost of voting.

“It turns out that time costs are very relevant to voting,” says Professor Gibson. “Just a small increase in the cost of getting to the voting booth has a large impact on voter turnout.”

The two economists worked with long-time collaborators Dr Bongseun Kim of Seoul National University and Dr Steven Stillman of Wellington-based think tank MOTU on the study, which was recently published in the leading international journal Public Choice.
From the Vice-Chancellor

By PROFESSOR ROY CRAWFORD

WELCOME to the first issue of rethink for 2012. Inside, we tell our stories about how the University of Waikato is adding value in New Zealand and around the world through our research, innovation and teaching.

Ideas are our stock-in-trade as a university, but our researchers do much more than simply generate ideas. Through our wide-ranging links with businesses, sector organisations, government agencies and international partners, we have a strong track record in turning ideas into solutions to real-world problems.

Our ambitious goal is to encourage our staff and students to change the world we live in.

In this issue of rethink you can read about how our researchers are helping to tackle issues ranging from adult literacy to better internet searching, and from elite sports training to biodiscovery.

The University of Waikato is situated in the heart of rural New Zealand, and one key focus for us is land-based industry. We have research strengths in many of the issues facing farming today: land ownership, environmental impacts, soil remediation, water as a valuable resource – the list goes on.

This year, we welcomed respected agricultural commentator and researcher Jacqueline Rowarth who has joined the University of Waikato as Professor of Agribusiness. Professor Rowarth will focus on consolidating and developing links with the wider agriculture sector in the Waikato region and beyond.

Her addition to the University of Waikato stable of top researchers further enhances our role as a strategic partner at the upcoming National Agricultural Fieldays.

If you are attending Fieldays this year, we welcome you to our stand where you can see first-hand the contribution the University of Waikato makes in this sector.

We also welcome your feedback and comments on any of the featured research at Fieldays or here in rethink.

About rethink

rethink is published by the University of Waikato to highlight our research, innovation and entrepreneurship. We welcome feedback, comment or inquiry about any of the issues raised in this publication. Contact us at rethink@waikato.ac.nz

The University of Waikato, Private Bag 3105, Hamilton 3240, New Zealand
Phone: 0800 WAIKATO (0800 924 528)
Email: info@waikato.ac.nz
www.waikato.ac.nz
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How much is a vote worth?

From Page 1

“Each extra kilometre – or two minutes’ travel – to the polling station reduces turnout by one percentage point, all else the same,” says Professor Gibson. “If you want to put a dollar value on the cost that seems to deter many voters, it’s about $10.”

“When time costs of travelling to vote are $10, the predicted national turnout falls by seven percentage points. In urban areas, the drop is even sharper, with $10 costs reducing predicted turnout by 20 percentage points.”

The research is a spin-off from Marsden-funded research on the benefits of home ownership.

“In working out whether home owners are more likely to vote, we had to account for them tending to live further away from polling stations,” says Professor Gibson. “It turns out the effort to map those distances yielded unexpected and interesting findings.”

Professor Gibson says the study provides a new and more accurate measure of voting costs – and indirectly of the low benefit that many people derive from voting.

“New Zealand is an ideal test model for this kind of study since general election voting is on a Saturday and almost always in person, so you can assume people are travelling from their homes. Also registering to vote is compulsory, and the NZES data are validated by checking against the electoral rolls, so there’s no over-reporting of voting which often happens with other surveys.”

jgibson@waikato.ac.nz

Full study available at www.springerlink.com/content/nm214413455210/

Doing business the Māori way

THE MĀORI economy is an integral part of New Zealand’s economy and it’s growing. Although modest, it is growing fast. It’s currently worth $36.9 million or approximately 5.9% of GDP.

The majority of Māori investment is in the primary sector – farming, forestry and fishing, but increasingly the asset base is expanding and diversifying to include manufacturing, business services, telecommunications, health and education.

Dr Robert Joseph, an indigenous governance expert at the University of Waikato, says it’s an indication of the increasing Māori economic clout.

“We have the big players – like Waikato-Tainui and Ngāi Tahu, and strong but quieter performers that are running power stations, dairy companies, and other diverse business,” he says.

A good example is the Tuisopaki Trust, formed in 1952 by seven Mokai hapū. “They’ve diversified their investments and are involved in horticulture and farming, power generation and more recently have moved into the telecommunications industry. They are also committed to R&D.”

The challenge now for Māori, he says, is to find ways to do business in a 21st century context but with core Māori values intact.

Dr Joseph, who heads the Centre for Māori and Indigenous Governance recently established at Waikato’s Te Piringa - Faculty of Law, says Māori do not need to follow traditional mainstream models of governance and business to be successful.

“Māori must draw strength from what we know best: ourselves and our worldview – culture, Te Reo, tikanga, kawa and mātauranga. Non-Māori are beginning to value the Māori worldview in business and governance as well.”

Earlier this year Dr Joseph was part of a group of five New Zealanders, led by leading Māori academic Professor Sir Mason Durie, invited to Arizona as guests of Harvard University to learn about a prominent 20-year Harvard study monitoring and measuring the economic success of First Nation tribes in Canada and the US.

Dr Joseph says one of the messages they received from Arizona was that traditional cultural values combined with good governance were essential for economic success.

He says some US and Canadian tribes are more isolated than tribes in New Zealand and have had the fortune to establish reservations on mineral-rich lands and are largely autonomous. “And they are reaping the rewards from being able to determine their own future.”

The Harvard research has shown that economically successful tribes in North America are those with a strong and vibrant culture, where people take responsibility for their own decisions, have good dispute resolution systems – including indigenous mediation and a robust culturally legitimate leadership and governance structure agreed to by the tribe.

“This goes contrary to past notions of assimilation – to succeed, Māori had to Europeanise themselves including in business and governance – which gives us plenty to consider when applying governance models in Māori business and governance today.”

Dr Joseph believes that with more autonomy provided by Treaty settlements and economic development, comes responsibility and great opportunities. “When people know the buck stops with them, they are much more likely to take ownership of their future. The government needs to step back and let organisations stand alone so that Māori can again determine their own political, economic, social and cultural future but in an updated 21st century context.”

rjoseph@waikato.ac.nz

PROFESSOR JOHN GIBSON: “If you want to put a dollar value on the cost that seems to deter many voters, it’s about $10.”

DR ROBERT JOSEPH: “Non-Māori are beginning to value the Māori worldview in business and governance as well.”
Waikato: Agribusiness “Silicon Valley”?  

THE WAIKATO isn’t just rolling lush pastures and prosperous farmers; the region is also New Zealand’s agricultural innovation heartland. 

That’s the opinion of Professor Jacqueline Rowarth, a leading agriculture researcher and commentator who has taken up the inaugural Chair of Agribusiness at the University of Waikato Management School. 

