KEYNOTE ABSTRACTS

Abstracts are included in alphabetical order.

THE STATE OF THE NATION: ENVIRONMENTAL EDUCATION / EDUCATION FOR SUSTAINABILITY

Grahame Collier
President of the Australian for Environmental Education

This paper provides a starting point; a welcome to the conference and a context in which the remainder of the program is set. Developed totally from an AAEE perspective, this paper firmly establishes the conference as being 'owned by the AAEE' and identifies it as the flagship event for the premier professional association in Australia; a body which represents the views of those who design, deliver and/or evaluate environmental education/ education for sustainability.

By taking a 'state of the nation' approach' to delineate some achievements, identify some limitations and to set some strategic challenges for our future, the paper provides visibility for an AAEE view of the EE/EfS world. The Association has the potential to take a central role in developing and supporting a highly competent field of education practitioners who are well equipped to move the community towards more sustainable practice through vibrant well-resourced education programs. Now is the time when that potential must be turned into action.

Grahame Collier. *A lifetime in developing, delivering and evaluating education programs and managing others involved in that process. A focus on working for environment protection, sustainability and public health outcomes and in programs that are achieving real behavioural shift. Work in the non-government sector, state government agencies, an international organisation and now as a sole operator consultant. Grahame is the current President of the AAEE.*

PLENARY ADDRESS

Professor Kerry Cox
Vice-Chancellor, Edith Cowan University
Western Australia

The United Nations has declared this decade as the decade of education for sustainability, setting the goal to provide every person with the chance to benefit from educational opportunities and to learn the lifestyles, behaviours and values necessary to create a sustainable future.

Universities have a key role to play in working towards these goals: we train the teachers who will interact with future generations; we also conduct research; work with our communities to build capacity and must of course lead by example. Unless we can teach others to be ecologically literate (as well as we teach numeracy, reading and writing skills) we will not be able to tackle some of the most serious issues facing humankind.

Kerry Cox *has published extensively in the international literature on autoimmune disease and the mechanisms of immunological self-tolerance. His memberships include the National Council on Environmental Education (NEEC) in Australia, the Business-Higher Education Round Table, the Australian Society for Microbiology (former President), the Australasian Society for Immunology, the Victorian Education Research Network and the Australian Higher Education Industrial Association (President).*

THE UN DECADE, A GLOBAL PERSPECTIVE

Professor Charles Hopkins
UNESCO Chair, Reorienting Teacher Education Towards Sustainability
York University, Toronto, Canada

Education, public awareness, and training can be powerful tools for moving nations, communities and households toward a more sustainable future. Education is such a powerful and potential laden instrument that the United Nations has declared 2005-2014 to be the UN Decade on Education for Sustainable Development, UNDESD. This lecture will describe the story behind the evolution of ESD from a global perspective.

This address will also describe the key issues in engaging environmental educators in the pursuit of a more sustainable future. These issues and challenges associated with education for sustainable development (ESD) include understanding what ESD is and how EE can contribute while still engaging other disciplines, institutions, sectors and individuals.

ESD builds the capacity of nations to create, broaden, and implement, sustainability plans. ESD improves sustainable economic growth by improving the quality and skills of the workforce. It enhances the implementation of sustainability plans by creating an informed public that can support enlightened policy and legislation, and raises the quality of life for all members of society.

The United Nations University has developed four contributions to the UNDESD. One of these four contributions is the Regional Centres of Expertise in ESD. This is a new global program that engages all sectors of the formal, non-formal and informal education sectors as well as those who have accurate information regarding the local environmental, social and economic threats to the community or region. Approximately twenty such Centres are either in place or emerging around the world.

ESD is emerging globally and EE is proving an essential component.

Charles Hopkins *is currently the UNESCO Chair at York University in Toronto, Canada where he coordinates an international network of 36 teacher education institutions from 35 countries collaboratively working upon the reorientation of elementary and secondary teacher education to address sustainable development. Hopkins is also a United Nations University (UNU) Chair on Education for Sustainable Development, assisting UNU to develop Regional Centers of Expertise in ESD, again on a global basis. He was an author of Chapter 36 on Education, Public Awareness and Training in Agenda 21, the Action Plan emanating from the Earth Summit in Rio (92) and he chaired the major education side event at the World Summit on Sustainable Development (WSSD) in Johannesburg in 2002. Hopkins continues to play a major role in the context of education for sustainable development at the international level. Chuck is a Fellow of the Australian Association for Environmental Education.*

STORIES OF CONNECTIONS IN NYUNGAR BOODJA

Pierre Horwitz
Consortium for Health and Ecology, Edith Cowan University

Westernised life in Nyungar boodja for many inhabitants does not necessarily mean engaging with a scratchy often charred forest, a remarkably idiosyncratic flora, the starry sky over an ancient flat land, the frog chorus in the lowlying swamps, the aromas of the coastal dunes and sandy coastal plains, or seasonal water. There's a retreat to air-conditioned and security conscious homes where processed and out of season food and drink are consumed in front of televised programmes (of predator-dominated nature shows, if you're lucky). In this we seem no different to other apparently civilised and developed parts of the world. Sensing this inexorable shift, and almost like last calls from the wild, we urge our education system to introduce ecological literacy into a curriculum obsessed with a written and numerical tradition, and struggle to persuade the emergency and hospital-focussed health sector to see the importance of contact with 'nature' as the ultimate preventative cure. Does it really matter? Where's the evidence that we need ecological literacy and contact with nature? Using local anecdotes of the elements, particularly earth, water and fire, I explore a theme of never-ending interdependence in Nyungar Boodja.

Associate Professor Pierre Horwitz *is currently the Director of the Consortium for Health and Ecology at Edith Cowan University. He has a particular interest in the relationships between human health and the health of their surrounding ecosystems. He has published 6 monographs and over 70 papers, edited several proceedings volumes and written numerous reports for government and industry in the last twenty years. Dr Horwitz is currently a Co-editor of the international journal EcoHealth, published by Springer.*

LIVING IN A POST-OIL WORLD

Molly Harriss Olson
Director, Eco Futures Pty Ltd

I want to challenge you to **imagine living in a post oil world.** To look back over the last 4.5 billion years, and forward to the next 1000 years of planet Earth. How will you, as educators, in rapidly climate changing, globally challenged world help kids to cope? What skills will they need?

I want to challenge you to step out of your comfort zone, to contemplate the evolution of the planet that brought you here and grapple with the enormous challenges we will face to get to a "post oil world".

I want to challenge you to imagine what a sustainable civilization will look like in the year Three thousand and five (3005). Humanity in all its wonderful diversity, living on an ecologically rich, climate stable, healthy, peaceful planet Earth.

How did we get there?
How did we overcome the cataclysmic ecological, atmospheric, economic and social problems we struggle with today?

Along the way I want to explore the evolution of our brains,
The state of the planet and the state of our civilization.
Thinking Badly; and the consequences.
Thinking Well; and the opportunities.

How can you help evolve a global culture of Sustainability?

Eco-Futures is an Australian-based international policy firm working on building sustainable strategies with business, government and civic leaders. ***Molly Harriss Olson*** *is the Convenor of the National Business Leaders Forum on Sustainable Development, Chair of the Editorial Board of Ecos Magazine (CSIRO Publishers) and an internationally recognised leader on sustainability.*

ENVIRONMENTAL FUTURE (WISDOMS FOR OUR FUTURES)

Professor Sohail Inayatullah
Political Scientist And Professor
Tamkang University, Taipei (Graduate Institute Of Futures Studies)
www.metafuture.org

Inayatullah will present basic concepts and questions in futures thinking, including the following: Have you purchased a used future? Which is your disowned future? What are the alternative futures? How can we link the external dimension of the future to the inner maps we use to give the future meaning? He will also present methods (the futures triangle, scenarios and critically unpacking the future so as to create alternatives). These will be used to develop next steps for environmental education.

***Dr Sohail Inayatullah**, a political scientist, is Professor at the Graduate Institute of Futures Studies, Tamkang University, Taipei; Adjunct Professor, Faculty of Arts and Social Sciences, University of the Sunshine Coast, Maroochydore; and Research Associate, Center for Social Change Research, Queensland University of Technology, Brisbane. In 1999, he held the UNESCO Chair at the Centre for European Studies, University of Trier, Germany.*
Inayatullah is co-editor of the Journal of Futures Studies and associate editor of New Renaissance. He has written more than 300 journal articles, book chapters, encyclopedia entries and popular magazine essays, and his work has appeared in over 40 different journals. His articles have been translated into a variety of languages, including Catalan, Spanish, Urdu, Hindi, Bengali, Italian, Russian, and Mandarin. Inayatullah has also written and co-edited fifteen books. His books since 1997 include: Macrohistory and Macrohistorians; Futures Studies (CD-ROM); Situating Sarkar; Transcending Boundaries; The University in Transformation; The Views of Futurists (CD-ROM); Transforming Communication; Understanding Sarkar; Youth Futures; Islam, Postmodernism and Other Futures, The Causal Layered Analysis Reader, and Questioning the future. Forthcoming in 2006 is Neohumanist educational futures: liberating the pedagogical intellect.

LEARNING FOR SUSTAINABILITY: CHANGE MANAGEMENT ON A NATIONAL AND GENERATIONAL SCALE

Paul J Perkins AO
Adjunct Professor, Australian National University

Paul J Perkins *is a national leader in public sector utility reform (water, wastewater, energy & health services) and the emerging sustainable development movement. He is presently chairman of the new Adelaide based Cooperative Research Centre for Contamination Assessment and Environmental Remediation (CRC CARE), a member of the Australian Government's Business Roundtable on Sustainable Development, Chairman of the National Environmental Education Council and Chairman of the Barton Group, a national CEO alliance responsible for leading implementation of the Environment Industry Development Action Agenda & project director of their national Water industry Development Roadmap study. He is a Companion of the Australian Institution of Engineers, and a Life Member of Environment Business Australia.*

LEARNING FOR SUSTAINABILITY: NEW LEARNING, NEW RESEARCH

Associate Professor Daniella Tilbury
Director of ARIES (Australian Research Institute in Education for Sustainability),
Macquarie University, NSW

The last five years has seen the sustainability agenda come alive within Environmental Education practice. It has been responsible for much of the shift in recent practice as policy-makers and practitioners rethink the role of education in achieving environmental outcomes. At last, the rhetoric arising out of Agenda 21 and WSSD is taking meaning in the form of new learning at the community, government, business and formal education level. The keynote presentation attempts to identify the frameworks which underpin this new learning. In the words of practitioners, the presentation highlights the realities of implementing this new approach to Environmental Education across the sectors. Concluding the presentation will be examples of effective 'bridges' between research and practice in this new area as well questions regarding the redefined role of research institutions and agencies which fund research in Environmental and Sustainability Education.

Daniella Tilbury *is the Director of the Australian Research Institute in Education for Sustainability. Daniella has a long and distinguished career in Environmental Education and Education for Sustainability. She has participated in many national and international committees and panels, including the IUCN and the OECD. She has a wide variety of publications, including the book Tilbury, D. and Goldstein W. (2003)* Engaging People in Sustainability.

PLENARY ADDRESS

Peter Woods
Chief Information Officer, Department of the Environment and Heritage

***Peter Woods** has executive responsibility in the Australian Government Department of the Environment and Heritage for developing and implementing national policy on education for sustainability. He chaired the National Reference Group established to oversee the development of the Australian Government's National Action Plan for Environmental Education. He currently chairs the National Environmental Education Network, comprising representatives from State and Territory education and environment agencies. Peter also represents the Australian Government on the Board of Trustees of the Japanese Government's Institute for Global Environmental Strategies. Peter has extensive experience in public policy and community consultation and has worked previously in a variety of areas in the Australian Government.*

CONCURRENT SESSION ABSTRACTS

Abstracts are included in alphabetical order.

ENVIRONMENTAL EDUCATION IN COURSES OF STUDY FOR THE NEW WESTERN AUSTRALIAN CERTIFICATE OF EDUCATION

Alan Atkinson and Elaine Horne

This workshop examines the opportunities for environmental education in new courses of study to be introduced in 2007 and 2008 in Western Australian secondary schools. These courses are from the learning areas of Science and Society and Environment, and are among the courses offered as part of the new Western Australian Certificate of Education (WACE). Courses to be discussed include Biology, Earth and Environmental Science, and Geography. Topics to be covered include links to environmental education themes; course structure and content; learning, teaching and assessment; and teaching and learning resources. Participants will be provided with sample teaching and learning materials such as unit outlines, evidence plans, schemes of assessment, student briefs for assessment tasks and assessment rubrics.

Alan Atkinson *is a teacher of Geography and Society and Environment who currently works as a Curriculum Officer with the Curriculum Council of Western Australia. He is involved in the development and implementation of the new Geography Course of Study.*

Elaine Horne *is a teacher of Biology and Science who currently works as a Curriculum Officer with the Curriculum Council of Western Australia. She is involved in the development and implementation of the new Biology Sciences Course of Study.*

ENVIRONMENTAL EDUCATION FOR RESTORATION OF URBAN BIODIVERSITY

Dr Catherine Baudains

Biodiversity is regarded as critical issue facing Australia with continued loss of biodiversity from urban areas of increasing concern. It is recognised that community education is required to improve awareness about environmental impacts and achieve behavioural change to reduce environmental impacts. However, while community education for issues such as waste management and transport have been developed, no effective strategies exist to achieve behavioural change relating to biodiversity. This paper presents the preliminary results of new research with Greening Australia WA in education for restoration of urban biodiversity which aims to establish an effective model for achieving behavioural change in urban garden practices. The concept of 'Discovery – Understanding – Action' leads participants through a process of learning, enabling learners to think of their own garden as a 'stepping stone' of habitat for endemic flora and fauna, and encouraging them to accept responsibility for appropriate development and management of this habitat resource. Development of an effective model based on this concept has potential to restore biodiversity of degraded urban ecosystems, and is an essential precursor to further research relating to both long-term urban environmental restoration, and education as a tool for achieving sustainability outcomes.

Dr Catherine Baudains *is a lecturer in Environmental Management and Environmental Education at Murdoch University. Her research interests focus on improving the effectiveness of environmental education as an environmental management tool. In other words, changing human behaviour in order to achieve a sustainable environmental outcome. Catherine completed her doctoral research in this area, specifically examining various education strategies in the context of transport use and developing the TravelSmart Workplace programme. Her more recent research includes work in the fields of urban biodiversity, environmental and lifestyle education programs, evaluation of environmental education, and the WA Sustainable Schools Initiative.*

ENVIRONMENTAL EDUCATION FOR SUSTAINABILITY: PREPARING THE PRACTITIONERS

Dr Catherine Baudains

Programs which focus specifically on environmental education for sustainability are rare in undergraduate tertiary courses, despite the clearly recognised need for training in this area. Those programs that do exist face many challenges in providing flexible and practical learning experiences, which develop the skill base needed for practitioners in the of education for sustainability, within the scope of a 13 week university program. This paper outlines the challenges and successes of one undergraduate tertiary environmental education for sustainability unit. The unit aims to promote an understanding of the nature of environmental education/education for sustainability, and enable students to develop the knowledge and skills required effectively to plan, implement, and evaluate environmental/sustainability education for a wide range of target audiences including schools, industry and the community. Stories from the unit will be shared in order to explore how project based student work in the unit achieves necessary graduate attributes while also meeting the needs of practitioners in the field and achieving positive sustainability outcomes.

Dr Catherine Baudains *is a lecturer in Environmental Management and Environmental Education at Murdoch University. Her research interests focus on improving the effectiveness of environmental education as an environmental management tool. In other words, changing human behaviour in order to achieve a sustainable environmental outcome. Catherine completed her doctoral research in this area, specifically examining various education strategies in the context of transport use and developing the TravelSmart Workplace programme. Her more recent research includes work in the fields of urban biodiversity, environmental and lifestyle education programs, evaluation of environmental education, and the WA Sustainable Schools Initiative.*

"SUSTAINABILITY MEANS SOMETHING CLEAN AND TIDY, DOESN'T IT?" DEVELOPING AND ASSESSING CHILDREN'S CONCEPTUAL UNDERSTANDING OF SUSTAINABILITY

Sally Birdsall
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The University of Auckland
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Sustainability is one of four key concepts identified for inclusion in environmental education programmes in the framework *Guidelines for Environmental Education in New Zealand Schools* (Ministry of Education, 1999). Of the four key concepts, sustainability can be regarded as the most important. However, arriving at a definition of sustainability for inclusion in a teaching programme is problematic because of its complex nature. This complexity is due to the myriad ways in which people interpret the word sustainability.