“The Waikato has always been a hotbed of development,” she says. “The herringbone milking parlour, the electric fence, in-line milk sampling, and added value milk ingredients have all been developed in the Waikato – it’s really the Silicon Valley of agribusiness.” 

The region is home or close to the HQs for Zespri, Fonterra, Ballance Agrinutrients, TruTest, LIC, DairyNZ and Gallaghers among others, plus a clutch of crown research institutes, industry bodies, Waikato Innovation Park and the University of Waikato. 

It’s this fertile mix, says Professor Rowarth, that makes the Waikato such an important part of New Zealand Inc. 

“We’ve got the vital critical mass for agribusiness here in the Waikato. That’s shown by all the ongoing developments in the known companies. The crucial next step for smaller companies is getting collaboration right, and building trust. All innovation is about sharing ideas. If you concentrate on creativity and innovation, the profit will follow.” 

Professor Rowarth cites Harvard Business School research which shows people are most creative and innovative when they have knowledge and can collaborate with others to make progress towards goals they value. 

“Our job at the University of Waikato is to give future agribusiness leaders a knowledge base so they can go on to be innovative,” she says. “And part of the education is to ensure that they are wayward thinkers – that they question the status quo from their base of knowledge. That’s the first step towards innovation – asking if there is a better way.” 

The university offers a business degree with a specialisation in agribusiness, and is currently developing a professional masters-level qualification aimed at business graduates wanting to gain a better understanding of New Zealand’s biggest industry. 

The proposed qualification has the support of leading agricultural organisations. Part of Professor Rowarth’s role at the University of Waikato is to consolidate and develop links with the wider agriculture sector in the region. 

The university already has a head start as a strategic partner in the National Agricultural Fieldays, and Professor Rowarth says the university’s new agribusiness qualifications will help create a pathway into agribusiness leadership. 

“Agribusiness and agriscience are vital for enabling high-quality sustainable food production, which is the keystone of our economy,” she says. 

“We’re missing almost a generation in this sector, so we need to hothouse a new generation and fast-track them in terms of leadership experience. I’m working with recent graduates to ensure that they hook up with the right people – top farmers and agribusiness leaders.” 

Professor Rowarth’s research is in nutrient cycling, collaborating with scientists at Waikato and Massey universities, AgResearch and Landcare. Another area of focus is leadership, innovation and management. 

She says a key ingredient for agribusiness leadership is an in-depth understanding of the sector. 

“Leaders have to be able to talk to people at the coalface, or to people who use what the coalface produces,” she says. 

“We need to know what farmers are experiencing if we want to improve that experience. New Zealand is a small country, and we don’t have enormous resources to pour into innovation, so it’s important we pool our efforts and work together.” 

Waikato’s agribusiness Silicon Valley may just be the place to do it.

IN MANY New Zealand towns and cities populations are either stagnating or declining because young people are leaving and not coming back to live, work and have their babies. The result is population age structures which are beginning to look like hourglasses. 

“In part, you can blame technology,” says Professor Natalie Jackson from the National Institute of Demographic and Economic Analysis (NIDEA) based at the University of Waikato. “Technological development has meant fewer people are employed on farms and in rural support services, but there are many reasons why there’s a hollowing out of the population at the point where it’s needed most.” 

Professor Jackson says local and regional councils need to find new ways to cope with this trend. 

“What’s especially hard for councils is that they have to go on consulting and their planning processes, which they’re currently consulting on for the 2012-22 planning period. 

“People are leaving and not coming back to live, work and have their babies when their income is reduced – facilities and services won’t attract them if their income is reduced,” she says. 

She says the Australian government provides a AUD$2.5 billion pool that it distributes to local governments who apply for assistance going through such population transitions. “So they can offer services irrespective of their ability to do so. New Zealand could look at doing something similar.” 

Professor Jackson says some local authorities have their heads in the sand about the longer-term sustainability of their populations, and people can find it difficult to accept that while we have economic cycles, we do not have demographic cycles. “What we do at NIDEA is provide the evidence base for this new and permanent reality. Auckland and the main cities will keep growing for many years, but overall, growth is coming to an end.” 

Professor Jackson recently provided the Napier City Council with a comprehensive socio-demographic study of the city which analysed population growth, ageing, ethnicity, migration and labour market trends, and what the implications of these trends might be for its community structure in the future. 

Napier City Council’s Manager of Community Services Antoinette Campbell says the study has formed the basis of their demographic forecasting assumptions to be included in their long-term planning processes, which they’re currently consulting on for the 2012-22 planning period.

PROFESSOR JACQUELINE ROWARTH: “Our job at the University of Waikato is to give future agribusiness leaders a knowledge base so they can go on to be innovative.”

Fieldays 2012 

At this year’s National Agricultural Fieldays at Mystery Creek on 13-16 June, Professor Rowarth will give daily seminars on topics covering food and the environment, efficiency versus productivity, and the right to farm: opportunity or a death knell? She will also facilitate a series of discussions on the changing face of farming, featuring University of Waikato researchers and outside experts.

For more information visit: www.waikato.ac.nz/events/fieldays.shtml

Hourglass trend spells change for local authorities

HOLLOWING OUT: Like many non-metropolitan areas, the Matamata-Piako District has an hourglass shaped population structure. The unshaded bars show what the population looked like in 1996, when there were lots of young adults and children.

“The Council will use NIDEA again for the further development of a demographic change model which looks more closely at migration,” says Ms Campbell. “We anticipate that the results of this research will be integral and extremely beneficial to our continued strategic planning for our community.”

njackson@waikato.ac.nz

www.waikato.ac.nz/nidea

40-44

50-54

60-64

70-74

80-84

90+
Fungi fix for contaminated land

Scientists from Waikato and Massey universities working with iwi have found a way to use fungi and plants to clean up contaminated sites in the Western Bay of Plenty.

ONE OF many drainage channels criss-crossing the coastal plain just east of Whakatane, the Kopeopeo Canal has long been a popular eeling spot. But the canal is now so polluted with dioxins that the locals have been warned against eating eels caught there.

Dioxin is the same poison that contaminated Agent Orange, the defoliant used by US troops during the Vietnam War that’s left a legacy of chronic ill health among the people who were exposed to it.

The Kopeopeo Canal’s high dioxin levels are the result of sawmilling operations in the area, which have left a similar legacy of ill health. Joe Harawira worked at the Whakatane Sawmill for nearly 30 years from the early 1970s handling timber preservative solutions laden with toxic pentachlorophenols (PCPs); the dioxins are contaminants in the PCP solution when it was manufactured. He says the left-over solution washed straight into the canal through a stormwater drain at the mill.

While the soluble PCP dispersed in the water, the dioxins bound themselves to the sediment in the canal, and then accumulated in the foodchain. “Nobody knows the effects of this stuff better than we do,” says Mr Harawira. “High cancer rates, high diabetes rates, chronic pain, disruption to the immune and endocrine systems. Some of us have managed to pull through, but many of our mates didn’t.”

Mr Harawira is co-ordinator for SWAP, Sawmill Workers Against Poisons, which in 2008 won a 20-year battle to gain official recognition for the health issues suffered by the local community. But there was still the environmental problem to be addressed. “The health of the land and the people have to go hand in hand,” says Mr Harawira. “From a Māori perspective, we needed to move away from blame and into fix-up mode.”

SWAP is now part of a unique partnership including the University of Waikato, Massey University, EarthFax Development Corporation in the USA and the Bay of Plenty Regional Council (BOPRC), as well as representatives from the local iwi, Ngāti Awa, and S.I.G (formerly Carter Holt Harvey).

With funding from the Health Research Council, the partnership is exploring options for bioremediating contaminated land using fungi and plants to naturally break down the toxins. In total there are more than 36 contaminated sites in the Whakatane area which are candidates for bioremediation.

The partnership’s initial programme, Te Ohu Mo Papataunui, was designed to combine mātauranga Māori with Western science. Working closely with iwi, the University of Waikato’s Biological Sciences Professor Roberta Farrell and honorary research associate Dr Joanne Thwaites Kelly collaborated with Massey University’s Dr Chris Anderson and Paul Futter of the BOPRC on a two-year trial focussing on contaminated sediments from the Kopeopeo Canal.

The researchers found the best combination for reducing dioxins was to inoculate the sediments with fungi for six months and then plant poplar trees. This reduced the toxicity equivalent quotient – which measures both concentration and toxicity of the dioxins – by 85% within 15 months.

“There is very limited research on large scale bioremediation of dioxins, and this is the first time fungi and plants have been used at this scale and in combination,” says Dr Thwaites Kelly.

“In future trials, we will optimise the sediment so that pH, nutrient levels and moisture content are optimal for fungal, bacterial and plant growth before any bioremediation occurs. This will hopefully give us even greater reductions in dioxin levels.”

The next stage of the project begins later this year when the Bay of Plenty Regional Council dredges the canal as part of flood protection measures. Some 30,000 tonnes of sediment from a 5km stretch of the canal will be removed to a safe site for bioremediation.

Waikato’s Professor Farrell says the project’s participatory collaborative approach to working with iwi has been a real success. “Science and mātauranga Māori have meshed beautifully, and that’s what’s made the project the most important for me as a scientist,” she says.

“Ngāti Awa want the land to be usable again for kai, and that is our target as well, to get dioxin levels to zero so that food can be grown in the bioremediated soil.”

rfarrell@waikato.ac.nz

The Kopeopeo Canal bioremediation project features in a new documentary series on mātauranga Māori and science to be aired on Māori TV in September this year.
Going to extremes

RAPPELLING down ice chimneys and trudging miles across some of the world's most inhospitable terrain to collect samples isn’t most people's idea of fun.

But for University of Waikato Antarctic scientists the trip down to the ice over the summer break is the highlight of the research year.

For one major project, supported by a Marsden Fund grant, this season on the ice was the last. The project is led by Professor Craig Cary, director of ICTAR, the International Centre for Terrestrial Antarctic Research based at the University of Waikato.

Over the past four seasons, Professor Cary and his team of Waikato Antarctic researchers, including Associate Professor Ian McDonald and Dr Craig Herbold, have extensively surveyed the geothermal hotspots and identified an ancient community of microbes on the summit of Mt Erebus, the world’s southernmost live volcano.

Rising nearly 4,000 metres above sea level on Ross Island, set in the ice sheet that extends off the coast of Antarctica, Mt Erebus provides some of the harshest conditions on the planet. The volcano’s super-heated soils can reach temperatures of more than 65 degrees Celsius, while air temperatures can plunge to minus 30 degrees Celsius in winter.

"The unique microbes that can survive under these conditions are a relic community, frozen in time in evolutionary terms," says Professor Cary. "Mapping their genomes will yield valuable information about how bacteria may have dealt with these conditions millions of years ago."

And they could provide as-yet undiscovered genetic capacity.

The hot soil dwelling microbes have already yielded an enzyme with unique properties which is now being used commercially to speed up DNA extraction and detection in human forensics, and Professor Cary believes this enzyme may be just the tip of the iceberg.

"Once we've analysed this microbial community, we'll have a bank of genetic data that will form a valuable resource for scientists. We may find new enzymes which could be used to replace synthetic compounds in the manufacture of drugs or treatment of wood products."

But first you’ve got to get your microbe.

This season, Professor Cary and his team were joined by a team from National Geographic magazine.

"Having National Geographic up with us this year was a huge bonus for the team," says Professor Cary. "It's always difficult to share what we are doing with the public, to show them that our science is not only exciting but important, and could yield huge benefits in the future. The National Geographic article will reach millions of people in one shot."

The group received a cold welcome from the mountain, but despite some setbacks due to poor weather after a particularly harsh winter, the scientists drilled through the ice to collect ice cores – 2 metre long tubes of ice – as well as gathering extensive soil samples which they are now analysing in order to characterise the microbial population.

They also analysed subsurface gases, and monitored temperature levels around the mountain using multiple probes to build up a picture of the thermal environment.

"It’s hard, cold and dangerous work," says Professor Cary. "During one sampling trip the weather closed in, and when we tried to walk back to the camp you could hardly see the person in front of you let alone the building. But having the opportunity to work in this unique and untouched environment makes it all worthwhile."

This season, the scientists got a chance to explore some ice caves and chimneys for samples. These are formed by steam vents coming through the ground beneath deep snow and ice deposits on the mountain.

The constant warm steam and air eventually form a cave.

"The caves provide a stable geothermal environment; at a balmy 10-25 degrees Celsius, it’s quite different to the polar climate above ground."

"One of the caves we went into, the Warren Cave, contains multiple vents which link together forming a cave over 200 metres long. Getting into the cave is something else: it’s a 35 metre drop straight down. But once inside, you would think you were on another planet."

The Erebus study is just one part of a larger programme that is investigating hot soils along a huge latitudinal gradient from Erebus to Yellowstone Park in the United States. As part of this research, the Waikato scientists have also surveyed Deception Island, a sub-Antarctic island off South America that also contains geothermal soils. Sites in Chile, Bolivia, Costa Rica are scheduled for later in the year.

caryc@waikato.ac.nz

www.ictar.org

www.zygem.com

Over the past 30 years, the University of Waikato has been involved in a range of Antarctic research programmes. This season’s projects have included:

» Studying and preserving the Antarctic huts from the historic Scott expedition.