An interpretive-qualitative mode of inquiry with a case study approach was used to investigate the development of 11-12 year old students' understanding of the concept of sustainability. Their understandings were developed through their engagement in an environmental education programme. Underpinning this programme was the World Commission on Environment and Development's definition of sustainability. The definition was contextualized for this particular group of students' use and only contained the social and environmental components of sustainability.

A tool was developed in order to analyse their understandings at four different points during the programme. The analysis tool was inductive in nature and linked to the contextualized definition of sustainability that underpinned the environmental education programme.

An analysis of the students' understandings about sustainability reflected the complexity of the concept. The students' understandings covered a broad range of ideas from biodiversity to intergenerational equity. In addition, its complexity was shown by the way that the majority of the students were only able to express an understanding in terms of one of the components of sustainability. This analysis suggests that developing an understanding of sustainability is difficult for students of this age-group.

Sally Birdsall *is a senior lecturer in the Faculty of Education at The University of Auckland. I lecture in pre and in service primary science education and have recently written and am lecturing in a pre-service environmental education course for secondary students.*

ABORIGINAL LAND MANAGEMENT AND RESOURCE USE IN THE SOUTH-WEST

Nerilee Boshammer
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Greg Hales
Program, Blackwood Basin Group
gregh@westnet.com.au

The ethos of sustainability and sustainable living has existed in the south-west for thousands of years. Nyungar people, the Aboriginal people of the south-west, practiced sustainable land and resource use and management, guided by the Dreaming and by their inherent understanding of the natural landscape.

Traditional Nyungar land management has had a significant influence on contemporary Natural Resource Management (NRM). This is expressed in a number of different ways, from using Nyungar names for our native flora and fauna, through to the overarching ethos of sustainability and custodianship of the natural environment.

The Blackwood Basin Group (BBG) believes that it is important to educate the community and the NRM sector about Nyungar land and resource use. The incorporation of traditional and contemporary Nyungar cultural values into NRM practice in the Blackwood Basin has environmental, social and even economic benefits, in the form of job creation for Nyungar people in NRM and education.

As part of this, the BBG has produced a School Resource Manual with a focus on educating students about Nyungar land and resource use and management, both traditional and contemporary, in the Blackwood Basin. It is designed as a flexible tool for educators, both in the school system and in environmental education programs (i.e. The Blackwood Waterwatch Program).

The BBG's presentation at the AAEE Conference is designed to illustrate the importance of Nyungar cultural protection and education within the NRM and school sector, through the presentation of our School Resource Manual.

Nerilee Jean Boshammer: *Qualifications: Bachelor of Science (Environmental Management) with First Class Honours. After graduating Edith Cowan University in 2004, I moved from Perth to Boyup Brook in March of 2005. I began work with the Blackwood Basin Group (BBG), a Natural Resource Management group based in Boyup Brook in April of 2005. I am currently working on a number of NRM projects, one of which is a project focused around incorporating Indigenous knowledge and cultural protection into NRM in the Blackwood Basin. Working on this project has illustrated to me the importance of educating people about Indigenous land management and culture, as it is vital to sustainability, biodiversity protection and environmental management.*

CONCEPTIONS OF SUSTAINABILITY AMONG UNDERGRADUATE STUDENTS

Kevin Brady
Lecturer in Education
Edith Cowan University
Robertson Drive, Bunbury, Western Australia

This research attempts to determine the range of conceptual ideas relating to sustainability in undergraduate education students. The students were surveyed to determine how they conceived of the term '*sustainability*' and how they perceived its relevance to their lived context in South-West Western Australia. The students had no formal instruction on sustainability or ecological issues beyond their high school courses of study. Student responses were categorised and compared to existing definitions from government and non-government agencies. The research identifies common conceptions of the term sustainability, highlights some significant areas where these conceptions differ from more authoritative sources, and describes the implications of these conceptions for teacher educators.

QUALITY CRITERIA AS A TOOL TO ENHANCE THE DEMOCRATIC POTENTIAL OF EDUCATION FOR SUSTAINABLE DEVELOPMENT

Soren Breiting
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What is quality in education for sustainable development (ESD), and how can we achieve it? The author has been involved in developing quality criteria for participatory school development of ESD and will share the ideas behind and how they link to some important aspects of empowerment and democratization.

A classic distinction in environmental education is between an aim of behaviour modification of the learner and - in an opposite direction - towards empowerment and supporting the enhancement of the learner's action competence. This distinction applies equally well to education for sustainable development. It seems to be important to avoid, that work with quality criteria suppresses the democratic potential of ESD as well as of EE.

The contribution builds on extensive work with school development and ESD / EE in several countries combined with joint work in the network of ENSI.

Soren Breiting *works with the development of democratic environmental education and education for sustainable development in theory and practice. His focus is on the learner's outcome as well as the teaching situation as such. Despite acknowledging the importance of the setting he has come to that conclusion that more similarities than differences are the case when comparing the basic mechanisms in successful learning and school development in different countries, e.g. Denmark, Hungary, Namibia and Thailand.*

GETTING A HANDLE ON A WHOLE OF CATCHMENT ECOSYSTEM: COMMUNITIES IN CATCHMENTS

Kathleen Broderick
ARC Centre of Excellence for Coral Reef Studies, James Cook University, Townsville, Queensland, Australia 4811. Email: kathleen.broderick@jcu.edu.au

Environmental management requires detailed understanding of environmental perception. Several bodies of literature inform this understanding but incorporation of the complexity of perception in has been limited environmental management to date. A case study of communities in the Collie catchment in Western Australia reveals strong place relatedness in both perception of environment condition and the perceived interrelationship of social systems and the environment. Furthermore it identifies the variation in perceptions by sub-groups within communities. Finally, the implications of this research for environmental management are considered and learning and organisation development are identified as key management tools.

Key words: communities, environmental perception, place, participation, environmental management, catchment.

SOS – SAVE OUR SHORES

Jenni Burdon
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In this engaging hands-on activity, explore the human impact on Australia's coast. Gain practical ideas to assist students to recognise problems and come up with their own solutions. Teachers will find this a great introductory activity for a unit on coastal and marine issues. It could also be a valuable follow up to a beach or estuary excursion, or a suitable tool for exploring coastal issues with community groups. Can be tailored to meet the needs of all age groups, from 8 years up. Use this memorable and fun activity to focus on relevant local issues (eg. pests, shorebirds, weeds, coastal development, sandmining).

Jenni Burdon *is an Interpretation & Education Officer with the Parks & Wildlife Service of Tasmania. She has a passion for the marine environment, world travel and educating about the magnificent Tasmanian landscape including its native inhabitants and wild-life experiences.*

SUSTAINABLE USE OF AQUATIC RESOURCES IN WESTERN AUSTRALIA

Michael Burgess
Department of Fisheries, Government of Western Australia

Western Australians enjoy a healthy and productive marine environment. However, our oceans, coastline, river systems and fish habitats are under pressure from population growth and increasing demand for natural resources.

The Department of Fisheries has a vital role to conserve, develop and share the aquatic resources of the State for the benefit of future generations. This role is described within the *Fisheries Resource Management Act 1994.*

The Act gives the Department management jurisdiction over all aquatic organisms except mammals, reptiles, birds and amphibians and contains provisions for the management of fish habitat protection areas.

To ensure our aquatic resources are managed sustainably, the Department requires expert scientific knowledge and advice to make informed decisions within the legislative framework.

The Department has developed an Education Strategy that operates in parallel with science and management to deliver key messages, promote best practice and conservation ethics and to foster sustainable behaviours.

The Strategy provides learning opportunities for the general community and targeted stakeholders that help them connect with fish and the aquatic environment. The soon to be opened Naturaliste Marine Discovery Centre will provide a vital interface to exchange ideas and link up with the community. These experiences enable the community to participate in and contribute to a sustainable future for Western Australia's aquatic ecosystems.

This workshop will explore the marine biology and ecology of WA's coastal and inland waterways, the impact of recreational and commercial fishing on people and communities and the highlight the importance of knowledge-based management to ensure healthy and abundant fisheries and environment.

Michael Burgess *currently works as the Southern Region Community Education Officer with the Department of Fisheries based in Busselton. His role is to engage with stakeholders and broader community about fisheries issues and oversees the Volunteer Fisheries Liaison Officer program.*

SUSTAINABILITY MEASUREMENTS IN SUSTAINABLE SCHOOLS NSW

Sue Burton
NSW Dept of Environment and Conservation

Across NSW there are around 3000 schools in a variety of schools systems. Schools are the daily workplace (staff and students) for about 1 million people in NSW and the systems that work to support them represent some of the biggest and most complex bureaucracies in the southern hemisphere.

The cumulative impact and importance of the sustainability role of schools in their local community and across the state cannot be underestimated.
But can it be measured? And if it were to be measured what would be the criteria and process?

The Dept of Environment and Conservation in NSW, as part of its commitment to Sustainable Schools NSW has developed online resources that can assist schools to implement and track how each school is working towards sustainability.

These resources were developed over 2003-2004 in the pilot NSW Sustainable Schools Program that worked with around 200 schools, 7% of schools in the state.

This workshop will outline and provide opportunities to discuss the processes in this online resource but also look at some of the issues schools and those who work with them have in tracking sustainability outcomes. These issues would include:

- What is a sustainability outcome in the school context?
- Data gathering across sustainability outcomes
- The role of data in ensuring the sustainability of environmental outcomes
- Measuring sustainability activities in school grounds
- Student outcomes and sustainability

Sue Burton *currently works as a senior project officer for the Sustainability Programs Division of the NSW Department of Environment and Conservation. Sue has spent many years working with schools and environmental issues and is currently working on Sustainable Schools NSW. Sue is also the Deputy Convenor of the NSW Chapter , AAEE and active in Sydney Environmental Educators Network (SEEN) .*

TOWARDS AN ENVIRONMENTALLY ETHICAL SOCIETY- AND THE ROLE OF ENVIRONMENTAL EDUCATORS

Sue Burton and Phil Smith
Sydney Environmental Educators Network

There have been many years of environmental education yet the environmental issues are becoming more urgent. Underlying many of these issues is how people live and how they think. This workshop will consider how ethics education can be a key tool for educators to address issues such as consumption and resulting environmental degradation.

The first part of the workshop will explore the meaning of environmental ethics utilising key ideas from thinkers such as Peter Singer and Clive Hamilton. The second half of the workshop will focus on working through current tools in ethics education such as those used by the St James Ethics Centre in Sydney.

This is not a workshop that has the answers. Rather it is an opportunity for educators to explore a different approach to addressing the impact of how we live on the environment and what the practical application of that approach might look like.

Sue Burton *currently works as a senior project officer for the Sustainability Programs Division of the NSW Department of Environment and Conservation. Sue has spent many years working with schools and environmental issues and is currently working on Sustainable Schools NSW. Sue is also the Deputy Convenor of the NSW Chapter , AAEE and active in Sydney Environmental Educators Network (SEEN) .*

Phil Smith – *A dozen years teaching here and overseas. A dozen years facilitating, designing, managing, evaluating environmental education programs. A few years in communication, training and management. State-wide, national and international experience. A long history in community protest campaigns and local political activism. Many years in the bush, on rivers & creeks, and in the snow. A lifetime practicing a fun imperative. Currently one of the AAEE vice presidents.*

WHERE TO FROM HERE? THE ROLE OF THE WATER EDUCATION NETWORK IN PROMOTING THE SUSTAINABLE MANAGEMENT OF WATER

Corinne Cheeseman
Education Manager, Australian Water Association

In September 2004, after consultation with educators across the Australian water sector, the Australian Water Association (AWA) created the Water Education Network (WEN). The WEN aims to link existing networks together and broaden communication across the full range of educators, facilitators and communicators including school education, tertiary education, community education and consultation.

Now, two years on, the WEN is a national inclusive network of more than 1,200 individuals with an interest or involvement in water education. The WEN is perhaps no different to many other national networks playing a role in coordination, information exchange and professional development of its members. So how does this support the sustainable management of water? This paper will discuss the challenges and opportunities that lie ahead for the WEN, its members and indeed for water educators, communicators and facilitators of behaviour change in Australia. The importance of strategic partnerships, greater national coordination of education activities and resources as well as the professional development needs of water educators will be discussed.

In addition, the 2005 WEN Survey results will contribute to this paper giving demographics of the network, the views of those that participated including feedback on activities, roles and the path the network needs to take in moving Australia towards a sustainable water future.

Corinne Cheeseman *was appointed as the Australian Water Association's first Education Manager in August 2004. Corinne established the Water Education Network soon after and today leads all of the Association's education activities. Prior to this appointment, Corinne worked for Sydney Water for eight years in various roles related to water quality; water conservation; and school and community education. Corinne holds tertiary qualifications in science and environmental management and developed her passion for water education, communications and sustainability during her professional career.*

KOREAN STUDENTS' ENVIRONMENTAL LITERACY AND VARIABLES AFFECTING ENVIRONMENTAL LITERACY

Hye-eun Chu
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Don hee Shin, Moon nam Lee
(Science Education Department, Dankook University, Seoul, Korea)

The purpose of this study was to investigate the main variables that affected Korean students' environmental literacy. Of the students, 969 in Year 3, 987 in Year 7, 1047 in Year 11 from large cities, medium sized cities and rural areas participated in this study. This research is based on Simmons' framework of environmental literacy - consisting of four areas, environmental knowledge, attitude, behaviour and skills - which is consistent with the general goals of environmental education. Descriptive statistics were calculated for each of four areas and the correlations between areas were analysed. Multivariate analysis (MANOVA) was conducted to investigate those variables that affected environmental literacy. Results showed that the relationship between environmental attitude and behaviour was strongest and that the relationship between environmental knowledge and behaviour was weakest. Also, results indicated that gender and parents' educational background were the main variables affecting environmental literacy for students in Year 3. Environmental education about the experience before schooling affected environmental attitudes and behaviours; learning methods about the environment affected all four areas of environmental literacy for students in all Years. The results of this study provide the prerequisite for a Korean environmental educational curriculum.

Hye-eun Chu *from Korea has a doctoral degree from Dankook University, Seoul Korea. I am working as a post doctoral researcher at the Science and Mathematics Education Centre, Curtin University of Technology.*

EDUCATION FOR SUSTAINABILITY-A VALUES APPROACH

Sue Coad and Owen Secombe

The UNESCO Asia Pacific Network for International Education and Values Education (APNIEVE) is providing professional development and school resources to highlight the importance of values education in the pursuit of sustainable development. The workshop will use the APNIEVE Teaching and Learning cycle to demonstrate how a values component can be integrated into all learning activities. A values approach to living more sustainably integrates the head (knowledge), hands (skills) and heart (caring) aspects of our lives. A sustainable future may be achieved through the growth of values-based communities. The workshop incorporates information from the framework for the UN Decade for Education for Sustainable Development (2005-2015) and the National Environmental Education Statement.

***Sue Coad and Owen Secombe**, former primary school principals, attended a 10 day Train the Trainer Workshop in Thailand in 2005 on Education for International Understanding and Ecologically Sustainable Development. They are now, as members of UNESCO APNIEVE, providing professional development for educators to promote and develop sustainability education. Sue is currently working with the Department of Environment and Heritage (SA) as a Curriculum Officer, Sustainability Education. Owen Secombe works with Flinders University in pre-service teacher education.*

WHAT HAS PEER EDUCATION GOT TO DO WITH A SLIPPERY FISH?

Grahame Collier[1] and Lynn Webber[2]
T Issues Consultancy[1] and the Department of Environment and Conservation NSW[2]

Although the term "peer education" may not be explicitly used, a number programs in NSW use the process of peers learning sustainability through sharing knowledge and experience as a primary adult education method. This is common in community-based programs such as Landcare, Bushcare and the Earthworks Program, a community waste reduction program delivered by local government and the adult community education sector. Peer education is also used in capacity building programs for environmental educators, drawing on the expertise of professional networks to promote mutual learning.

This paper introduces a recently developed "how to" guide for peer education, *Getting a Handle on a Slippery Fish.* The underlying theoretical concepts and objectives of peer education are presented to provide a conceptual framework and mechanisms for effective peer education practice. Useful advice and guidance about how to structure, support and deliver peer education programs to optimise spin-off effect from its delivery is discussed. A case study is included to provide an example of a peer education approach to the design, delivery and evaluation of an environmental educators' skillshare workshop.

The intent of the paper is to enhance understanding about the "slippery fish" of peer education and how to use it effectively in promoting enhanced community wide sustainability outcomes through environmental education.