» Collecting soils from across the Dry Valleys, including almost a tonne for permafrost simulators creating “Antarctica in a box”.

» Continuation of a long-term project in collaboration with Landcare Research to gather wind and soil climatic data.

» Investigating the microbiology of the ponds on the McMurdo ice shelf.

The constancy of the warm air and steam eventually form a cave.

"The caves provide a stable geothermal environment; at a balmy 10-25 degrees Celsius, it’s quite different to the polar climate above ground."

"One of the caves we went into, the Warren Cave, contains multiple vents which link together forming a cave over 200 metres long. Getting into the cave is something else: it’s a 35 metre drop straight down. But once inside, you would think you were on another planet."
Boosting literacy and numeracy skills at work

MORE than a million adult New Zealanders don’t have the literacy and numeracy skills they need for daily life. New Zealand’s National Centre of Literacy and Numeracy for Adults, based at the University of Waikato, aims to support and strengthen tutor practice at polytechnics, wānanga and private providers to improve learner outcomes in New Zealand Qualifications Framework Level 1-3 foundation programmes – whether it’s hairdressing, automotive engineering, wood turning, horticulture or cooking.

The National Centre works with 177 different providers throughout New Zealand. Staff work with providers to identify literacy and numeracy demands in programmes, courses and work tasks, and then knowledge the learners’ skill levels apply deliberate and systematic embedded teaching practice to strengthen the learners’ skills to meet the demands.

At the Eastern Institute of Technology, which operates in Hawke’s Bay and the East Coast, Dr Elly Govers has been the project manager responsible for seeing that literacy and numeracy is embedded in all EIT Level 1-3 programmes. “In the beginning, tutors would say that some of their students lacked the literacy and numeracy skills to take a particular course, but they also said it wasn’t their job to change now,” says Dr Govers.

She says they have a good relationship with the National Centre. “Their strength is in bringing new thinking, new ideas to us – new ideas have to come from somewhere – and the National Centre takes that initiative.”

The Centre’s Director is Professor Diana Coben, an Emeritus Professor from King’s College London who was co-founder of England’s National Research and Development Centre for Adult Literacy and Numeracy.

“Some of the initiatives being taken up in New Zealand are quite progressive – the country has come a long way in a short time on a limited budget,” says Professor Coben. “Now we’re doing the research to measure and assess the impact of our programmes.”

Tutors are carrying out their own action research – with the results being fed back through the National Centre to the sector. “We’re constantly refining what we do, but early results indicate that with improvement in literacy and numeracy, student retention and course completion is improved which is what we’re all striving for.”

The National Centre’s Associate Director Niki McCartney says a partnership signed in 2010 with Te Whare Wānanga o Awanuiārangi in Whakatane brings expertise related to Māori needs.

“The Centre’s Director is Professor Diana Coben, an Emeritus Professor from King’s College London who was co-founder of England’s National Research and Development Centre for Adult Literacy and Numeracy.”

THOUGH she has a Bachelor of Education, Kim Brown (pictured) says different skills are needed for teaching adults and she’s studying for a Postgraduate Diploma in Adult Literacy and Numeracy Education through the University of Waikato while working full time at the Eastern Institute of Technology Hawke’s Bay campus.

Mrs Brown worked with special needs learners in the UK but in New Zealand has relished the opportunity to work with foundation learners. At EIT she’s a Literacy and Numeracy Champion, working to have literacy and numeracy imbedded in all 33 NZQF Level 1-3 programmes taught at EIT. She also helps train the tutors across campus, and teaches foundation courses for students learning land skills, trade skills and computing skills.

“I simply can’t take my literacy glasses off,” she says. She runs workshops with tutors on how to identify where embedding can happen and to develop context-appropriate steps to embed the learning, and she also works one-on-one with students and tutors if necessary.

Working with the National Centre of Literacy and Numeracy for Adults based at the University of Waikato, Mrs Brown has been on the receiving end of “lots and lots” of their workshops.

“They basically taught us how to teach our staff, so we’ve done training around that and also around diagnostics – learning how to assess and align what we’re doing with the national strategy. I became so enthusiastic; it’s what encouraged me to study for a formal qualification in literacy and numeracy.”

She’s only doing her first paper but Mrs Brown says she’s already seeing results: “What I’ve done is amazing. I’m picking up new tips and tricks all the time and can immediately put them into practice when I get to work.”
Marine research in the Bay

WHEN the Rena ploughed into the Astrolabe reef in the waters of the Bay of Plenty in October last year, University of Waikato researchers were some of the first on the scene helping to coordinate a fast response environmental programme.

The reason they were able to be on the ground so quickly is that the University of Waikato has a Coastal Marine Group based in the Bay with a field centre at Sulphur Point in Tauranga.

Heading the group is Professor Chris Battershill, who holds the university’s inaugural Bay of Plenty Regional Council Chair in Coastal Science. He began the job last year and immediately initiated a review of marine life in and around Tauranga Harbour and the wider Bay of Plenty, focusing on how various organisms adapt to environmental change. The Rena grounding presented even more research opportunities.

Julien Huteau, who’s a doctoral student in the university’s Coastal Marine Group, is studying ecological changes in the Tauranga harbour, and in the wake of the Rena disaster added a case study to find out when seafood in the Bay of Plenty will be safe to eat again.

“I’m a keen diver,” says Mr Huteau, a Frenchman who’s been in Tauranga for seven years. “I used to go diving every two days, but after Rena it was frustrating not being able to go to sea. So my research topic comes from the heart, and from wanting to give iwi and people around Tauranga some hope that sea life can recover.”

Another student, Nikki Webb, in her preliminary research has been creating an inventory and a bio-resource repository of Tauranga Harbour to see if there are potential cancer- or PSA-bearing compounds in Bay of Plenty waters. She’s been collecting algae, species, seaweed, sea sponges, sea squirts and other samples of marine life from Leisure and Rabbit islands and Waiareka Estuary. It’s part of a bigger study looking into the biochemical machinery of marine organisms to generate biomedical and agrochemical leads.

“New Zealand is known internationally for being one of the top sources for biodiscovery leads,” says Ms Webb. “I’m checking organisms for potential drug and agrochemical leads and once I’ve completed the inventory it will be available for educational purposes in museums around New Zealand.”

Ms Webb is also looking at biodiscovery laws for New Zealand to see what can and cannot be taken for scientific research. “I’ve found that there are no comprehensive laws in New Zealand, but the Ministry of Economic Development is working on that – alongside the Waitangi Tribunal and the Convention of Biological Diversity, an international treaty that helps with biodiscovery laws.”

The University of Waikato Coastal Marine Group based at Sulphur Point in Tauranga has more than 40 PhD and MSc students.

The group works closely with the university’s Environmental Research Institute (ERI), and has relationships with iwi, the Bay of Plenty Polytechnic, the Bay of Plenty and Waikato regional councils, Priority One, port companies, several government ministries, DoC, and university coastal groups worldwide.

http://sci.waikato.ac.nz/research/centres-and-units/cm
www.waikato.ac.nz/eri/

Rena offers research opportunity

COMMENT

By PROFESSOR CHRIS BATTERSHILL

THE GROUNDING of the Rena on Astrolabe Reef in the early morning of 5 October 2011 had the potential to be an environmental disaster for the Bay of Plenty. But it also provided an unparalleled opportunity for coastal scientists to study the impact of a major contamination event, and highlighted the importance of collaboration between the various agencies involved in the response effort.

Immediately following the shipwreck, the two key questions asked by iwi, commercial businesses and the wider public were: What is the environmental impact and how long will it take to recover?

To answer these questions we needed to know what the environment should look like, what is “normal”. Without that knowledge it would be difficult to gauge the extent of an impact – and impossible to predict recovery.

So, within 24 hours of the grounding, the University of Waikato and the Bay of Plenty Polytechnic were talking about what may be needed by way of an immediate environmental response.

Our first step was to identify areas of heightened sensitivity to any contamination from the grounded ship. We pooled information with Maritime New Zealand, the Bay of Plenty Regional Council and Tauranga City Council to review what was known of the reef environments around Astrolabe Reef, and the inshore beaches and estuaries.

The regional council had quantitative data from long term monitoring programmes stretching back 20 years for open beaches and estuaries in the Matakana Island to Opotiki region – the area of immediate concern.

However, some habitats close to the Rena did not have “before impact” quantitative information. These surprisingly included Motiti Island and the offshore rocky reefs north and south of Astrolabe Reef.

A fast-response survey team from the polytechnic and the university went out to gather information on representative rocky reef habitat character, biodiversity and abundance of key species (kai moana). The team also collected samples to establish background hydrocarbon and metal concentrations in sediments and fish/shellfish tissue.

When the weather worsened, and oil began to wash up on shores from Matakana Island to Pukenia, and particularly around Motiti Island, the team turned its attention to shore-based shellfish, working with the Bay of Plenty Regional Council to monitor estuaries and open beaches.

Monitoring was expanded by a University of Canterbury team, led by Professor Dave Schiel, building on a national intertidal biodiversity programme. Te Whare Wānanga o Awanuiārangi, based in Whakatane, contributed mātauranga Māori expertise.

The partnership, now known as Te Mauri Moana, is currently involved in the long-term environmental recovery plan as rolled out by the Ministry for the Environment.

A series of hui ranging from Waikato to Te Kaha has provided input from iwi leaders on the focus and design of the monitoring programme. The partnership has also been able to draw on the experience of colleagues across the Tasman.

Professor Russell Reichelt, CEO of the Great Barrier Reef Marine Park Authority and Board member of AMSA, the Maritime NZ equivalent in Australia, has delivered presentations to iwi and local body leaders on similar oil spill events on the Great Barrier Reef.

Thanks to this collaborative work, the dataset gathered to date is unique in that it documents background oil contaminant levels, shows a rapid uptake in marine species during the peaks of oil spill engagement with reefs and beaches in November, and then a relatively rapid decline back to background levels in most locations.

A number of hotspots remain however, and we are continuing to monitor the possibility of further contamination from oil slowly leaking from the wrecked ship.

Another continuing focus is the longer term impact on the area, especially where the reproductive processes of important species may have been compromised.

What we have learnt is that very little is known about the ecotoxicity of heavy fuel oils, and that almost nothing is published about the ecological effects of contaminant mixtures in nature.

The Rena grounding has opened our eyes to these gaps in knowledge, and we have now initiated an active ecotoxicology programme with the very important focus of understanding how the environment reacts to contamination in the short and long term. The programme will involve field investigations as well as work in the laboratory.

It means if something, like this happens again we will be in a far better position to provide accurate predictions of the impact and effects of large scale pollution.

chatter@waikato.ac.nz
www.renarecovery.org.nz
Being pregnant in a foreign land

IN CHINA it’s not uncommon for pregnant women to wear a radiation protection suit, they’re told not to watch horror movies, and after they’ve given birth, mother and baby stay indoors for a month. Importantly, doctors make the big decisions.

Waikato University PhD student Phoebe Guo is studying immigrant women’s experiences of pregnancy and childbirth in New Zealand and hopes her research will improve communication between immigrant women and their healthcare providers.

“New immigrants with little English can feel lost and alone when they arrive in New Zealand, and if they’re pregnant their situation can be doubly difficult.”

Ms Guo had her two children in New Zealand but the instructions she received from her midwife and doctor in Hamilton varied greatly from the advice she was receiving from family members back in China. Her interviews with other women reflected a similar experience.

“So you’ll have the midwife here saying there’s no need to wear a radiation protection suit, the mother won’t want to argue, but is likely to disobey the midwife and wear a suit anyway.

“I think there’s an assumption that the Western way is the one and only right way when it comes to maternity care, and I don’t believe that’s the case. We need to think about alternative knowledge and its application.”

Ms Guo says immigrant women arrive with different values and beliefs strong on medicalisation and safety aspects required for pregnancy and childbirth – a cooperative model. “They’re used to taking direction from the experts and it’s worked for them before. The Western way has a focus on natural childbirth, it’s more of a partnership model and immigrant women are being told they have to do it one way – even if it’s not explicit, it’s implied.”

“Sometimes it’s the words they use – like placenta, breech or cerebellum – they’re hard to understand for people who have English as a second or third language. I had trouble telling the doctor about my swollen feet, and because I was too scared to say no, I let a student doctor attend the birth of my first child. There’s no way I wanted him there.”

As well as interviewing immigrant women, Ms Guo has interviewed maternity care providers including midwives, Plunket nurses and doctors. “Maternity and health care providers are aware of language barriers and cultural differences existing between them and non-Western migrant clients. They believe that understanding is the most important issue in the process of communication, and they do try to achieve that.”

Ms Guo says health workers want Chinese mothers to understand what services are available in New Zealand. “But often Chinese mothers don’t talk or ask much so it is hard to identify if there is a problem or if they understand or not.”

She believes we should be adding to the existing knowledge of maternity care, that we should value the differences and use new knowledge to help create a sense of belonging for everyone associating with the health sector.

“It’s not just a matter of strictly adopting a partnership communication model and natural childbirth discourse; many maternity and health care providers ignore the multiplicities and complexities of Chinese mothers’ identities, cultural beliefs and experiences. In doing so, they start to create boundaries between them and the mothers, and also enjoy the privilege and power as Western health providers.”

Phoebe Guo won the People’s Choice Award at the Thesis in 3 competition, held during the university’s annual Postgraduate Month.