Grahame Collier. *A lifetime in developing, delivering and evaluating education programs and managing others involved in that process. A focus on working for environment protection, sustainability and public health outcomes and in programs that are achieving real behavioural shift. Work in the non-government sector, state government agencies, an international organisation and now as a sole operator consultant. Grahame is the current President of the AAEE.*

ZEROWASTE - A TARGET FOR SUSTAINABLE SCHOOLS ON THE MORNINGTON PENINSULA IN VICTORIA

Anna Cooke

Zerowaste is a project aimed at dramatically reducing water use, greenhouse gas emissions and solid waste output from all schools of the region. The Mornington Peninsula Region in Victoria includes about 70 schools from Catholic, Government and Independent sectors of education. This pioneering project aims to establish every school in the Shire as a Sustainable School moving towards net zero waste outputs in liquid, solid and gaseous forms. All schools in the region will, over a two and a half year period apply Zerowaste approaches to their Sustainable Schools endeavors and will monitor their ecological footprints. CERES Environment Park, Sunrise Energy Management and the Mornington Peninsula Shire are coordinating this program for the region, a landmark sustainability program not only for Victoria, but for the UNESCO 'Decade of Education for Sustainable Development'. This Learning Sustainability session will provide a background to this project, the logistics of facilitating this project, and what schools in this Region are currently doing to work towards their Zerowaste targets.

Anna Cooke *has worked both in schools and for organizations delivering Sustainability Education and professional development for Teachers since graduating from Melbourne University in 1995. Anna has worked for the Gould League in Victoria for a number of years and managed the Gould Leagues School Programs. Anna was a facilitator in the first Pilot in Victoria of the Sustainable Schools Initiative in 2001. Now working for the Centre for Education and Research into Environmental Strategies (CERES) Environment Park, Anna is currently the Mornington Peninsula Regional Facilitator for the Sustainable Schools Initiative in Victoria. Having seen and experienced different approaches to teaching and delivering Sustainability Education over the years, Anna feels we as passionate Educators are closer to getting things right!*

EDUCATION FOR SUSTAINABILITY IN COASTAL MANAGEMENT EDUCATION PROGRAMS

Kristina Cooke[1], Kristen Hebert[1], David Wortman[1] and Daniella Tilbury[1]
Australian Research Institute in Education for Sustainability, Macquarie University[1]

Effectively designed coastal management education programs are a principle tool used to build the skills and capacity of learners to participate in coastal management, engage people in examining their own relationships to coastal management issues, and motivate participants to take action for the coast. Up until now it has been difficult to determine the differences in effectiveness among the various education and training approaches, or to assess their effectiveness in relation to outcomes sought by the *Framework for a National Cooperative Approach to Integrated Coastal Zone Management*.

This paper presents the results of a research project undertaken by ARIES which addressed such questions regarding the effectiveness of coastal management education programs. It assessed case studies and experiences in community and coastal management education from Australia, as well as select international locations. The report combined reviews of case studies and experiences with a synthesis of literature on how education programs can most effectively promote not only awareness, but also action and change.

The synthesis of literature and lessons learnt from case studies formed the foundation for the development of an interactive *coastal management education assessment tool*. This assessment tool aims to go beyond a straightforward analysis of how successful past programs have been in achieving their stated objectives. To determine the true value of coastal management education programs, a different type of assessment is required, one that identifies the most effective education approaches for supporting coastal management and assesses existing programs against these approaches. The tool presented in this report provides such an approach, identifying critical coastal management education success factors so that coastal planners, managers, community groups and others can assess their program's effectiveness against these factors, identify gaps and improve practice.

This research was conducted with funding from the Australian Government Department of the Environment and Heritage through the Natural Heritage Trust.

Kristina Cooke *currently works as the Deputy Director for the Australian Research Institute in Education for Sustainability. Holding a Masters of Environmental Studies from Macquarie University she has previous involved in the design, delivery and evaluation of sustainability education programs within the business and industry sector with a particular focus on Australian manufacturing.*

Kristen Hebert *currently works as the Coordinator for the Australian Research Institute in Education for Sustainability. She holds a Masters of Environmental Management from Macquarie University and has previously worked in wetlands assessment, water quality monitoring and development applications approvals with a fisheries focus.*

CARING FOR OUR FUTURE – TOWARDS A NEW NATIONAL ACTION PLAN FOR ENVIRONMENTAL EDUCATION

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This presentation will outline progress in regard to the development of a new National Action Plan for environmental education and contextualise this in relation to the Australian Government Strategy for the UN Decade in Education for Sustainable Development (UNDESD). Facilitated discussion will cover broad policy directions in these areas and will engage participants in defining their sector priorities. Further opportunities to contribute to the National Action Plan will also be outlined.

Since its release in July 2000 the National Action Plan has provide a framework for the Australian Government's approach to environmental education nationally. The Plan has guided the development of initiatives including the establishment of the significant bodies such as the National Environmental Education Council (NEEC), the National Environmental Education Network (NEEN), and the Australian Research Institute in Education for Sustainability (ARIES).

With all the structural initiatives of the inaugural Plan now in place there is a need to review the existing approach, assess current gaps and needs, and develop a new National Action Plan which reflects current developments, including the shift from environmental education to a broader focus on the social, environmental and economic dimensions of sustainability.

A new National Action Plan will set out the range of actions needed to contribute to the realisation of the vision and goal of education for sustainable development in Australia, within the context of the UN DESD. The presentation will coincide with the public consultation phase of the policy development. As an opportunity to discuss and provide input to issues at the national level it will be of particular interest to those working in AAEE Special Interest Groups, as well as practitioners more broadly.

Joan Cornish *is an Assistant Director in the Department's Sustainability Education Section. She manages the Australian Government input to the UN Decade of Education for Sustainable Development and Secretariat for the National Environmental Education Council. She is currently managing the process for the development of a New National Action Plan for environmental education. Joan has a Batchelor of Arts in Communications and is undertaking a Graduate Diploma in Professional Communication (Professional Writing).*

Angela Colliver *is an Assistant Director in the Department's Sustainability Education Section. She manages the continued development of the Australian Sustainable Schools Initiative in collaboration with the States and Territories and supports the implementation of the new 'National Environmental Education Statement for Australian Schools: Educating for a Sustainable Future'. Angela has a Bachelor of Arts and a Graduate Diploma in Education. She has taught in all school contexts, including universities and is the author of numerous environmental education publications. Angela is the President of the Marine Education Society of Australia and the National Convenor of the Australian Marine Education Alliance.*

SUSTAINABILITY LEARNING AT WATER CORPORATION

Bob Humphries[1], Natalie Reilly[1], Julian Crawford[2], Susan Oliver[2]
Water Corporation[1], EcoSTEPS[2]

This Paper will discuss the innovative and pioneering sustainability education program being undertaken by Water Corporation.

Key Learning Outcomes: At the end of the session, participants will be able to:

- Enhance their own sustainability education programs;
- Apply the learnings to own organisation;
- Use the group exercises for themselves.

Water Corporation has been progressively implementing its comprehensive sustainability strategy over the past few years. EcoSTEPS were engaged to conduct a series of staff sustainability awareness training sessions during 2005 and 2006. Over 400 people have attended these half-day and full day sessions. The overall aims were to:

- Promote Water Corporation's sustainability strategy and principles;
- Foster environmentally responsible behaviour amongst staff and lay the foundation for ongoing change.

This workshop paper will focus on the key learnings from the process applicable to all organisations, including councils, state agencies and business. Topics addressed include:

- Innovative EFS techniques employed
- Sustainability Action Goals
- Pre and Post Evaluation processes

Delegate engagement and participation will be achieved directly using illustrative sample exercises from the program including: Single Biggest Issue, Ecological Footprint, and House A & House B.

Julian Crawford *studied zoology at Oxford and then joined PriceWaterhouseCoopers, working as an accountant in UK, Europe and Australia. He founded the sustainability advisory firm EcoSTEPS in 1999. He works with business and government organisations to help them take practical, cost effective steps towards greater sustainability. As Chairman of the Institute of Chartered Accountants' Triple Bottom Line Group and a former director of Environs Australia and the Futures Foundation Julian is a highly qualified and stimulating speaker and facilitator on sustainability issues. Recent clients include: Water Corporation (WA), Yarra Valley Water (Vic) & Ergon Energy (Qld) and numerous local governments.*

CHALLENGING THE STATUS QUO: ECO-LITERACY AS A CONTENT VEHICLE FOR EXAMINING THE CONTENT-PEDAGOGY RELATIONSHIP IN EARLY CHILDHOOD EDUCATION

Amy Cutter-Mackenzie, Suzy Edwards
Monash University

Using eco-literacy, the paper examines the highly contentious relationship between content and pedagogy in early childhood education. Early childhood education has a historical commitment to play-based pedagogy which emphasises pedagogy over content knowledge. This is problematic because research suggests that children do not automatically acquire content through play-based learning. Furthermore, whilst sociocultural theory has recently challenged traditional practices, its potential to inform the content-pedagogy relationship has not been realised. The paper in interfacing eco-literacy and early years pedagogy creates a unique marriage between two research fields in order to develop a theoretical framework for interfacing content and pedagogy in early childhood education.

Amy Cutter-Mackenzie *is a lecturer in the Faculty of Education at Monash University. She commenced her career as a primary school teacher in Queensland. She later moved into academia after completing her PhD in 2003. During the last five years Amy's research efforts have been focused on environmental education, ecoliteracy and teachers' knowledge.*

Suzy Edwards *is a lecturer in the Faculty of Education at Monash University. During the last five years her research efforts have focused on early childhood education and curriculum.*

ENGAGING IN THE DEBATE: PROFESSIONAL TEACHER STANDARDS AND LEARNING IN ENVIRONMENTAL EDUCATION

Amy Cutter-Mackenzie, Phil Smith and Jeff Su
Monash University, AAEE and Gould League of Victoria

Since the 1990s, professional teaching associations have commenced the process of developing teacher standards and associated professional learning and assessment models in the key discipline areas. The intent of this approach is to capture the depth and range of accomplished educators' teaching. The development of effective professional learning programs relies on the formation of appropriate teacher standards. Despite the increasing work on teacher standards in Australia, currently there are no teacher standards in environmental education or any other inclusive curriculum area (Cutter-Mackenzie, 2005). Other than general international, national and state environmental education statements and policies, only one policy document has been produced which contains environmental education standards (termed competencies) for Australian (specifically Queensland) teachers (Board of Teacher Registration, 1993). While the initiative was well received by environmental educators, the competencies were too broad to implement and/or impact environmental education practices in primary and secondary schools.

Up until the recent implementation of the sustainable schools initiative there was little or no recognition of environmental education practice in Australia. Through an accreditation process, the program recognises schools as 'sustainable schools'. However, such recognition focuses upon environmental management, rather than students' or teachers' 'understanding of, and concern for, stewardship of the natural environment, and the knowledge and skills to contribute to sustainable development'.

To these ends, this workshop is about the recent, yet early, developments in environmental education concerning the advance of professional teacher standards and learning in Australia. This is an open session, encouraging participants to actively engage in the debate. This workshop is based upon a project being driven by Monash University, AAEE and the Gould League of Victoria.

Amy Cutter-Mackenzie *is a lecturer in the Faculty of Education at Monash University. Amy is also the convener of the Teachers and Teacher Education Special Interest Group. She commenced her career as a primary school teacher in Queensland and the later moved into academia after completing her PhD in 2003. During the last five years Amy's research efforts have been focused on environmental education, ecoliteracy and teachers' knowledge*

Phil Smith *is the vice-president of the Australian Association for Environmental Education. Phil is an environmental education consultant specialising in the development, delivery and evaluation of environmental education programs.*

Jeff Su *is the business development manager of the Gould League of Victoria. Jeff has extensive experience in environmental education and environmental science both in Australia and the US.*

SUSTAINABILITY IN SCHOOLS ~ SUSTAINABLE SCHOOLS VICTORIA – A CASE STUDY

Glenn Davidson
Senior Facilitator Sustainable Schools Initiative Victoria ~
SSi Program Delivery Manager CERES
CERES Community Environment Park
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With the Victorian division of the Australian Sustainable Schools Initiative powering along into its 5th year we have learnt a thing or two about facilitating sustainability education into Schools!

The key to SSi success has been using easy entry point activities, whole school management & strategy processes
(SEMP), embedded curriculum, wide school acceptance and particularly mentor facilitation. This interactive paper covers a short history of the Victorian SSi pilot and roll out, its successes and failures, update of contemporary approaches and case studies of successful approaches, projects and outcomes from a range of schools. This paper is also designed to look at the principle arguments and approaches to getting the school staff, students and particularly principals 'on side'.
The future of sustainability education relies on the sector getting its key message right, working co-operatively with a cross agency approach, getting wide spread acceptance of EFS goals and getting as many schools as possible on board.

The very active Victorian program is now looking at state wide roll out with some very exciting cross agency approaches coming into focus. This mixed with state curriculum reform has left AuSSi in a strong position and promising future.

CERES currently facilitates 230 of the 300 schools in the Victorian SSi program as well as facilitating the only 5 star fully accredited schools in Australia. CERES, a world renowned community owned and governed environment park, enjoys over 65,000 student visits on site per annum alongside 500,000 public visits. CERES also co-facilitates the Waste Wise Schools program, a range of student incursion programs, VET/VCAL programs, greenhouse abatement programs, community education, local and state government consultancy as well as servicing nearly 120,000 Victorian students across all school sectors through the SSi program (approx. 10% of Victorian schools).

Glenn Davidson *- working with the CERES Community Environment Park ~ Sustainability Team, Glenn is one of the key architects and senior facilitators of Australian Sustainable Schools Initiative ~ Victoria (DEH), the program winning the 2005 Allen Strom Eureka Award. Also a member of various advisory boards including Waste Wise Schools and the Sustainability Education Roundtable, for school building development, nutrition and healthy eating, community enterprise and liaises heavily with many of the state education for sustainability service providers, NGO's and state and federal government agencies. Glenn works with over 130 schools in Victoria as a mentor and facilitator of sustainability projects and curriculum. Along with CERES Glenn currently acts as education consultant to a number of national companies and is the one of the founding directors of HATCH ~ Corporate Sustainability Advocacy and Communication.*

MARINE STEWARDSHIP AS EDUCATIONAL PRAXIS FOR SUSTAINABILILTY: A CASE STUDY OF 'ADOPT A BEACH

J.K. Davis and L.J. Stocker
Institute for Sustainability and Technology Policy, Murdoch University

We analyse the role of marine stewardship as educational praxis for sustainability. Environmental stewardship is the long-term care of the environment for the benefit of present and future generations of the community of life. Stewardship provides a creative alternative to the dominant paradigm of private ownership and consumption on one hand and apathy towards public good on the other hand.

Marine stewardship has become a popular practice among coast-dwelling Australians, for many of whom the beach is a defining feature in their identity. The coast forms a legal and biophysical commons so its offers a portal into an ethical framework for caring for our shared environmental heritage and legacy. As educational praxis we suggest that stewardship models environmental citizenship in terms of both responsibility for place and accountability to future generations for our current actions.

We examine the scope, scale and aims of 'Adopt a Beach' programs in their various forms from litter removal to coordinated monitoring and management. We present two detailed case studies.

***John Davis** is a postgraduate research student and casual tutor at Murdoch University. John has worked for lengthy periods in Bangladesh and Indonesia, and continues to be active consultaning on sustainable development of poor communities in Asia and Africa. In Australia he has had experience in the landcare and coastcare programs. His current PhD research examines ideas of stewardship of the coast and how stewardship of the Western Australian coast might be strengthened.*

HUMAN RESOURCE TECHNOLOGY – HOW CAN THESE MODELS BE USED IN BUILDING COMMUNITY CAPACITY?

Gun Dolva

In response to the rapid growth in technology, communication and knowledge today, workplaces are changing to become places where knowledge, capacity, capability and networking need to occur to generate more resilience and sustainability in businesses. Many transglobal organisations focus on building and enhancing the innovation, creativity, cultures and values of what they are recognising are their most valuable resource – their human capital.

Making these changes occur within organisations needs strategic involvement of management with Human Resources Departments to alter the structures and methods of communications within organisations to support individuals and networks inside and outside the organisation.

These methods, of which some are models, can be transferred into community capacity building schemes. Essentially, they involve a thorough front-line analysis with a focus on communications, resources, networks and needs to identify barriers, interventions and solutions as well as generating effective targets and monitoring schemes to ensure outcomes are working towards meeting targets. I will illustrate this through the use of one of these models.

Key words; mentor, front line analysis, barriers, interventions, monitoring, outcomes vs outputs, capacity, empower, collaborative, model

HOW DO YOU FEEL ABOUT?

Amanda May Doust

All things are connected.
Whatever befalls the earth
Be falls the sons of the earth.
Man did not weave the web of life.
He is merely a strand in it.
Whatever he does to the web,
He does to himself.

'Chief Seattle 1854'

The above quote is how the workshop will be introduced. This workshop will give the attendees a small glimpse at how damaging actions towards the environment and others affects ourselves.

The expression will be through art; drawing with crayons, paints, pencils etc. Short footage, photos, news paper articles etc, of destructive actions to our environment and others will be shown. Attendees will then be asked to drawn how they feel. A sharing session will then be offered. The same will be done showing photos etc. of positive action towards one another and the environment. Again, a sharing time will be offered.

This workshop, as mentioned above, will perhaps raise awareness towards our actions, and how they affect the earth, others and ourselves. The people who attend this workshop may, with this in mind, start to make small positive changes that ripple onto the lives of those around them.

Amanda Doust *currently studies at Edith Cowan University, Bunbury working towards to completing her degree in 'Creative Industries'. Amanda has completed a Diploma of Holistic Counselling at Sophia College, Brunswick Junction, WA. She has a passion for the environment and wishes to raise awareness as to how the rapid destruction of the environment is affecting us soulfully and spiritually. Amanda has, also attended a week long Joanna Macy workshop at the Camp School in Bridgetown.*

RE-IMAGING TEACHERS' WORK FOR THE 21ST CENTURY

Barry Down
City of Rockingham Chair in Education
Murdoch University

This paper explores how we might begin to re-imagine teachers' work in more socially progressive ways. In today's hostile political environment where public schools and teachers are under siege from a range of political, business and media interests there is some urgency to creating an alternative critical-democratic vision and practice of teaching and learning based on the values of civic responsibility, democratic participation, social justice, and sustainability. This conception of teachers' work means teaching against the grain. What this paper does is provide some critique of existing educational policies and practices, asks some questions about the efficacy of current conceptions of teachers' work, and suggests some helpful ways forward for teachers committed to remaking their world. In this task a range of resources are used including critical pedagogy, place-based education, social capital, and critically reflective practice.

Barry Down *is the City of Rockingham Chair in Education, at Murdoch University, Rockingham campus.He has particular expertise in teacher development at both pre-service and in-service levels, critically reflective practice, action research and collaborative models of whole school reform. Barry has had extensive involvement in Commonwealth funded teacher development programs including Innovative Links, Quality Teacher Project and Values Education Good Practice Schools Project. He has published in national and international journals on a range of issues including: teachers' work; teacher education; school and community linkages; citizenship education; youth policy; and WA educational history. He is currently working on a three year Australian Research Council (ARC) Linkage grant entitled "Enhancing School Retention: School and Community Linkages in Regional Western Australia" (2005-2007).*

REDLAND SHIRE COUNCIL HOME SUSTAINABILITY AUDIT AND ENGAGEMENT PROJECT

Glenn Eales

Redland Shire Council is sponsoring a Home Sustainability Audit and Engagement Program as an extension to their Home Water Saver Offer. The Home Sustainability Audit and Engagement Project comprises of three key components delivered within a single home visit; home owner survey; home audit; and personalised home action guide. The assessment and recommendations will be structured around three central themes of importance to the local authority; waste; water; and energy. EnviroCom Australia®, a local environmental education and research consultancy will be responsible for the development, implementation and preliminary assessment of this project. The project is to be delivered in its pilot phase from March – June 2006.

The Home Sustainability Audit and Engagement Program recognises the importance of engagement as the basis for personal action change. The provision of in-home engagement allows for a significant influence on the behavioural aspects of domestic resource consumption. The approach is intended to build the case for the behavioural and infrastructural changes within households on demonstratable savings from their current household appliances and achievable goals for the householder whether they be for infrastructural or behavioural changes.

The program is supported by the use of software tools designed to collate and interpret information gathered in the survey and audit phases to generate printed materials specifically relevant to the household immediately. The customisation of the recommendations provides the householder with a direct connection to the recommendations that is not achievable through any other information delivery system. The immediacy of this information provides the greatest chance to deliver information within the context of the assessment while the householder is more receptive.

Glenn Eales *- Manager Queensland Projects EnviroCom Australia*

During my 8 years at EnviroCom I have developed, implemented and evaluated many environmental education (school and community) and technical programs. I hold formal qualifications in Environmental Science and Environmental Education and at present coordinates a wide range of projects including; the Redland Home Sustainability Audit and Engagement Project, Gold Coast Waterwatch Program, research and development programs for the Queensland EPA's ecoBiz Program, Redland Shire Council, Gold Coast City Council, Redcliffe City Council, Toowoomba City Council and others in the field of waste education, planning and management, water conservation, energy conservation and catchment protection.

INVESTIGATING PEDAGOGIES THAT PROMOTE STUDENTS' ACTION COMPETENCE IN ENVIRONMENTAL EDUCATION

Chris Eames[1], Barry Law[2] and Miles Barker[1]
University of Waikato[1], Christchurch College of Education[2]

This paper presents some research outcomes from five case studies in New Zealand schools that examined teaching and learning approaches to promote students' action competence in environmental education (EE). The project created research partnerships between experienced researchers (mentors), school advisers in EE and teachers.

Previous research had indicated an under-emphasis on education *for* the environment in New Zealand school-based EE, suggesting a lack of student action-taking. This research focussed on the concept of action competence in EE as a means of overcoming this deficit and providing a pathway towards a student's education for a sustainable future. The research team developed a framework on the nature of action competence, which underpinned the research.

The project paired a classroom teacher with a school adviser to research the implementation of an EE unit in the teacher's classroom. Each teacher chose their own EE unit and co-planned with their adviser the pedagogies they might use to enhance action-taking. The school adviser documented the teaching and learning during the unit and its outcomes using classroom observations, interviews, questionnaires and analysis of student work. The teachers and advisers collaborated in the analysis of their case study and a cross case analysis was undertaken together by all five teacher/researcher pairs, under the guidance of the research mentors.

The research provided evidence of successful and not so successful development of aspects of action competence. Factors such as the use of appropriate pedagogy, the teacher-student relationship, the manageability of action-taking and the age of the students emerged as themes.

Chris Eames *is a senior lecturer in environmental education in the Centre for Science and Technology Education Research at the University of Waikato, Hamilton, New Zealand. He teaches graduate level papers and supervises research students in environmental education. He was part of a research team that conducted a New Zealand-wide study on environmental education in schools in 2003, and led a national project on action competence in classrooms in 2005, which is the focus of the presentation.*

BENEATH OUR FEET, BEYOND OUR CONSCIOUSNESS: THE ROLE OF GEOLOGY IN ENVIRONMENTAL EDUCATION FOR SUSTAINABILITY

Jane Edwards

As humanity's demand for earth resources continues to increase, we become more and more disenfranchised from the source of these resources—earth. Although education for sustainability encourages the development of deeper, more holistic understandings of human–earth dependency, there remains a striking absence of teaching about that which lies beneath our feet. There are many reasons for the lack of geological education in schools, headed perhaps by the notable absence of earth science in pre-service teacher education. However, there is also a genuine misunderstanding of the nature of geology and its relevance to environmental education.

Geology integrates many sciences in a multidisciplinary, naturalistic approach to investigating both historical and present-day natural phenomena. The earth's historical record of changes to natural phenomena provides fantastic insights into potential effects of modern environmental issues, from things such as sea level rise and climate change, to changes in biological diversity or the effects of natural disasters. Geological understanding forms an essential component of current and emerging social issues, particularly in relation to energy, and debates concerning hydrocarbon versus nuclear technologies. If students today are to be well equipped for the decisions they will need to be making in the future, basic geological understanding is critical.

This paper highlights the unique character of geology for providing an essential foundation for holistic education for sustainability. Strategies and examples of how to begin achieving this will be provided.

Jane Edwards *is a geologist and environmental/science educator. She worked in geological research as a government geologist for over a decade, and has conducted a wide range of geological investigations for other industries and organisations. In response to a developing concern about the lack of geological understanding in the community, and increasing propensity of this to lead to misinformed decision making, Jane is now involved in education. She is undertaking PhD research in environmental education in relation to the sustainable school program in Victoria, and teaches science to pre-service teachers at RMIT University.*

SUSTAINABLE PLAY SPACES: STORIES FROM EARLY CHILDHOOD

Sue Elliott, RMIT University and Tracy Young, Swinburne University

When selecting centres to include as case studies in a forthcoming publication 'The Outdoor Play Space: Naturally', the main criterion applied was the development of a natural outdoor play space. However, the stories revealed by the case studies describe a richness of experience beyond mere trees, rocks and logs. Themes emerged not only about shared Nature values, but also about collaborative processes, empowerment and a sense of owner ship and identity for both children and adults. All of these themes are also evident in discussion about learning sustainability. This workshop will explore the collected case studies and provide an opportunity to share stories about creating natural play spaces for young children. The focus will be on demonstrating practical insight into the links between learning sustainability and the development of natural play spaces. These links are fundamental to maximising opportunities for learning outdoors, yet many early childhood services continue to install generic, synthetic outdoor play spaces that significantly limit opportunities.

Sue Elliott *(Dip KTC, B Sc Hons, MSc)*
Sue has worked in a variety of early childhood settings and lectured at the tertiary level in early childhood training courses. She shares a passion for environmental education and science education in her teaching. Sue is co-author of several books including 'Snails Live in Houses Too, Environmental Education for the Early Years' and 'Just Discover Connecting Young Children with the Natural World' and author of 'Patches of Green', the first review of early childhood environmental education in Australia. Currently, she lectures at RMIT and convenes the Australian Association for Environmental Education Early Childhood Special Interest Group.

Tracy Young *(Dip Soc Sci, B Ed Ch Dev, Grad Dip Ch Dev)*
Tracy has worked in the early childhood profession for many years in child care centres and kindergartens. Tracy has no formal science qualifications, although she has always had a passion for animal welfare and environmental education. Tracy believes that an enthusiasm for science and nature studies can be passed on though creative teaching and removing some of the mysteries that surround science. She actively implements this approach in her current role lecturing at Swinburne University. Tracy has co-authored several publications with Sue Elliott exploring topics such as connecting with nature, demystifying science and technology experiences for young children and exploring natural outdoor play spaces. Tracy is currently enrolled in postgraduate research and her thesis will explore connections with the natural world and the implications for early childhood educators and children.

Abstract included but not presented at the conference.

MORE THAN A SIGN ON THE GATE? TEACHER LEARNING AND THE REEF GUARDIAN SCHOOLS PROGRAM IN TROPICAL AUSTRALIA

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Over 190 schools in Queensland have signed up to be a Reef Guardian School in coalition with the Great Barrier Reef Marine Parks Authority. This unique program encourages schools to commit to the protection and conservation of the world heritage listed Great Barrier Reef, by changing school and community practices. Examples include increased waterways protection, litter reduction, elimination of use of plastic bags and other initiatives.

The ARIES (2004) report into whole school approaches to sustainability states there is a need for focused research that evaluates the uptake, effect and impacts of such programs on teachers. We will report on results from an original study of teachers working in regional Reef Guardian Schools in Far North Queensland. Teachers from three quite different schools were interviewed about their experiences with the program. Our analysis considers what effects the program has had on teachers' professional and personal lives.

It is widely believed that teacher learning occurs as a result of targeted professional development programs. In this study we look for evidence of teachers learning as an outcome of participating in a sustainability education program. Specifically, we ask whether teachers are thinking and doing things differently as a result of their participation in the Reef Guardian Schools Program

Neus (Snowy) Evans *is completing a Bachelor of Education Honours degree at James Cook University Cairns Campus. Over the past four years she has developed a personal interest in sustainability education, particularly with respect to teacher learning. She would like to take this interest further and enroll in doctoral studies next year.*

THE SUBURBAN MICRO FARM AS A BASIS FOR OPEN SOURCE FRANCHAISING

Ari Fainchtein
Institute for Sustainability and Technology Policy
Murdoch University

Out of all the different types of economic activities that can be analysed through the sustainability filter, none is more central to human existence than the production, distribution and consumption of food. While efforts that try to understand and modify current business practices through the lens of sustainability have yielded some progress, these efforts have mainly been focused on optimizing a sector or a manufacturing process. Examples of this are renewable energy or organic food growing.

There is however little work done on how business models of operation should change to accommodate the pursuit for a more sustainable way of living, including doing business. In the case of food, over the past fifty years, the idea of the food franchise as a business model has gone from virtually zero to become the dominant way by which non-home made food is prepared and consumed. This was also followed with an overall decrease in the quality of food and has raised significant concerns related among others to health implications for consumers, sourcing of ingredients, learning of meaningful food preparation skills and encouraging of a consumerist behaviour.

An alternative model would have to follow accepted business practices so that it could easily be adapted in multiple locations, but it must, at the same time, define sustainability not just as a filter or an attribute, but rather, as a basis for food production, distribution and consumption from which all elements must come from. This paper presents an introduction to the idea on how to create such a business model for a traditional food franchise.

Ari Fainchtein *was born and raised in Mexico CIty and obtained his Bachelor Degree in Electrical Engineering from McGill University in Montreal, Canada. From 1989 to 1994 he worked as a consultant to electrical utilities in the US, Canada, Japan and Australia in the field of long term planning. He then reoriented his efforts to developing distributed business solutions as a System Architect, worked designing and implementing software systems in the US, Ireland, Spain, England and Italy. Prior to starting his PhD, he was the Chief Technical Officer of Stakeware, a San Francisco based Software Company engaged in the development of Stakeholder Engagement software*

REORIENTING TEACHER EDUCATION TOWARDS SUSTAINABILITY: MODELS FOR CHANGE

Jo-Anne Ferreira[1], Lisa Ryan[2], Daniella Tilbury[3],
Griffith University[1] ARIES Macquarie University[2],[3],

Teachers hold the key to change in schools. This has been recognised by international agencies such as UNESCO who have identified the professional development of teachers in learning for sustainability as 'the priority of priorities'. Teacher education is widely recognised as a key strategy that is yet to be effectively utilised to embed learning for sustainability in schools.

This paper reports on an ARIES research study that examines a range of models for pre-service teacher education, both national and international, that may assist in reorienting teacher education towards sustainability. The research reviews previous efforts at incorporating environmental education or sustainability concepts within teacher education. In particular, the research seeks to understand:

- Which models of professional development have been used in pre-service teacher education to bring about innovation and change;
- What the critical success factors of each of these models are;
- How these models involved and motivated professionals to engage with change;
- Which models are conceptually congruent with the goals of learning for sustainability; and
- Which models may be the most effective for mainstreaming learning for sustainability within pre-service teacher education.

This paper presents three models identified in the ARIES report and on the range of critical factors that need to be addressed if we are to be successful at reorienting teacher education towards sustainability. The research was funded by the Australian Government Department of Environment and Heritage under the Natural Heritage Trust.

Jo-Anne Ferreira, Lisa Ryan, Daniella Tilbury
The presenters work at Griffith, Sunshine Coast and Macquarie universities, where they are employed as environmental educators. Their interests in environmental education range across the school, community and business sectors. They have recently undertaken a research project for the Australian Research Institute in Education for Sustainability (ARIES) examining models for mainstreaming learning for sustainability in pre-service teacher education programs in Australia.

THE SUSTAINABLE SCHOOLS INITIATIVE (SSI) IN WA

Howard Flinders
Project Manager, Sustainable Schools Initiative (WA)

The Australian Sustainable Schools Initiative, which commenced in 2002 in New South Wales and Victoria, aims to support approaches to teaching and learning that foster enhanced understandings of sustainability, and encourages a movement towards 'living sustainably'. Western Australia joined the Initiative in 2005. The Intitiative is federally funded, and supported by a range of agencies and organisations in broad partnership at the State level.
The Initiative supports considered and efficient use of schools' resources (e.g. energy, water, products and materials) and the sustainable management of school grounds (e.g. biodiversity, waste, landscape design and vehicular traffic). In addition, it promotes key concepts and themes such as social justice, human rights and cultural diversity, participation and respect consistent with an holistic, integrated model of sustainability.

A decision to become a 'sustainable school' ultimately signals commitment to the idea of ***embedding sustainability within the culture of the school***. That is the ***whole school*** engaging in an ongoing process of improvement in the practical operations of the school and integration of sustainability education across the curriculum. The Initiative has a clear focus on critical thinking processes and supports action-learning. This commitment builds on various aspects of existing programs and practice, and provides a clear focus for continued whole school development via reference to ***a supportive framework and process*** (the essence of SSI).

A short presentation will provide an outline of the journey thus far for this exciting project, encompassing a pilot program with 20 schools in 2005, the ongoing development of significant partnerships and the broader 'rollout' of the Initiative to 100 additional schools in 2006. This presentation will link to / cross reference other presentations delivered by participants in the SSI e.g. Peter Robinson's 'Crooked Brook Forest Alliance' and Elaine Lewis's 'Understandings of Sustainability'.