Phoebe Guo: She says many immigrants struggle with Western assumptions about pregnancy and birth.
**Game on!**

**VISITORS to the University of Waikato's Fieldays stand will be able to try their hand at dairy farming thanks to a specially created iPad game.**

The game features the university's graduation cow Māu, and players have to keep milk production up by making sure Māu eats the right things in the paddock and doesn’t bump into the electric fence too often.

The game is the brainchild of Cold Studios, a hi-tech start-up created by second-year Bachelor of E-Commerce student Brian Cole.

Mr Cole spent 10 years in the military, the last five of those as a science researcher in the Defence Technical Agency. Going to university was an opportunity to move out of the Auckland rat race and into something a bit more entrepreneurial.

"University is the perfect sandbox to get in and rip around and try things out," says Mr Cole.

"You’re surrounded by some extremely knowledgeable people, so help is never very far away. And you’ve got a ready pool of young talent.”

To scope out that talent, Mr Cole last year decided to take both core first-year computing papers and as part of his e-commerce degree.

"My strength is in management, but I thought ‘This is the skillset I need, let’s go and find people who excel in this area as well as gain programming skills.’"

He got talking to his fellow students about breaking into the highly competitive computer games industry, and they decided to put together a company to give themselves experience and material for their portfolios.

"We’re really hoping that by the time we finish our degrees we’ll have a profitable business so we won’t have to go out looking for jobs!"

Mr Cole is the business brain behind Cold Studios, which now employs three programmers and two graphic designers – all Waikato students. He says they expect to be able to pay themselves a living wage by the third year of operation, but in the meantime he’s working hard at leveraging course credits for some of the work the company does.

He used the start-up of the enterprise as the basis for one of the two required industry experience internships which are a key part of the BECom degree.

"The next project we’re working on is to create an application for a not-for-profit rural playcentre, and my strategic management lecturer has agreed to accept this as an assignment task," says Mr Cole.

He’s also arranged for the computer graphic designers to do their internships in the company, and is talking to faculties and the university’s commercialisation arm, WaikatoLink, about plans to get a student incubator programme up and running.

Mentoring has come from Professor of E-Commerce Bob McQueen and Bill Rogers in the Department of Computer Science.

"Brian is a great example of the range of mature students and fresh out of high school students who have chosen the BECom because of its mix of management and technology courses," says Professor McQueen. "There are many exciting career opportunities for these graduates, both as employees working their way up an organisation, and also, as Brian has shown, in launching their own technology start-ups."

As well as working with clients, Cold Studios is also working on its own IP. Projects include a space shooter game, an internet radio streaming app for a specified music genre, and an app which allows users to create their own sound files for ringtones, for example.

*info@coldstudios.co.nz*

**Taking up challenges**

**ON HER first day at Whangarei Girls’ High School, Briar Thompson was issued a challenge by the school’s kaumatua. He told the Māori students to change the statistics on poor Māori performance and to make the most of the educational opportunities on offer.**

Ms Thompson has done that. A dux at Whangarei Girls’ and University of Waikato honours graduate with Ngā Puhi affiliations, she is one of three New Zealanders going to Oxford University this year on Rhodes Scholarships. There, Ms Thompson will study for two masters degrees – one in Refuge and Forced Migration Studies and the other in Global Governance and Diplomacy.

She intends to focus on the Pacific region, including forced migration, security, diplomacy, and regional decision-making, especially those issues that arise as a result of disasters and/or climate change. She hopes her supervisor will be Professor Roger Zetter, Emeritus Professor and former director of the Refugee Studies Centre at Oxford.

The prestigious Rhodes Scholarships constitute the pinnacle of achievement for university graduates wishing to pursue post-graduate study at one of the world’s leading universities. The awards are administered by Universities New Zealand – Te Pōkai Tara.

"I first heard about the scholarship when I was 14. I was on the Young People’s Reference Group for the Office of the Children’s Commissioner and was at a function at Government House when Lady Susan Satyanand, wife of the then governor-general mentioned it in general conversation. Then in my second year at university, I was asked to attend a function for top students and the scholarships were mentioned again. That sowed the seed.”

While at Waikato, Ms Thompson studied communication majoring in public relations, but says she’s always been interested in development studies, even before she knew it had that name, and she thinks her Waikato degree has set her up well for Oxford. Alongside her Waikato studies, she’s worked part-time at various jobs, been a mentor for other Māori students, completed a Certificate in Refugee Resettlement Practice and worked with a refugee family settling in Hamilton.

Ultimately she would like to work for the UN High Commission for Refugees, but is aware she’ll need to get plenty of experience (and also learn to speak French) first. “It’s policy rather than field work that interests me most. I see myself as a problem solver and these two degrees I’m doing will help equip me for work in a governmental or other organisation involved in policy advising or in developing solutions to regional and global issues.”

Her old school kaumatua would be pleased.

“I believe he meant us to take his words beyond the school gates, to expand upon his vision, and to assume the mantle of leadership. I’m stubborn, or as my father would say, ‘bloodied-minded’, and I’m not afraid to work long and hard to achieve my goals. By learning about, analysing, and dissecting the theories and practices in place, I believe we can find better ways of doing things; we can find solutions to societal problems.”
Sustainability grads land top jobs

IT’S OFFICIAL: Saving the planet can boost your career.

Students who have taken the University of Waikato Management School’s graduate-level sustainability paper are popping up all over the world in jobs with corporations that want to become more environmentally and community friendly.

Joe de Jong graduated last year and is now working in Stuttgart, Germany, for PE International, where he gets to put into practice everything he learned from the Strategies for Sustainability paper (STMG 580).

“PE International is the international market leader in strategic consultancy, software solutions and extensive services in the field of sustainability. Mr De Jong currently works as an analyst developing sustainability solutions for corporate clients worldwide. “I am primarily in a team using the SoFi software platform, a corporate carbon footprinting tool,” he says.

Mr De Jong sees a direct connection between his sustainability studies and the work he is now doing for Fortune 500 and Global 200 companies.

“The strategic and product sustainability consulting arena is growing in demand, which means companies are always on the lookout for graduates who ‘get sustainability,’” he says.

“Executives at PE International have told me that they would be interested to hear from more Waikato Management School graduates with a world-class knowledge of sustainability.”

That comes as no surprise to Associate Professor Eva Collins, who designed and teaches Waikato's STMG 580 paper.

“In a tight job market, the key to landing that ideal job is to stand out from the crowd. Our focus on sustainability gives our graduates an edge. We tell them they can get paid and save the planet too.”

One key element of the paper is the fieldtrips – students learn firsthand from windfarm managers, sustainable farmers and local entrepreneurs about how to implement sustainability strategies.