SAFE, EFFICIENT AND SUSTAINABLE EXTRACTION OF MINERAL AND PLANT MATERIALS

Dr Frits Grader

Ultrasound operating at 2.4 Kw and at frequencies between 25 and 40 KHz shows profound chemical and physical effects on solids suspended in a liquid medium. Acoustic cavitation resulting from ultrasonic waves give rise to minute microjets of very hot pressurised gas, capable of activating solvating or physically abrading the solid. This leads to a surprising number of useful laboratory and manufacturing outcomes. When applied to digestion or extraction processes on a laboratory or industrial scale, advantages in safety, economy and waste reduction make this technology attractive when compared to other and current methods used.

Dr Frits Grader *has worked for over 30 years with the Department of Education and Training; 28 of there with TAFE. A graduate from the University of Western Australia in Chemistry, he works at the eCentral Campus of Central TAFE as a lecturer and senior researcher in Sustainable Science. During 2001 – 2004 he received grants form the State Government Science and technology Innovation Fund to research Applications of Ultrasound to chemistry, using immersible sonicators operating at frequencies of 25 and 40 HHz. Among a number of significant applications are included acid digestions of ores, leaching of ores and extraction of essential oils from plants. Dr Grader continues to work with staff at Central TAFE to extend the use of his technique into other areas.*

Abstract included but not presented at the conference.

KNOWLEDGE NETWORKS: LESSONS OF A PROFESSIONAL DEVELOPMENT PROCESS FOR IN-SERVICE TEACHERS IN EDUCATION FOR SUSTAINABILITY

Andre Grant, Ben Roche[1]

Realising effective professional development for in-service teachers is a complex task that is often hard to gauge impact. The Sustainable Living Project at the University of New South Wales recently gained funding from the NSW Environmental Trust to conduct a pilot project to explore pathways for education for sustainability into the NSW curriculum through innovative in-service teacher education. Following a futures based, holistic and learner centred approach to education for sustainability as defined by the NSW environmental education action plan *Learning for Sustainability* and the United Nations Decade of Education for Sustainable Development, the project sought to demonstrate the synergies possible with the perceived rigidity of NSW syllabi. It explores the tensions associated with the need to situate learning whilst navigating the day to day realities of classroom practice. While exploring the synergies, teachers involved reflected on their own teaching practice and how and where they could incorporate EfS. Participants worked in a variety of combinations to produce, trial, document and publish a 'teaching and learning project'.

Knowledge Networks involved three sequential action learning teams of secondary teachers that focused on reprogramming their own teaching with topics and processes associated with education for sustainability. Over these three iterations the project reflected on the key components and processes that contributed to a successful professional development experience for the participants' involved. The project has delivered some key outcomes in terms of strong and demonstrated synergies with the NSW Quality Teaching Model, an action learning and mentoring model for engaging teachers in professional development for education for sustainability and an online interface and resource hub for teachers allowing the open sharing of educational resources (*teachsustainability.com.au)*. This paper explores and reflects on some of the key learnings of the Knowledge Networks Project.

[1] The Sustainable Living Project, Faculty of the Built Environment (UNSW).

USING SUSTAINABILITY SKILLS TO SECURE INDUSTRY PLACEMENT FOR BUSINESS GRADUATES

Wayne Gumley, BSc LLM, Senior Lecturer in Law
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One of the most fundamental objectives of higher education is to assist students to find a satisfying career. The Faculty of Business and Economics has provided an industry placement programs within the undergraduate business and commerce degrees which provide students with valuable industry insights and hands-on experience. These placement programs have been highly successful in assisting students to later find full time employment. However, they have generally been provided within the context of traditional business disciplines such as accounting, marketing and management. This paper considers a proposal for extension of these placement programs to include training in sustainability skills which can assist business graduates to secure placements as sustainability 'change agents', particularly in the small to medium sized entity sector. The proposal is based upon the highly successful Green Steps program developed at Monash, with a stronger focus on business related sustainability skills. The main objectives will be to secure short term industry placements for business graduates whilst promoting sustainability awareness in industry. This paper will describe the progress of the project to date, and seek discussion of the types of skills that participants would need and strategies for making connections with industry placement partners.

Wayne Gumley *BSc, LLM (Monash) Senior Lecturer in Law, Department of Business Law and Taxation, Faculty of Business and Economics, Monash University. Wayne has worked as a solicitor in general practice and as a legal officer with the Australian Government Solicitor's Office in Melbourne. Wayne has taught a wide range of taxation and commercial law units at undergraduate and graduate level. He has also carried out in-house training roles with chartered accounting firms KPMG and Pitcher Partners in Melbourne. He is a member of the National Environmental Law Association and is the current editor of the NELA journal, /National Environmental Law Review/. Wayne's current research interests are ecological tax reform and corporate environmental responsibility."*

ENVIRONMENTAL EDUCATION FOR CHINESE IMMIGRANTS IN AUSTRALIA

Melanie Xiumei Guo and Dora Marinova
Institute for Sustainability and Technology Policy, Murdoch University

Australia's booming economy is fast becoming an important destination for Chinese business people, tourists and students. China is a big market for Australia's resource inputs and raw materials and it is currently one of Australia's fastest-growing tourism markets. Australian universities have been actively targeting Chinese students as overseas export market for their services. Australia is also attractive with its stable social, economic and political system, vast land and clean natural environment making all three categories potential migrants. Latest statistics show that Chinese immigration is an important component of Australia's migration program.

In Australia's highly active economic environment, the care for the natural resources and their long-term management is a major consideration. Environmental education for migrants, including those from China, is becoming a very important issue due to significant cultural differences. Migrants bring their own perspectives and attitudes towards the Australian environment and often lack knowledge and understanding of existing environmental standards.

In order to protect Australia's fragile environment, educational programs are needed to promote environmental awareness among migrants. Understanding the protection of the Australian environment and business regulations involving the environment is very important, and any business opportunities for Chinese migrants should be presented through ecologically sustainable practices.

This paper aims to present learning approaches of providing environmental education for adult migrants, to ease the concerns about environmental degradation. It presents a case study of the Chinese community with a view of providing some generalisation for the broader ethnic community and achieving a more sustainable way of living in Australia.

THE DISCURSIVE CONSTRUCTION OF ENVIRONMENTAL EDUCATORS AND ENVIRONMENTAL EDUCATION THROUGH POSITIONS VACANT ADVERTISEMENTS

Jan Connelly[1], Joy Hardy[2]
University of New England[1], University of New Enngland[2]

This paper turns its attention to desired environmental educators who, depending upon one's educational philosophy, deliver, facilitate or collaborate in 'learning sustainability'. Specifically, this paper explores *desired* educators by critically analysing positions vacant advertisements in the field of environmental education. The analysis includes examination of how the advertisements construct four dimensions of environmental educators, namely: the individual self, which examines desired personal qualities such as disposition, values and knowledge; the social self, which examines desired interpersonal skills; the environmental self, which examines desired relationships between prospective applicants and the environment; and lastly the global self, which examines the relationships between prospective applicants and the global environment. The construction of desired environmental educators cannot be dissociated from the construction of environmental education. This mutual inscription enables comparisons to be made between the construction of environmental education in positions vacant advertisements and constructions in the broader environmental education arena. Such a comparison reveals the dominant and privileged discourses. Concomitantly, this approach enables the construction of desired environmental educators to be assessed in terms of the aims, goals, objectives and priorities identified in the broader environmental education community.

Joy Hardy *is a lecturer in Social Contexts, within the School of Education, The University of New England. Her research passions are environmental education, philosophy of education, poststructuralist perspectives in education, and poststructuralist critiques of language and cultural production.*

PLANTING THE SEEDS OF ENVIRONMENTAL EDUCATION AND HOW TO DO IT!!

John Harris
Environmental Education Officer
Donvale Christian College, Victoria
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Donvale Christian College is an ecumenical, co-educational school in metropolitan Melbourne with student enrolments of nearly 1000, from Prep to Year 12. For more than 20 years, the College has undertaken environmental projects involving its students. These projects have included tree plantings, paper recycling initiatives and a range of environmental topics within the curriculum, including some associated with literacy improvements for boys in the Primary school. In the past 5 years, the environmental philosophy of the College has become more integral to all operations, associated particularly with the appointment of an Environmental Education Officer. Environmental topics are increasingly significant in the curriculum across both the Primary and Secondary sections of the College. The school is involved in state and national programs such as Land for Wildlife, and Sustainable Schools – as part of the Australian Sustainable Schools Initiative. Students also participate in planting activities each year to recognise World Environment Day and Planet Ark Tree Day as well as implementing Energy, Water and Waste reduction programs. DCC has been successful in acquiring grant funding for many of its projects over the last 5 years.

The workshop will be in two parts. First of all, we will 'case study' the College's activities and, secondly, we will look at how other schools might get involved in similar projects, sources of funding, required equipment and the marketing opportunities.

John Harris *has had a passionate affinity with the environment since he was a young child. Studying Biological Resource Management at University and later a Dip Ed, it was John's dream to work in environmental education related to National Parks. After a stint as a ranger, he took up a teaching job and has continued this for the last 10 years. Moving back to Melbourne from Queensland, he took up a position at Donvale Christian College, where he quickly became involved in the environmental issues of the College. John's current position is Environmental Education Officer at the College where he has been instrumental in achieving Land for Wildlife accreditation, has written the College's Property Management Plan along with another staff member and is the driving force behind the College being part of the Sustainable Schools Initiative. He has been successful in obtaining both local and federal grants for environmental works around the College.*

A SYSTEMS APPROACH TO LEARNING FOR RESILIENCE AND SUSTAINABILITY

Nan Hewitt

This PhD project involves the implementation of an educational intervention for irrigators on the Gnangara Mound and assessment of its effectiveness in building social and ecological resilience. Resilience theory argues that rigid approaches to the management of natural resources gradually lead to a decline in resilience, or the buffering capacity of systems. It proposes that flexible management approaches that allow minor disturbances, that draw on local and traditional knowledge and that have the ability to adapt to change will build or maintain resilience of social and ecological systems.

This study uses a customized educational intervention designed using a model based on existing theories of adult learning, instructional (educational) design and the social ecological context of the learning audience. Initial research undertaken in 2004 confirmed the need for a localized, customized approach to education for sustainability.
The educational intervention aims to increase participant's ecological comprehension, and to build resilience through increasing learning and adaptive capacity among participants. Measures for surrogates of ecological resilience are also included in the research design to determine whether there are any changes to the biophysical system in the short term. While this educational intervention has been designed for the local irrigation context of East Wanneroo, which is a groundwater dependent ecosystem, the model has the potential to be applied in other contexts.

Reference:
Hewitt, N.A., & Horwitz, P. (2006). Learning and capacity building for irrigators in Western Australia's East Wanneroo area: a theoretical framework for educational provision and a sketch of the socio-ecological context. Applied Environmental Education and Communication, 5(1).

Nan Hewitt *BA Communication (Murdoch); Master of Education (USQ).*
I have had extensive experience in educational design working collaboratively with academics to develop learning materials for Tertiary students. The emphasis of the educational design and development work has been on creating constructive learning environments that facilitate learning. In 2004 I worked with Pierre Horwitz on a research project that involved an analysis of the learning needs, preferences and social ecological context of irrigators in East Wanneroo. My PhD project involves further development of this customized approach to education for sustainability and its effectiveness in building social and ecological resilience.

THE VALUE OF INDIGENOUS TECHNICAL KNOWLEDGE IN THE SOUTH-WEST

Mike Hill

Michael Hill *is a Nyoongar man from the south west of Western Australia who lives in his Mother's country in Busselton. He holds a B A Aboriginal and Intercultural Studies ECU. Qualified Workplace Trainer & Assessor (Cert IV), completed BA Sociology and Anthropology with Honours, currently working towards Ph D. Part time Lecturer at Edith Cowan University. Experience includes Cross Cultural Training, Curriculum Development, Research, Working with Indigenous young people and their families. Worked in remote areas in the Northern Territory with traditional people providing essential services and assisting groups & families to return to their homelands as per the Land Rights Legislation. Founded the Lake Jasper Project (an alternative to incarceration for offending/at risk youth) and managed it for 11 years. Michael is recognised and respected in his community. Work in the international community includes being an Indigenous delegate to the United Nations Convention on Bio-diversity, Member of the World Intellectual Property Organisation (WIPO), Indigenous Chairman of the Pacific-rim Region, Member of the United Nations Roster of Experts on Coastal and Aquatic Bio-diversity. National commitments include being a member of the Bio-diversity Advisory Council and Chairman of the National Indigenous Fisheries Strategy Board.*

SOFT-SELL SUSTAINABILITY

Elizabeth Hope, Garth Borroughs
Urrbrae Agricultural High School

Have you ever wondered how to take big concepts like sustainability and make them directly relevant to a teenage audience? This one-hour presentation proposes ways students can be encouraged to connect personally with their research and feel motivated to take positive personal action as informed citizens. Exemplars will focus on processes are transferable across a range of environmental studies. They will also show how the wider community can be involved. Urrbrae Agricultural High School has consistently won environmental awards since the mid 1990's. The school was the National Landcare for Education Award winner in 2002 and the United Nations World Environment Day National Education Award winner in 2005.

Often students do research work on issues like habitat degradation, species extinctions, sustainable energy. They present a poster or a PowerPoint presentation which may be authoritive, interesting and even appealing to other students but it becomes compartmentalised into an area named "school work" which does not impinge on their personal lives and sometimes seems to have little relevance. Perhaps the main motivation for the research is the marks.

What we are both aiming to do at Urrbrae is to cross this line so that students see their work at school as part of the bigger picture of their personal lives and their future. We have developed courses which give a strong environmental emphasis to traditional content (eg. Science: Chemistry in the Environment) and we have invented courses which are unique (eg. Environmental Technology, Native Animal Studies). Our extra-curricular offerings tap into community organisations such as Conservation Volunteers Australia and Rotary International.

* In Environmental Technology students study generating energy from the wind as one of their topics in year 9. Students begin with a walk and a demo on how to make a propeller out of bark, then design, make, test and evaluate prototypes of several different wind-generating devices.

* Urrbrae Conservation Volunteers is linked to CVA and use their expertise in activities such as roadside plantings, clearing weeds, collecting seeds and propagating plants.

We would like to share our successful ideas and propose a format which encourages questions and interaction.

Elizabeth Hope *has taught at Urrbrae Agricultural High school for 14 years. She has an abiding interest in natural Australian environments and practical knowledge of raising orphaned and injured native animals. A teacher of Year 11 and 12 Biology, Elizabeth brings extensive theoretical knowledge to the practical stage of environmental activities Elizabeth works in extracurricular programs involving direct action by students in rehabilitation of degraded habitat for endangered species.*

Garth Borroughs *has an extensive knowledge base in energy systems which he has developed as a radio-technical officer over many years. This wealth of experience enriches his teaching methodology and his planning for courses which marry Environment and Technology eg. Sustainable energy, energy-efficient housing. Garth also works in an extracurricular program involving the Model Solar Car Challenge.*

THE EVOLUTION OF EDUCATIONAL ECOTOURISM – DOLPHIN STYLE

Andrew Horan
Dolphin Discovery Centre, WA

The Dolphin Discovery Centre, located along the foreshore of Koombana Bay in Bunbury is a small but rapidly growing marine discovery centre that offers a range of opportunities for the general public to learn about and interact with wild bottlenose dolphins. Established in 1994, this non profit organisation has had an ongoing commitment to the general public to offer these opportunities with full support from local businesses and government organisations. Initially the Centre was established to satisfy a potentially growing tourism market but has also become an important education centre for the whole community, not just the tourists who visit. The challenge for the Centre then and now is to develop an experience that is not only enjoyable, but also educational.

As far as many are concerned, education is about learning and becoming aware of something new, however effective education is the process of this information remaining with the student and then being passed on to others in a meaningful and accurate way. Realising this, the DDC has attempted to design and deliver education and tourism experiences through interpretation that is meaningful and compels the audience to think, feel and behave. In essence, the DDC is attempting to use their education and interpretation programs to minimize impacts on the environment through understanding and awareness. This is the evolution of educational ecotourism and the basis for this presentation that will describe the DDC and the various experiences on offer for the community.

Andrew Horan: *After growing up in the North West, Andrew Horan worked in the Nature Conservation division of the Department of Conservation and Land Management (CALM) for 15 years before taking the position as Manager of the Dolphin Discovery Centre in May 2001. Many facets of his career with CALM delved into raising awareness of issues for the community and stakeholders. Now with a mix of conservation and tourism backgrounds, Andrew understands the importance of delivering a message through effective interpretation techniques.*

SPIRITUAL SYNERGIES FOR SUSTAINABILITY

Amzad Hossain, Popie Hossain-Rhaman and Dora Marinova
Institute for Sustainability and Technology Policy
Murdoch University

Achieving sustainable development requires a holistic approach to environmental resource management, policy formulation, economic prosperity and social justice but what determines people's values and lifestyle is actually deeply rooted in their spirituality. This can be manifested for example through religiosity, materialism or through the love of nature. The synergies from spirituality and everyday life transcend the change required for sustainability.

This paper explores the role of Semitic Sufis and Bengali Bauls as educators in promoting a sustainable lifestyle. It argues about simplicity, naturalism and creative ways of spreading the messages they carry. Almost all religions have written or/and oral traditions to serve humans with knowledge, wisdom and practices for a lifestyle in harmony with nature and other human beings. Examples are given with verses from the holy Quran which can be applied to both literate and laity communities. The impact the Bangladeshi gurus have is outside the traditional schooling and educational system, it is also outside the government, professional or political arenas; but it is extremely potent and aimed at the long term. It also comes from the grass roots and has the power and support from the community.

Although the lifestyle of people from different geo-political and cultural conditions are likely to differ from one other, there is need for sustainability education based on spiritual values as they provide the synergy required for a holistic view of the world. Such an education could complement the existing techno-economic drives in order to achieve sustainability.

SUSTAINING LOCAL LIFESTYLE: A WAY TO AN ECO-WORLD

Amzad Hossain, Popie Hossain-Rhaman and Dora Marinova
Institute for Sustainability and Technology Policy
Murdoch University

The paper analyses changes in rural Bangladesh between 1960s and 1990s which were heavily influenced by the Western model of (mal)development. When the consequences started to devastate the rural population, villagers stood up for the revival of their traditional eco-spiritualism. They also started to restore the depleted eco-friendly greenery, orchards and gardens. A major part in this was played by rural spiritual gurus through the education they provide to rural communities.

On the other hand, the destruction of the city environment in the pursuit of economic wealth, at least in the developing world, seems irreversible with numerous examples emerging from China and India. What we argue is that sustaining local values and lifestyle during the transformation of human settlements in developing and developed countries could bring us closer to sustainable development.

The culture of the city is mainly a product of the Industrial Revolution which among other achievements precipitated the current environmental and social problems that the world now faces. The role of education is to promote a change towards eco-lifestyle within a city environment. There are examples of this happening in the West with the growth of urban agriculture, composting and reusing of resources, responsible social behaviour and planning for sustainability. If the present Western city life is reproduced in the developing world, it would be hard to sustain the resources of the planet. An educational system developed to preserve the local culture and transform the present Western city culture into an eco-city culture could give hope for an eco-world.

SUSTAINABILITY EDUCATION BY WAY OF VALUES EDUCATION: A CASE STUDY OF SRIPUR VILLAGE SCHOOL IN BANGLADESH

Popie Hossain-Rhaman, Amzad Hossain and Dora Marinova
Institute for Sustainability and Technology Policy
Murdoch University

The literature seems to be scarce about the relationship between values education and sustainability education although education in general has been identified as one of the key forces of change. Values education is increasingly being recognised as critical to the achievement of educational outcomes in Australia. The paper argues that values education is a powerful tool for solving society's most important problems, including achieving sustainability locally and on a global scale.

A Bangladeshi proverb states: "Whenever you find something unexplored, even ashes, you may gain valuables by unfolding them". This paper focuses on a case study of an Islamic school in Sripur village in Bangladesh and how this school implicitly addresses sustainability issues through values education. Interviews with teachers reveal that they are unaware of the current global sustainability agenda, and therefore, the term sustainability is not used in their pedagogical vocabulary. They teach to transmit values such as respect, truthfulness, modesty, kindness, patience, perseverance and gratefulness, which values inherently empower students for long term environmental, social and economic sustainability practices. This school's vision and mission as well as approaches to teaching are contrasting with that of schools in Australia. The teachers teach their students why it is better to be happy with 'less' instead of trying to be happy by getting 'more'. A survey of the school students finds them to be very respectful to their environment, including parents, teachers, seniors, fellow students, plants, animals and school property.

Values education is crucial for instilling values which are likely to encourage a positive attitude towards sustainability and facilitate a sustainable way of life. Further investigation, understanding and appreciation of the processes that continue to sustain a sustainable lifestyle, including teaching and learning, are needed.

WATERKEEPERS AUSTRALIA – FOR FORMAL AND CONSTRUCTIVE FIGHTS

Greg Hunt
National Manager, Waterkeepers Australia

Environmental activism requires us to take a stand, to get involved in alternative ways of living. This means that we will find ourselves in opposition – opposing vested interests, arguing for different ways of doing things and overcoming inertia and apathy.

Waterkeepers Australia is an environment NGO established to support community groups that are involved in care and protection of waterways, freshwater and marine. Our waterkeeper members are often at the pointy end of environmental fights, as management agencies and extractors and users carry out activities that communities don't want. Who is on the side of the environment in water allocations? How can we take up the good fight in a way that gives us the best chance of success and that will allow us afterwards to work with those with whom we have been fighting? After all, we all want to live in a healthy environment with healthy waterways.

Waterkeepers Australia has a successful model for community activism for waterway protection. In this session, the Waterkeepers Australia model will be presented and its operations illustrated with case studies. How can you apply this model in your own community for your own waterway?

Greg Hunt *studied Biology at La Trobe University, taught Science and Environment for 15 years, before working for the Victorian Association for Environmental Education. He went to work in policy in environmental ed in Victoria's Department of Education. He spent 6 years at Melbourne Zoo, first as Assistant Principal, then as Principal and was Manager of Education at Melbourne Museum for five years. Nearly three years ago, he joined Waterkeepers Australia, an organisation that gives nationwide support to community groups working to save their local waterways.*

DEPICTING BANGLADESH CULTURE IN TERMS OF SUSTAINABILITY

Rumana Islam
Institute for Sustainability and Technology Policy
Murdoch University

Despite poverty, studies such as the 1999 Survey of the London School of Economics show that Bangladesh is the happiest country in the World. The paper argues that happiness is linked to the country's culture and cultural history which encourage sustainability.

The culture of Bangladesh embeds nature, environment and people's way of life including consumption habits, religious beliefs, practices, values and spirituality. Its cultural heritage is reflected in the lifestyles of the rural mass. Most rural people do not have formal education, but they have knowledge about caring for the land, use of resources and respect for all living beings.

Bangladesh culture is enriched with values such as to be happy with less, respect, simplicity, appreciation and gratefulness. These cultural values inspire the Bangladeshi people to be respectful to nature, including unfavourable natural phenomena. In accordance with the cultural heritage, both males and females remain closely linked to nature in their daily activities. Maintaining the link with the physical environment is also the basis for their socialisation and economic activities. According to local cultural wisdom, the seeds of sustainability lie here.

This paper attempts to reveal the process of sustainability education as it happens in rural Bangladesh through religious practices, proverbs, folk and baul songs, ballads, village dramas and story telling. These accomplish what is often difficult to achieve through formal education. All media in Bangladesh also feature environmental educational programs as part of the country's cultural tradition.

This unique approach to sustainability in Bangladesh contributes towards people's happiness.

RURAL COMMUNITY CULTURAL DEVELOPMENT – SMALL REALLY IS BEAUTIFUL

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This paper will explore how small communities can, and often are, leading the field in community cultural and art development and, consequently, social change – often without realising the social change they are fostering. It will also examine where cultural development sits within the broader sustainability agenda.

Through the use of a case study of cultural planning within a small Local Government Authority in rural Western Australia the paper will examine the value and depth of community knowledge gained by many sources through community consultation into a wide range of areas. These vary from peri-urban and rural land use planning and policy development through to environmental and recreational activities and on-the-ground community art projects. It recognises that cultural development owned by the community can be a catalyst for social, environmental and economic development and, overall, is about enhancing local skills and resources to transform people's dreams, ideas and initiatives into real outcomes, resulting in community celebrations.

Overall, the paper will demonstrate that "small is beautiful" when the community is engaged and takes the position that community driven work often goes unnoticed externally and sometimes within the community itself. The paper will conclude by exploring implications for educators and social change agents in relation to their grassroots work in small rural communities.

Anne Jennings *has worked in sustainable community development in the South West of Western Australia for 20 years - for the non-government community sector, the tertiary sector and local, regional, state and commonwealth government. She holds a Bachelor of Social Science degree and a Master of Arts in Ecologically Sustainable Development and runs a Sustainable Community Development Consultancy as well as being involved in many community projects as a volunteer. Anne has recently commenced a PhD in Education for Sustainability through Edith Cowan University, Bunbury.*

THE RIVER FLOW MODEL
AN INNOVATIVE EDUCATIONAL RESOURCE

Mike Johnson
Rivercare / Ribbons of Blue, Department of Environment, Geraldton

Investigating river restoration provides students and adults alike with a great opportunity to learn about how rivers work, how environmental problems are caused and the best methods of restoring our waterways.

In this interactive hands-on workshop the River Flow Simulation Model will be used to demonstrate key concepts in river degradation and restoration. The model can be used to demonstrate:
• erosion;
• transportation of sediment;
• the role of vegetation;
• the role of woody debris;
• the role of rocks and riffles;
• formation of pools;
• stock watering points;
• stock crossings;
• waterlogging; and
• wetland and dryland salinity.

The model is designed to be:
• user-friendly to teachers and members of the community;
• adjustable to vary the slope;
• easily stored and transported; and
• suitable for displays.

A handbook has been produced with detailed instructions on using the model and a range of activities has been developed for schools that address outcomes in the Western Australian Curriculum Framework.

Mike Johnson *has been a Ribbons of Blue / Waterwatch coordinator in the MidWest region since 1995. The river restoration model was developed to make learning about waterways fun and meaningful through participation. Apart from Ribbons of Blue he is employed by the Department of Environment as a Regional Rivercare officer giving support to the Northern Agricultural Catchment Council.*

"MISS, MISS, DRAW US A PELICAN!"

Sue Kalab

Art is a fabulous device in developing environmental and contemplative relevance in school children. The natural environment is marvelously accessible.

Children are hungry to learn traditional, realist drawing skills. They delight in volunteering their personal experiences of nature. Further insights emerge working with Indigenous children; also the disabled: their world view and perceptions teach me too.

It is possible to convey a sense of appreciation and custodianship of the natural world through artwork. There is potential to impress on children the importance of how and where creatures and plants fit into the Web of Life.

I enthuse children to work at home or in the environment. The art equipment I use is simple, portable and economical. I take along framed and unframed artworks. I explain the origins of a painting with a narrative story-telling - the process of the drawing and then the painting. Relevant aspects about the natural world are highlighted as an integral part of the narrative. This becomes a creative part of the education process.

Art inspires, and touches a deep part of human nature. Nature impresses, leaving an image or a memory that subliminally reflects well being and deeper levels of appreciation.

Sue Kalab *specialises in watercolours of Australian Nature. She is a professional artist and has studied at Monash University and Claremont College of Art. Her work is in collections throughout Australia, many with overseas destinations. She has practiced art therapy, and is inspired by having lived in Croajingolong National Park, Mallacoota, Victoria on the 'wilderness coast' for 12 years and then in the Pilbara on an Aboriginal community. In 1995 she established her studio in Bunbury and her work now reflects experiences in the south west - the bush and beach of the 'cultivated coast'.*

Website: www.suekalab.com *for Sue's studio profile and images.*

Abstract included but not presented at the conference.

SUSTAINABILITY INITIATIVES IN A MAJOR STATE GOVERNMENT DEPARTMENT

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Imagine ….. a corporation that has 1,350 public contact points; 50,000 employees; 493,000 customers; 1,000,000 shareholders; turnover of $5.2 B per year, one could ask the question "Can a corporation like this focus on being sustainable?" This is corporation is Education Queensland (EQ).

EQ has a very long history of significant achievements in environmental education for sustainability in both the curriculum area; through the production of the P -12 Environmental Education Curriculum Guide for Schools, the implementation of quality curriculum and through the support services of a comprehensive network of 25 Outdoor and Environmental Education Centres across the very diverse and decentralised state of Queensland.

However we cannot rest on our laurels. With sustainability being a significant global, national and state issue, the Queensland Government, through the Smart State Strategies has a whole of government priority for 'Protecting the environment for a sustainable future'. EQ has taken this as a challenge and is currently addressing the sustainability issue as a system wide priority. The following projects are currently being addressed to assist in the progressing the EQ towards a more sustainable future.

- Ministerial Advisory Committee on Educational Renewal (MACER) working group on Education for Sustainability
- Collaborative ESD (Environmentally Sustainable Development) Research and Implementation Team (CERIT)
- Queensland Environmentally Sustainable Schools Initiative (QESSI)
- Representative roll on the international Environment and Schools Initiative (ENSI)
- Bunya to Bay Student participation program that is a regionally significant student participation program focused on the middle phase of learning.

All these initiatives are centred on the UN Decade on Education for Sustainable Development as tangible examples of outcomes focussed processes on the pathway towards a more suitable future that will benefit student, schools and the broader community.

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***Cam Mackenzie** has been teaching environmental education for over 25 years both in the formal and non-formal sector. From1982 to 1987 Cam was the President of the Townsville Town Common Natural History Association, in 1987 he was elected President of the Wildlife Preservation Society of Qld - Townsville Branch. From 1988-2002 Cam was a member of the State Council of the Wildlife Preservation Society - Qld. In 1992 he was elected the inaugural President, Queensland Gould League for Environmental Education and in 1995-97 was elected National Director, Australian Council of Gould Leagues. From 1998 to 1999 Cam was the Vice President, of the Queensland State Wide Network of Environmental Education Centres. From 2000 to 2002 he was the National Treasurer - Australian Association for Environmental Education. From 2001 to 2004 he was the Chairperson of the Mountains to Mangroves Corridor Committee. and is currently the president of the North West Brisbane Branch of the Wildlife Preservation Society of Queensland.*

USING STUDENT PERCEPTIONS IN DEVELOPMENT, VALIDATION AND APPLICATION OF AN ASSESSMENT QUESTIONNAIRE

Rekha B Koul
Darrell L Fisher
Curtin University of Technology

This paper reports on a two-stage study aimed at developing, validating and applying an instrument that can be used to assess secondary students' perceptions of assessment. In the first stage, following a review of literature, a six-scale instrument of 48 items was trialed with a sample of 470 students from grades eight, nine and ten in 20 science classrooms in three Western Australian schools. Based on internal consistency reliability data and exploratory factor analysis, refinement decisions resulted in a five-scale instrument that was named the *Student Perceptions of Assessment Questionnaire* (SPAQ). The scales of the SPAQ are Congruence with Planned Learning, Authenticity, Student Consultation, Transparency and Diversity. In the second stage, the SPAQ was used with five scales of the *What is Happening in this Class* (WIHIC) questionnaire, an attitude scale, and a self-efficacy scale. This survey was administered to a larger sample of nearly 1,000 students from 41 science classes from the same grades as in the first stage. Statistical analyses confirmed the validity and reliability of the SPAQ. The mean score ranged from 2.16 for the scale of Student Consultation to 3.17 for the scale of Congruence with Planned Learning on a four point Likert type scale. Cronbach Alphas ranged from 0.62 t0 0.83. Significant correlations ($p < 0.01$) were found among all the scales used in the instrument, for example, Congruence with Planned Learning was positively related to and was positively associated with all the other scales of SPAQ.

Rekha B Koul *has taught in high school for a short time, followed by teaching at undergraduate level and finally over twelve years of research/extension activities aimed at women as main beneficiaries at Agricultural University Kashmir, India. She obtained her Doctorate in Science Education from Curtin University of Technology, Australia. At present Rekha is working on a few learning environment projects in Australia. Her most recent research has involved studies of classroom learning environments, teacher interpersonal behaviour and cultural sensitivity in science teaching.*

INFUSING VALUES THROUGH REAL WORLD ENVIRONMENTAL ACTIVITIES IN THE SECONDARY SCIENCE CURRICULUM IN INDONESIA[1]

Udan Kusmawan[2]

Environmental education has a fundamental role of justifying values over the humanity's relationship with nature. It is fundamental because it effects how humans behave toward nature. A school has a key role in which young generations learn as well as practice scientific ways to relate values with their beliefs regarding the environment acquired from their interactions with natural environment and societies. This paper describes an *infusive* approach on the learning of the environment in the secondary Science Curriculum in some key Indonesian schools. This approach focused on scientific activities to enable students to pervade environmental values in the Science curriculum. The activities consisted of student research and participation involving groups of students defining their own problems, solving the problem through either the research or participation method and finally communicating their results. Preliminary results indicate that infusing real world observation values in scientific activities reinforced student concern for environmental problems and fostered positive attitudes to the environment.