As a networking opportunity, the class goes to the annual Sustainable Business Network Forum, held in Auckland and sponsored by Waikato Management School. The response, says Dr Collins, has been overwhelmingly positive.

“Students tell me that the SBN Forum offers an insight into the real-life application of sustainability principles and concepts in different businesses,” she says.

“Regularly hear from students that they took more out of the field trips than any test or assignment.”

One of those students is Paulien de Haes who now works as a consultant at KPMG’s Climate Change & Sustainability practice in her native Netherlands.

Ms De Haes already had a Masters in international business from Maastricht University before making the trip down under to do a postgraduate diploma at the University of Waikato.

“The highly specialised study I did at Waikato is not available in many other places,” she says. “We had lots of opportunities to relate the things we learnt to practical cases of companies, NGOs, etc, which I enjoyed very much. And it helped me find a job more easily in the field of sustainability since I had specialised knowledge and had written a thesis.”

Another graduate, Trent Bos, took a ‘mainstream’ marketing job with beverage and food giant Lion in Australia. When his employers found out that he had taken a sustainability paper, they asked him to be part of the team that put together Lion Nathan’s sustainability strategy, with a multimillion-dollar budget.

Mr Bos has also been selected for the Australian delegation to the Rio+20 Earth Summit in Rio de Janeiro next month.

Despite the global economic downturn, the demand for graduates with an understanding of sustainable business shows no signs of slacking off.

Earlier this year, Joe de Jong was back in New Zealand for a few months in PE International’s Wellington office, one of just two branch offices set up within the last two years in the Australasian region. The first thing he did was pick up the phone to his former lecturer Dr Collins to see if she could recommend any STMG 580 grad.

“They’re an amazing bunch,” says Dr Collins. “Trouble is, they get snapped up real quick – there’s what I call the S80 global network out there now. The good news is it shows there are plenty of businesses that understand you can’t just tack sustainability on to the traditional take, make and waste business model. It requires a completely different mindset to harness the power of commerce to create a sustainable future.”

evacoll@waikato.ac.nz

ASSOCIATE PROFESSOR EVA COLLINS: Graduates with sustainability expertise can get paid and save the planet too.
Lessons from l’Aquila earthquake

AS CHRISTCHURCH wrestles with rebuilding options in the wake of the 2010 and 2011 earthquakes, its Italian counterpart l’Aquila is poised to become a test case for a European Commission initiative to increase public participation in decision-making.

An economist from the University of Waikato Management School is one of a team of 15 experts drawn together by the EC to advise on ways to kickstart economic development around the central Italian city, which was largely destroyed by an earthquake in April 2009.

The initiative, Abruzzo 2030: On The Wings of L’Aquila, is supported by the OECD and Groningen University in the Netherlands, and funded by the Comitato Abruzzo post-quake reconstruction solidarity fund. The fund is made up of donations from businesses and the Italian trade unions which pledged a sum equivalent to one hour’s work by all union members.

Waikato University economist Professor Riccardo Scarpa says the expert advisers are putting together a test suite of economic indicators to measure the impact and efficacy of post-earthquake reconstruction initiatives in the region.

“We’re dealing with issues of identity as well as economic activity,” he says. “L’Aquila lies in a region which was already lagging behind, and the fragmented response to the earthquake has left many of the city’s residents believing they’ve been forgotten.”

It’s now three years since the quake devastated l’Aquila, which lies about 100km east of Rome in the mountain region of Abruzzo. The medieval city centre was destroyed in the quake, and remains largely deserted; while the city’s more than 70,000 inhabitants have been relocated to new residential areas outside the quake zone.

Rather than rebuilding the city as it was, the OECD-Groningen initiative has put forward a vision for l’Aquila as a ‘smart city’, focusing more on sustainable long-term economic and social development within a national and international perspective.

Professor Scarpa, who is an environmental economist specialising in the economics of choice, is responsible for developing an attitudinal survey designed to find out what local people really want – and to provide feedback to decision-makers without it being filtered through interest groups or the media.

“We see the l’Aquila reconstruction and economic development plan as a test case for a bottom-up rather than a top-down approach, based on evidence of what people want. Part of this evidence will be provided by surveys,” he says.

Survey sampling of this kind can help increase citizen participation in economic development. The EC is developing a suite of tools to monitor investment aimed at promoting economic growth in regions that lag behind the rest of the EU. Survey-based evidence is seen as a potentially important component of this suite of tools.

“So in a way l’Aquila is a test case for making public investment more accountable to the people it’s supposed to benefit as well as to those who fund it.”

The survey, which is currently underway, aims to gather information on what local people think should be the long-term drivers of economic development in Abruzzo, and what role the big regional institutions – including the local university and the internationally renowned Gran Sasso National Laboratory for nuclear physics – should play in kickstarting technical development for the proposed ‘smart city’.

People are also being asked about their quality of life after the earthquake, and the adjustment to a more suburban lifestyle.

“The survey will help us create a systematic measure of how successful reconstruction investments have been to date,” says Professor Scarpa. “In l’Aquila, there have been problems with the infrastructure for new residential areas – schools located in hard-to-access areas, inefficient public transport, and fragmentation of competence across different authorities.

“And while the mountainous location lends itself to shared heating systems for homes, and other energy efficient solutions, the opportunity wasn’t taken. But there’s always a trade-off between urgency of response to any disaster and longer-term benefits.”

Professor Oxley says Captain Cook to the 160-year study.

RESEARCH, INNOVATION AND ENTREPRENEURSHIP AT THE UNIVERSITY OF WAIKATO

Professors Scarpa and Oxley are part of an international study looking at the health and wealth transition of New Zealanders.

Professor Oxley is part of an international study looking at the health and wealth transition of New Zealanders.

He’s working with Dr Evan Robbers, a New Zealand-born PhD student based at the University of Minnesota, and Kris Inwood, Professor of Economics and History at the University of Guelph in Canada. They’re researching height and body mass (BMI) and our economic wellbeing from the 1830s to the present day.

While it’s been customary to measure a nation’s wealth by GDP per person, Professor Oxley says it may be there are alternative ways to more successively measure Maori and Pakeha living standards. The study covering 160 years may help to find the origins of New Zealanders’ changing health and wellbeing status, including the recent increase in obesity.

He says we can’t just assume it’s all to do with genetics.

“We know that factors influencing height are about 70% genetic and 30% lifestyle; in particular nutrition (specifically protein) and exposure to diseases,” says Professor Oxley. “When people started moving to cities, whole cross-sections of the population ended up being a little shorter, and health and stature picked up once infrastructure was in place to cope with a rising population and outbreaks of disease.”

Professor Oxley says international studies have found a close link between childhood nutrition and adult height, and that link has often been used by historians to gauge the material standard of living in a population.