***Udan Kusmawan**, a Sundaneese from Indonesia. I am a lecturer at the Indonesian Open University. Currently, a PhD research student at the university of Newcastle, Australia. Focus of the research is environmental education with an emphasis on its connection with citizenship values.*

[1] Presented in the National conference for the Australian Association for Environmental Education, 4th – 6th October 2006, Western Australia

[2] Udan Kusmawan is a PhD candidate at School of Education, the University of Newcastle, Australia

MARINE EDUCATION: DEEP AND WILD WITH MILLENNIUM KIDS

Brendan La Mar and Dr Laura Stocker

We review a range of approaches and philosophies underlying selected marine education centres and develop a proposal for a sustainably based Millennium Kids marine education centre. We illustrate similarities and differences among approaches by comparing seven marine education centres in New Zealand, Australia and the United States. While marine education centres have broadly similar missions and goals, they are diverse in their origins, implementation of technology and philosophies of teaching and learning. They also differ in their explicit orientation to sustainability. We identify a role for Millennium Kids in marine education and develop a model based on our analysis of other marine education centres. The proposed MK marine education centre would emphasise the physical and spiritual engagement of young people in environmental activities such as snorkelling, kayaking, coastal discovery walks and surfing. These activities encourage both physical and mental health and help to embody pleasurable experiences of the sea. This aspect is similar to the Marine Education and Recreation Centre at Long Bay in Auckland. The proposed centre would promote deep eco-philosophical understandings of the marine world, drawing on teachings of eco-philosophers such as Anthony Weston and David Orr. The proposed centre would aim to empower young people not just to be environmental citizens but environmental leaders who can enable positive change towards marine and coastal sustainability. Education at the proposed centre would also include the Millennium Kids Green Teams Ten-Step approach to environmental empowerment. The proposed centre thus builds strongly on existing MK approaches and combines these with the best aspects of marine education centres studied in this research.

Brendan La Mar *is currently an MK teacher and a research student at the Institute for Sustainability and Technology Policy where he is completing a thesis on the ideas presented here. He is a keen surfer, lover of the ocean, steward of our planet, and intimately interested in the concept of teaching going wild.*

Laura Stocker *is a marine ecologist and a Senior Lecturer in Sustainability at the Institute for Sustainability and Technology Policy, Murdoch University where she began teaching sustainable development in 1990. This year she teaches 'Wangkiny Boodjah', 'Introduction to Sustainability', 'Ecologically Sustainable Development', and 'Marine Conservation Policy and Coastal Sustainability'. The overlay mapping process described above is used in 'Ecologically Sustainable Development' (as well as at Lance Holt School - see Netherwood, Buchanan and Stocker, this conference).*

FROM ENVIRONMENTAL CONSERVATION TOWARDS SUSTAINABILITY: ENVIRONMENTAL CONSERVATION MODEL SCHOOLS IN KOREA

Sun-Kyung Lee[1], Dae-Hee Kim[2], In-Ho Kim[3], Jae-Young Lee[4], Cheol Chung[5], Namsoo Kim[6], Sooyeon Kim[6], Eunjeong Cho[6]
Cheongju National University of Education[1], Sooncheon Univeristy[2], Shingu College[3], Kongju National University[4], Daegu University[5], Seoul National University[6]

Environment conservation model school initiative, which has been supported by Ministry of Environment since 1985, has played a central role in developing an environmental education model for Korean schools and promoting the importance of environment education within the school curriculum. This paper aims to suggest recommendation for innovating environment conservation model school initiatives based on the evaluation of present status. We first analyzed documents and reports available which included first to eleventh operation guidelines for environment conservation model schools, case studies, implementation reports. Interviews and surveys with people in those initiatives and expert groups in environmental education were included to address the current status and issues related to the initiative.

The results showed that model activities helped the development and implementation of teaching methods and contents of environment preservation, implementation of various environment education programs through extracurricular activities, and increasing awareness of environment protection at homes and local communities. In the survey conducted with the teachers at the 10th and 11th model schools, teachers gave high marks for the program, clearly indicating its benefits. We could also see that the scope of program was diversifying and new attempts were being made. From the campaign type activities for pollution prevention that we saw in the early years of the program, we now see ecological field trips, learning & teaching in curricular activities, and projects involving whole school also being used. Teachers' survey gave us information on operation period, method, support level, incentives and participation level of teaching staff and students in the pilots. It also showed the need for training, information and other programs to enhance the competencies of teachers.

Based on these results, the followings are proposed as the way to improve support for environment conservation model schools: First, the overall direction needs to be changed from environmental conservation towards sustainability. Second, overall direction of the improvement needs to : i) focus on sustainability, ii) improve quality of programs, iii) build capacities of school members, iv) strengthen diverse supports, v) strive to be model cases for dissemination, vi) be sustainable, vii) differentiate evaluation by objectives and standards, viii) strengthen partnership with the Ministry (or Offices) of Environment, Ministry (or Offices) of Education, local governments and environment organizations and ix) strengthen partnership with environmental education expert groups.

Sun-Kyung Lee *currently works as assistant professor at the Department of Science Education in Cheongju National University of Education, 135 Sugok, Heungdok, Cheognju, Chungbuk 361-712, Korea. Her interests lie on the teaching-learning strategy and evaluation for environmental education and education for sustainable development. She has been involved in many consultations and researches for EE/ESD in Korea, such as the national strategy development for ESD in Korea and the research for improving Environmental Conservation Model Schools, etc. She has been also participating actively in international EE/ESD networks, such as TEEN(Tripartite Environmental Education Network among China, Japan and Korea), ESD-AP and ENSI.*

SHAPING LIVES – LEARNING AND LEADERSHIP WHEN THE SURVIVAL STAKES ARE HIGH

Sue Lennox Co-Founder/CEO Oz GREEN
(slennox@ozgreen.org.au)

Stories of searching and learning for transformation – a journey of thirty years across Australia, India, Papua New Guinea, East Timor and Pakistan

- How can we build resilience and unconditional tenacity in ourselves and our communities?
- How can we realise our best amidst the brutal truth of a growing ecological crisis?

There are many challenges before us (climate change, peak oil, peak food, nuclear threats, population, poverty, global water crisis to name a few). Any one of these has the potential to trigger social and economic collapse. The evidence is substantial. The potential impacts demand our attention.
However, I see the biggest threat we face right now is not these issues in themselves, but our response to them. Our capacity to act is limited by our capacity to deal with the emotional energy around these issues. Our challenge is to move through overwhelm, denial, shutdown and take on these challenges from a place of deep courage and fierce hope. It is both the toughest and most magnificent thing we need to accomplish.
You may wonder where the hope is in all of this? Education is a key. The seeds of hope reside with the incredible resilience of life and human potential. Our capacity to face the facts, to seek to know the truth as it is rather than trying to define the truth in our own terms that is critical right now. The hope is human potential and realising that. Hope is in our realising the magnificent radical interconnectedness of all of life. And our preparedness to put our shoulders to the wheel of change and do what it takes to get it moving.
Fourteen years ago my life partner Colin and I decided to quit our jobs and sell our home so that we could set up Oz GREEN. We did this because we had inner alarms ringing about the threats to life on Earth – especially the global water crisis. We did this because we knew we had skills that worked and were needed – skills for transformative learning based on the bedrock of speaking the truth, of facing the facts based on the best available information (rational and scientific as well as emotional intelligence and deep spiritual questioning). We did this because of our deep concern for our kids, ourselves and the future of life on this planet.
Since then Oz GREN has grown to work nationally and internationally in India, Papua New Guinea, East Timor and Pakistan. Oz GREEN runs life changing learning and leadership programs for sustainability. Oz GREEN programs harness the creativity and wisdom of people to become agents of positive change in their own communities and beyond. Oz GREEN major programs include Youth LEAD, MYRiveR, Living Communities and the Village Environmental Action Plan. Much of Oz GREEN's work has been recognised through national and international awards. Youth LEAD is currently being written up as a case study in best practice Learning for Sustainability by NSW AAEE.

Sue Lennox *Oz GREEN Co-Founder/CEO (BSc DipEd). To Sue, Oz GREEN is not a job – it is her strategic response to her deep concern about the world's waters and her vision to build a more sustainable, peaceful and equitable world. Sue, along with her husband Colin, has been the driving force behind Oz GREEN since it's inception. She has 30 years experience in education program innovation, development, management and implementation in Australia, India, Papua New Guinea, East Timor and Pakistan. Oz GREEN (Global Rivers Environmental Education Network – Australia Inc) is an independent, not for profit organisation established in 1992. Oz GREEN runs life changing learning and leadership programs that harness the creativity and intelligence of people to build pathways to ecologically sustainable futures. Donations to Oz GREEN are tax deductible in Australia. Sue has received Banksia Environmental Awards, UN Media Peace Awards, Environmental Educator of the Year (1998), Award for Excellence in Teaching from NSW Department of Education and her former school was designated a Centre of Excellence in Environmental Education. Oz GREEN's youth leadership program "Youth LEAD" is a case study in best practice education for sustainability by NSW AAEE. Sue is an Australia Day Ambassador. She represents the NGO sector on the NSW Government Advisory Council on Environmental Education. She is a member of the Australian Association for Environmental Education and Women Chief's of Enterprise International. Oz GREEN is a member of NSW Nature Conservation Council, the Australian Council for International Development (ACFID), a signatory to the ACFID Code of Conduct and a member of the AusAID NGO Cooperation Program. Oz GREEN Phone (+61 2) 9984 8917 E slennox@ozgreen.org.au www.ozgreen.org.au*

ENVIRONMENTAL EDUCATION IS MORE THAN JUST PLANTING TREES

Cathy Levett

This program opens children's eyes to the wonders of the natural environment and encourages them to become positive environmental citizens. An eight step plan guides students (and teachers) as they learn about environmental issues. The progressive manner in which knowledge, skills and values are developed aims to ensure that students develop positive attitudes towards conservation of the natural environment that will continue throughout their lives.

This project was developed over a three-year period by a practicing teacher in a Western Australian Government school. The project focuses on environmental education in the upper primary school setting and addresses the problem of how to deliver environmental education concepts at a level that is appropriate for the abilities of children of this age. It explores the availability of suitable resources and details the development of a program that can be used by teachers in any location. The program incorporates indoor and outdoor activities across most curriculum learning areas.

Developing partnerships with local community organisations was an important aspect of this project. The model described centred on the conservation of an area of natural bush that was close to the school and of significance to the community.

Cathy Levett*. - Since commencing my teaching career in the early 1980s I have included topics of study on natural environments and native animals in my yearly programs. In the mid 1990s the school at which I was teaching was approached by members of the local community. They wanted to create a partnership with the school for the purpose of involving the children in learning about and caring for local natural areas. I agreed to coordinate the school's involvement in various community projects and this lead to the development of a variety of school environmental projects including some with the Millennium Kids organisation.*

THE STORY OF SUSTAINABILITY AT A MONTESSORI SCHOOL

Elaine Lewis (B.A., Dip.Ed., M.Ed.)
D.Ed student Murdoch University

Effective education for sustainability is not simply a program you 'do', or a curriculum commitment you plan, implement and complete. Effective education for sustainability is integrated into a whole school approach. A vision for sustainability, developed through input from the whole school community, and the embedding of sustainability principles into school policies, supports such an approach. The philosophical beliefs underpinning a school's values can also make an important contribution to the success of its education for sustainability programs. In addition to whole staff professional development on education for sustainability, keeping the school and local community involved and informed, are also shown to be vital elements of the whole school approach.

A case study of a Western Australian Montessori school is presented. The Montessori philosophy and curricula are analysed to determine links with sustainability education. Furthermore, specific learning programs in the school are reviewed, showing a comprehensive whole school, community-based, approach to sustainability. These programs include projects such as, nest boxes for endangered native birds, living with tiger snakes, developing a solar power system that feeds into the Western Power grid, and a longitudinal flora and fauna survey of the local area. Links between this school and the Sustainable Schools Initiative are also examined. Results from a range of evaluations of the whole school approach to education for sustainability are presented, indicating successful outcomes for students, staff and the wider community.

Elaine Lewis *currently works as a teacher at a Western Australian Montessori school. She conducted her Master of Education research in the field of gifted education and is currently undertaking doctoral studies in education for sustainability. Ms Lewis is involved in numerous school-based projects that have been funded by state and federal government grants which enable engaging investigations to be conducted that link the needs of the students with the needs of the local environment.*

UNDERSTANDINGS OF SUSTAINABILITY WITH PARTICULAR REFERENCE TO THE SUSTAINABLE SCHOOLS INITIATIVE

Elaine Lewis (B.A., Dip.Ed., M.Ed.)
D.Ed student Murdoch University

There are many different definitions and conceptions of the word 'sustainability'. Some of these definitions will be examined in the context of four levels of usage: international, national, state and local. From this analysis of definitions, the related conceptions or models of sustainability will be reviewed. For one of these models, the implications of 'triple bottom line' accounting and reporting will be investigated and current developments explored.

An analysis of sustainability in the context of the Sustainable Schools Initiative (SSI) will be presented. An historical overview of the Australian Sustainable Schools Initiative (AUSSI) will be conducted in terms of its guiding principles, benefits, drawbacks and achievements. Then developments in the Western Australian (WA) SSI will be reviewed, with particular reference to the evaluation of sustainability at the schools involved in this phase of the Initiative. Enhanced understanding of sustainability, commitment to a whole school approach and increased education for sustainability were some of the positive outcomes achieved by the WA SSI.

Elaine Lewis *currently works as a teacher at a Western Australian Montessori school. She conducted her Master of Education research in the field of gifted education and is currently undertaking doctoral studies in education for sustainability. Ms Lewis is involved in numerous school-based projects that have been funded by state and federal government grants which enable engaging investigations to be conducted that link the needs of the students with the needs of the local environment.*

ENERGY LITERACY FOR A FUTURE WE CAN BREATHE IN

Hon Paul Llewellyn, MLC

Renewable energy technologies are the key to a sustainable, reliable, secure and cost effective electricity supply for Western Australians into the future and the technology is available now. Climate change has been identified as the most important threat to the economic welfare of this State and the Southwest is already experiencing significant impacts. The State's electrical infrastructure system is past its use-by date and in need of a major re-tooling. Very few people understand electricity and energy and our communities lack the language needed to be part of this important conversation. Empowering communities to engage in these broader conversations by giving them the language brings about effective and meaningful social change?

These issues will be addressed in an informal discussion led by the Hon Paul Llewellyn MLC for the Southwest, complementing his presentation on his Private Members Bill to introduce renewable energy targets. For over 25 years Paul has been well known in the region for bringing a fresh energy to key issues such as native forest conservation, plantation industry development, and sensible regional planning. Paul has been a wind energy consultant, wood worker, builder, solar designer and environmental planning and management consultant. He brings his extensive experience in regional planning, environmental science and economics to the role of Greens Member of Parliament.

Paul's strategic focus is on achievable outcomes that deliver practical improvement in people's lives through ecologically and economically sustainable development. Paul leads by pro-active example claiming we can invent our own future.

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GREENS PATHWAYS TO A SUSTAINABLE ENERGY FUTURE

Hon Paul Llewellyn, MLC

The Greens have a vision of a sustainable energy future for Western Australia. Inspired by this vision, the office of Southwest Greens MLC Paul Llewellyn has breathed life into the concept and developed groundbreaking renewable energy target legislation. The legislation sets out to achieve 20% Renewable energy generation by 2020, improving electricity service delivery, bringing the State's electrical system into the 21st century and boosting clean safe economic development.

Paul Llewellyn will outline his Private Members Bill, The Electricity Industry (Western Australian Renewable Energy Targets) Amendment Bill 2005, known as WARET 20/20.

WARET 20/20 is an easily regulated mechanism designed to increase the uptake of renewable energy by requiring electricity retailers on the South West Interconnected System to source 20% of their energy from renewable sources by 2020. It is an important practical step towards reducing greenhouse gas emissions from our electrical systems by increasing the use of clean, safe, reliable and secure power generation technologies, including wind, solar and biomass.

WARET 20/20 can be implemented now using current technology and will spearhead the development of a vibrant renewable energy sector. It leads the way in planning and design for renewable energy development and provides a model that can be replicated elsewhere.

The Bill was introduced to Parliament's Upper House at the end of last year with strong support from the renewable energy industry. WARET 20/20 is about building relationships with the community of decision-makers and power-brokers and the debate is just beginning.