“By looking at overseas research and patterns we can learn from other countries and find out whether we can drop in to New Zealand an economic solution from elsewhere – once we fully understand the New Zealand situation.”

The New Zealand research is being funded by the Health Research Council and a Marsden Grant.

The researchers are using military records of soldiers from both world wars, information from prison, data from the Boer War, health studies and school records to track our changing stature.

“The data can tell us how the population's stature has changed over time and we can link that information to when various diseases were affecting the population and the impact that had on people's growth. We can also link it to the cost of foodstuffs, wages and unemployment, etc, to consider whether the ability to buy food affects stature differently at different points in time.”

Professor Oxley says Captain Cook recorded that Māori were lean and muscular – that was in the mid-1700s – and they were not noticeably bigger than Pakeha. “Our sample of late 19th and early 20th century records show farmers were on average an inch (25mm) taller than the average male, and males born in Dunedin were shorter than those born in Christchurch. So we’re trying to find the causes for these differences, which may help us plan for controlling issues such as obesity in the future.

“We also need to know if economic policies play any part in stature. For example, when there’s high unemployment, particularly in certain groups, that may have led to those groups, either ethnic or occupational, not attaining their maximum height potential.”

ricarpa@waikato.ac.nz
Graham Oberlin-Brown is aiming for the London Olympics.

ATHLETES going to the London Olympics may not want to hear this, but new sports science research reveals that putting athletes under extreme stress will result in better performance.

For 12 years University of Waikato lecturer and sports physiologist Brett Smith has been consulting to New Zealand’s elite rowers and top coaches as they’ve risen to the top in world rowing.

For the past four years he’s been completing his PhD on optimal sports performance and found that contrary to accepted theory, those rowers who experienced greater increases in stress (eg decreased testosterone, impaired immune function, increased muscle damage and worsening mood) had greater improvements in performance.

His findings indicate that rather than predicting overtraining, large negative changes in physiological or psychological markers of stress may be more useful for ensuring elite athletes are training hard enough.

“When you’re pushing the body to extremes, the brain tells you to slow down, to stop what’s potentially damaging,” says Mr Smith. “But what we found was the most stressed rowers, the ones who had the worst mood changes and the greatest sleep disturbances actually ended up performing best at the world rowing championships. So you could say they’re only overtraining when their boat speed falls off.

“You have to remember that just to compete at elite level probably means you’re not normal or average. You’re already something pretty special and the tools used for predicting overtraining aren’t always adequate or accurate enough to monitor world class athletes. These are people at the outside end of the bell curve, the outliers.”

Mr Smith accompanied the New Zealand rowing crews to most international competitions including the Olympics in Athens and Beijing. The Evers-Swindells, Rob Waddell and Mahe Drysdale were among his guinea pigs.

“In the early days we were testing everything – blood, salvia, hormone levels, immune function, muscle damage, psychological state, heart rates – everything that was measurable, row by row. We wanted to identify the levels that produced top results and the triggers that might push them over the edge. You wouldn’t believe the personal data we had. We also had data from every race they competed in throughout their international careers.”

He admits he was in a unique position. “Few academics would have access to so much data over such a long period from a large group of successful elite athletes.”

He’s grateful that New Zealand’s rowing coaches were happy to come on board and utilise the strategies he developed to more accurately predict overtraining. “We developed systems and technology to monitor the athletes’ performance during training. So if an athlete was feeling stressed, say they were showing signs of a decreased heart rate variability or depressed mood state, as long as training workload didn’t drop we would keep pushing them.”

It makes Mr Smith sound like some kind of training ogre, but he says the coaches keep a good eye on their athletes, watch the boat speed, watch the body language and compare what they see with what their rowers are telling them.

Mr Smith won’t be in London working with New Zealand rowers in July. He’s handed in his PhD and is now back working full-time at University of Waikato for the time being.

brett@waikato.ac.nz

PUSHING for information within an organisation’s archives can be like looking for a needle in a haystack – particularly if you don’t know exactly what you are looking for.

Even with the best electronic filing systems, crucial bits of information can be hidden away or scattered across multiple documents, making them almost impossible to track down.

But now a new software tool created by researchers at the University of Waikato is being harnessed to tackle this problem of unstructured data.

Wikipedia Miner, developed by Dr David Milne and Professor Ian Witten of the University of Waikato’s Digital Library Group in the Centre for Open Software Innovation (COSI), allows users to “mine” the resources of the open encyclopedia.

“Wikipedia is the largest and most visited encyclopaedia in existence,” says Dr Milne, “and it’s also densely structured. There are literally hundreds of millions of links which allow you to encounter information you might never have thought of searching for.

“What we’ve done is bring the same explanatory links to all documents on the web.”

The open source tool can compare terms and concepts to measure how strongly they are related to each other, and can cross-reference topics automatically – once the program has been ‘trained’ to make the same decisions as humans regarding what’s important in any document.

The resulting information structures – or taxonomies – provide much more contextual information than a simple word search.

Professor Witten, Dr Milne and machine learning specialist Dr Anna Huang are now collaborating with hi-tech company Pingar, which helps its customers manage unstructured knowledge, to develop commercial applications for Wikipedia Miner.

Pingar has offices in New Zealand, Hong Kong, India, the UK and California’s Silicon Valley, and is developing specialised software tools to automate information organisation and search functions.

The company’s Chief Research Officer is Dr Alyona Medelyan, who completed her PhD at Waikato under Professor Witten’s supervision.

“Documents need to be categorised into a meaningful taxonomy for successful browsing or searching,” she says. “Our software allows companies to manage data in the same way a professional librarian would organise books.”

Over the last six months, Pingar’s software developers have been working with the Waikato researchers to develop a one-click taxonomy extraction tool.

“Waikato’s Department of Computer Science has a global reputation for its work on data mining, natural language processing and machine learning, so it’s a perfect fit for us,” says Dr Medelyan.

Pingar and the university research team have won funding from the Ministry of Science and Innovation for the project, and hope to have a prototype taxonomy extraction tool ready for testing by mid-2012.

“This collaboration aims to develop a new way of addressing the ever-increasing problem of data complexity and overload,” says Professor Witten, who has a string of innovative software solutions to his name, including the Greenstone digital library software and FLAX, an education tool that allows language teachers to create practice exercises from ‘real’ language texts and multimedia available through digital libraries.

“This latest project is a great example of how research expertise can partner with business to create value.”

ihw@waikato.ac.nz http://wikipedia-miner.cms.waikato.ac.nz/ http://pingar.com/

PROFESSOR IAN WITTEN heads the NZ Digital Library Research Group in the University of Waikato’s Department of Computer Science. The group’s open source Greenstone digital library software is currently used in more than 60 countries and by UNESCO for tasks ranging from collating information on disaster relief operations to development work. In 2010 Professor Witten was named a World Class New Zealander for his work.