Hon Paul Llewellyn, MLC *- For over 25 years Paul has been well known in the region for bringing a fresh energy to key issues such as native forest conservation, plantation industry development, and sensible regional planning. Paul has been a wind energy consultant, wood worker, builder, solar designer and environmental planning and management consultant. He brings his extensive experience in regional planning, environmental science and economics to the role of Greens Member of Parliament. Paul's strategic focus is on achievable outcomes that deliver practical improvement in people's lives through ecologically and economically sustainable development. Paul leads by pro-active example claiming we can invent our own future.*

INDUSTRIAL ECOLOGY: THE NATURE WAY TO SUSTAINABILITY

Associate Professor Chris Lund
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Industrial ecology is an emerging discipline based on parallels between industrial systems and natural systems that offers a practical approach to increasing the sustainability of modern industrial society. At its core lies the concept of using nature to learn from and discover new insights for dealing with industrial activity, and seeks to balance the development of industrial systems with the constraints of natural ecosystems. Thus it can be seen as the "Nature way to sustainability". Although it, like the natural systems it seeks to parallel, is still evolving, it provides an academic framework and practical set of tools for measuring and practically seeking to increase environmental sustainability.

This paper will seek to provide a brief introduction, through the use of examples, to some of the aspects of the discipline of industrial ecology and the role it can play in increasing environmental sustainability. It will start with a (multidisciplinary) definition/s of industrial ecology and then introduce a number of the practical tools and approaches it provides for measuring and improving the sustainability of industrial society. These include frameworks for setting sustainability goals, such as Factor X, new business models, such as The Natural Step, and concepts for measuring environmental sustainability such as ecological backpacks and footprints. Some of the tools that will be looked at to achieve these goals include eco-efficiency, industrial symbiosis, life cycle analysis, design for the environment and biomimicry. It will finish by looking at the role of technology and innovation in achieving sustainability, with examples from areas such as biotechnology, nano-technology and information technology.

Associate Professor Chris Lund *is an adjunct researcher in the Centre of Excellence in Cleaner Production at Curtin University. He currently works as a Principal Sustainability Consultant for GHD, one of Australia's leading professional services companies. Prior to this he held full time academic and research leadership positions in the Centre for Cleaner Production at Curtin University of Technology, and Energy Studies Program at Murdoch University. He has 20 years multidisciplinary research and teaching experience in the areas of sustainable technology and innovation, and more recently, triple bottom line corporate sustainability. His teaching and research are in the areas of sustainable energy, greenhouse gas management, eco-efficiency and industrial ecology.*
While at Murdoch University he was responsible for leading the development of its internationally recognised online Energy Studies programs. These undergraduate and postgraduate programs now enable sustainable energy education and training to be delivered in a flexible manner to students all over the world. He has also been involved in the development of a range of sustainable energy resources and activities for schools (K-12) and the community. These include the award winning Noranda Primary School PV system and website (http://energy.murdoch.edu.au/solarschool/), and the WebRAPS website (http://energy.murdoch.edu/webRAPS/). He is currently involved with the Worsley Alumina Energy Challenge, an exciting initiative between industry and 4 schools in the Bunbury area to promote more sustainable use of energy by the students and their community.

EDUCATION ABOUT AND FOR SUSTAINABILITY IN AUSTRALIAN BUSINESS SCHOOLS

Jeremy Mah, SallyAnn Hunting, Daniella Tilbury [1]
Australian Research Institute in Education for Sustainability (ARIES)[1]

The sustainability agenda is gaining significant ground in the business sector internationally, although in Australia it is happening at a slower pace. The lack of opportunities to build capacity for sustainability in business may help explain why the increasing interest in the area of sustainability has only resulted in limited reorientation of business strategy and practice.
Business Schools play a key role in driving change towards sustainability in preparing Australia's future decision makers and leaders in sustainability.

Based on initial findings, ARIES undertook a 12 month action research project funded by the Australian Government Department of the Environment and Heritage under the National Heritage Trust, involving participants from four leading Business Schools including: Australian Graduate School of Management (AGSM), Macquarie Graduate School of Management (MGSM), the University of Queensland Business School (UQBS), and the University of Technology Sydney Graduate School of Business (UTSGSB).

The primary aim of the project was to use an action research approach for building capacity, resources and partnerships to infuse education *about* and *for* sustainability into the MBA program across Australian Business Schools.

Rather than ARIES adopting an external consultant role, the action research process provided significant impetus for the schools to critically examine their own program designs. In particular, funding champions to undertake action research projects provided incentive for them to become agents of change within their own institutions.

The key findings of the project and recommendations made are important, practical outcomes for other Business Schools wishing to make change towards sustainability.
The outcomes of the project will be released in a report due end October 2006.

Jeremy Mah *is a Project Coordinator at the Australian Research Institute in Education for Sustainability. He has a Bachelor of Commerce majoring in Marketing and Japanese from the University of NSW and a Masters in Environmental Management from Macquarie University. He is currently working on the Business Schools Project which aims to build capacity, resources and partnerships to strengthen education about and for sustainability across the Business School curricula.*

SallyAnn Hunting *is a Project Director at the Australian Research Institute in Education for Sustainability and has extensive experience in organisational change programs. She has a Masters in Sustainable Management from the University of Sydney and is currently working on three projects aimed at making change towards sustainability in the corporate, business school and federal government sectors.*

Daniella Tilbury *is the Director of the Australian Research Institute in Education for Sustainability.*

THE IMPORTANCE OF PERMACULTURE IN A POST-OIL FUTURE

Dr Ross Mars

Modern agriculture has been described as the use of land to convert petroleum into food. We use oil and petrol or diesel to operate almost every type of farm machinery. Without petroleum the world as we know it would irreversibly change.

During the last few years geologists and other scientists have conceded that the world's supply of crude oil is on the decline. The USA reached its peak production and extraction in the early 1970's and the rest of the world is experiencing its 'peak oil' production about now – certainly within the next five years. Australia reached peak oil in 2000. This means that our oil and gas supplies are fast dwindling, and within our lifetime, the age of fossil fuels will be over.

We live in an age where climate change, enhanced greenhouse and large-scale earth changes all threaten our existence. While all of these changes are serious threats, global energy peak will surpass all others as the driving force towards true sustainability.

Permaculture is the design and development of sustainable agricultural systems. Permaculturalists have long advocated for the increase use of renewable energy sources and an increase in food production at a local level. While some would argue that permaculture has only made an impact at a grass roots level, its importance in the years that follow our current energy decline cannot be under-estimated. The survival of many humans will depend on the availability and production of food, and developing and using other sources of energy. In fact, Permaculture may well be a mechanism for the transition to a modified society, a society which relies more on individuals obtaining their own supply of food and resources.

Permaculture has much to offer. Using particular design principles and unique ideology, permaculture will enable people to grow organic food without the use of pesticides and artificial fertilisers, build and live in energy-efficient homes, use appropriate technology and energy systems, and develop ways to reduce and recycle waste. While sustainable production of food and other resources remains the prime objective of permaculture strategies, permaculture has also been effective at pioneering what has come to be called "sustainable consumption".

History will reveal our response to the environmental issues which confront us today, and our foresight to seek better solutions for food and energy security, for it was Aldous Huxley who said "facts do not cease to exist because they are ignored". History will also attest that Permaculture ethics, principles and practices are extremely relevant as we descend into a low-energy future.

REUSABLE MATERIALS - A CHARACTER TRAIT OF 'THE THIRD TEACHER'

Elissa McAuliffe - REmida Creative Reuse Centre

The paper has two main goals: (1) To highlight the potentials of reusable materials as learning tools in the school classroom (2) To generate discussion around 'The Third Teacher' in the context of environmental education. The 'Third Teacher' is a pedagogical model of the 'Reggio Approach' which espouses the classroom environment as a didactic force to be consciously constructed by teachers and learners. Participants will address the problem: *What does a Sustainable classroom look like?* and example will illustrate ways of incorporating reusable materials into the classroom context that supports a culture of sustainability. Together with the session participants, we will conceptualise the possibilities of reusable materials both as technical learning tools in an integrated curriculum and as devices for supporting an environmental ethic in the classroom.

Elissa McAuliffe *BA (Sustainable Development)*
Since completing a Bachelor of Arts in Sustainable Development in 2003 and pursuing a graduate diploma in Primary education Elissa McAuliffe has been applying her creativity and energies to a new and inspiring challenge: the challenge of establishing REmida PERTH, an educational creative reuse centre modelled on similarly innovative centres operating in Italy and Denmark. As Coordinator for REmida Perth, Elissa travelled to some of these European centres and has returned to develop the Perth centre in this REmida network. Elissa has also worked at Bold Park Community School as an early childhood and primary school teacher since 1996.

CREATING SUSTAINABLE FUTURES: A CASE STUDY OF LANDLEARN CHANGING MINDS, INNOVATING OUTCOMES

Natalie McDonagh
McDonagh 2D 3D 4D Design

This case study shows how LandLearn (an education program housed in the Department of Primary Industries, Victoria) very successfully used an art-based methodology of inquiry to generate significant outcomes in two areas. The first, in changing the team's ways of seeing and understanding sustainability, and secondly, in creating innovative thinking tools and professional development experiences for environmental education teachers. Using the documentation and data generated over the year-long project, this case study clearly demonstrates the benefits and applications of art-based methods in both increasing our abilities to effectively engage with issues as abstract, complex and 'slippery' as sustainability, and in producing original, tangible, practical tools for learning and teaching.
There is also an associated workshop offering an opportunity to experience for yourself some of the creating sustainable futures thinking tools.

Natalie McDonagh *conducts an experimental practice that is a fusion of art and design dedicated to expanding the ways we think about and understand the world and our actions in it (and on it). This form of applied creative practice is the topic of her current PhD research. Since January 2003, Natalie has been working with Victoria's Department of Primary Industries applying her original art-based methodology of inquiry to effectively enhancing organisational capability. In early 2005 she began a close collaboration with DPI's LandLearn team to apply the methodology to their work providing professional development experiences and curriculum material to environmental education teachers.*

CREATING SUSTAINABLE FUTURES: INNOVATIVE TOOLS FOR EXPERIENTIAL LEARNING AND TEACHING

Natalie McDonagh
McDonagh 2D 3D 4D Design

In 2005 LandLearn (an education program housed in the Department of Primary Industries, Victoria) very successfully used an art-based methodology of inquiry to create original, tangible, practical tools for learning and teaching related to sustainability. This workshop offers you an opportunity to experience for yourself some of these Creating Sustainable Futures thinking tools and consider how their applied use may enhance your work or teaching practice. It is a gently paced, guided exploration of how you see and practice sustainability in relationship to yourself, to others and to the world.

Natalie McDonagh *conducts an experimental practice that is a fusion of art and design dedicated to expanding the ways we think about and understand the world and our actions in it (and on it). This form of applied creative practice is the topic of her current PhD research. Since January 2003, Natalie has been working with Victoria's Department of Primary Industries applying her original art-based methodology of inquiry to effectively enhancing organisational capability. In early 2005 she began a close collaboration with DPI's LandLearn team to apply the methodology to their work providing professional development experiences and curriculum material to environmental education teachers.*

CROSSING BORDERS FOR SUSTAINABILITY IN HIGHER EDUCATION THROUGH CREATIVITY AND PARTICIPATION

Natalie McGrath, Dora Marinova and Peter Newman
Institute for Sustainability and Technology Policy
Murdoch University

The complexity and diversity in a globalised and rapidly changing world require knowledge and skills by citizens, professionals and leaders that cross the borders of disciplines and institutions, cultures, gender, power, privilege and other divisions in society. The primary challenge of sustainability in higher education is to prepare sustainability professionals for the art of active citizenship where they can subvert such divisions. Creative and critical thinking and reflection will be necessary skills as in any liberal education but the new sustainability professional will require skills in deliberative democracy as well. An education in sustainability must therefore nurture these skills and in itself practice and reflect upon the process of community engagement. This article analyses and reflects upon the practice of education at the Institute for Sustainability and Technology Policy in preparing professionals for sustainability. The analysis has been categorised into the different types of borders that this practice crosses and these include: crossing disciplines (especially how environmental education needs to be transformed into education for sustainability), institutions, theory-practice dichotomy, teacher-student dichotomy and the borders that prevent communities from engaging in future strategies. The paper demonstrates that the best practice case studies within the analysis are closely aligned to the theoretical foundations that guide the ethic of education at ISTP but which actively engage students in border-crossing placements and projects. Conclusions focus upon the need for creativity and participation skills to be integrated into teaching and learning of sustainability in real-life placements and projects.

ENGAGING AN AGRICULTURAL INDUSTRY THE ENVIRONMENTAL CHAMPIONS PROGRAM

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Authors: Phil Smith, Katie Ross, Louise Adcock, Janelle McGufficke, Les Gordon.

In 1999 a group of passionate rice farmers began developing a program to lead Australian agriculture in environmental change. Their objectives were;

- To reward growers for their efforts, past, current and future
- To demonstrate stewardship and achievements
- To aid growers to a healthy legacy

Through close partnerships with farmers, government bodies, green groups and natural resource management organisations, the Environmental Champions Program evolved.

An inclusive and comprehensive environmental policy was developed and adopted by the industry. This led to flagship programs including biodiversity, greenhouse, and industry improvement. The key to on ground achievement however depended on taking such programs from the shelf and into the paddocks, sheds and homes of farmers. This is the role of the ECP.

The ECP delivery mechanism provides a streamlined approach to natural resource management. It focuses on participation and partnerships and is based on the principles of change management. Through five levels of achievement and ten management pathways the ECP encompasses legislation, regional programs, education and the rice industry's flagship programs. Delivered through farmer groups it supports progression through the program and provides recognition while building the capacity of the individuals involved and their local community.

In the three years since its implementation the benefits are beyond what was anticipated, particularly in community building.

Key lessons learnt;
Ownership of outcomes is fundamental
People are the key to outcomes, not just information
A holistic approach is important
Change takes time – building a solid foundation will reap benefits in the long term

Phil Smith *is an educator who has experience working in government and community groups as an environmental educator.*

OIL AND SUBSTITUTION: REVIEWING THE POSSIBILITY OF FAILURE IN THE TECHNOLOGY MARKET

Adam McHugh

Oil's vital economic role is referenced against its degree of substitutability with other factors of production. Crude oil is a key component in the macroeconomic production function not only as an energy source but also as the primary material building block of innumerable intermediary products requisite in a vast range of contemporary industrial and agricultural processes. Standard economic theory suggests that as oil becomes scarce its price should rise resulting in entrepreneurial drive to find alternatives, including technical substitution towards more capital, labour or land in production. Hence market forces should provide for automatic adjustment. The paper discusses likely flaws to this view including: imperfect geological information; economies of scale acting as a barrier to entry; oils gross complementarity to other factors of production; and the non-inclusion of time in analysis. It is argued that planning will be required to manage technology market failure and avoid undesirable equilibria.

WHAT IS LEADING PRACTICE?: PRINCIPLES FOR SUSTAINABLE EDUCATION IN LOCAL GOVERNMENT

Lynne McLoughlin and Geoff Young
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Leading practice in community education is something we aim for, but rarely completely achieve. It involves learning from experience through shared ideas, and the discovery of new possibilities and approaches. It takes time to develop, it continuously changes, and it differs according to context. While there is a significant body of work identifying frameworks and general principles in education for sustainability, there is much less available to assist us to understand and apply these at project level.

An Urban Stormwater Education Program (USEP) ran in New South Wales from 1998-2002. It was part of a much larger Urban Stormwater Program (USP) funded to $80m over 5 years, 1997-2002, to encourage and support better stormwater management practices to improve condition of state's urban waterways. A significant element of this focus on stormwater was a grants scheme for local government to implement education programs associated with their infrastructural approaches. In 2004-5, the learnings from the major investments in stormwater with local government were captured in two ways by independent externally conducted projects; firstly, through an external meta-evaluation of 327 Stormwater Trust funded education projects to identify success factors and leading practice principles for environmental education from the experiences and ideas of councils across NSW, and secondly, through identifying processes and structures for more effectively integrating and sustaining environmental or sustainability education in local government strategic planning frameworks.

This paper presents an overview of the outcomes of those projects and the key lessons for environmental and sustainability educators across Australia.

Lynne McLoughlin *has manages social research and program evaluation in the Sustainability Programs Division of the Department of Environment and Conservation. She also runs a post-graduate course in environmental education and heritage interpretation in the Graduate School of the Environment at Macquarie University. Prior to her current position she was a part-time academic at Macquarie, completed her PhD in environmental history, and also acted as a consultant to state and local government in a variety of education and interpretation projects.*

RIBBONS OF BLUE
COMMUNITIES CARING FOR CATCHMENTS

Jen Mitchell

Ribbons of Blue was initiated in Western Australia as a schools environmental education programme in 1989. The vision of 'Communities Caring for Catchments' is delivered through five key objectives.

- Increase community awareness and understanding of water quality issues in a whole of catchment context
- Provide school and community with educational opportunities through a range of curriculum areas and public forums
- Encourage collaborative action projects involving the community (including schools), local government authorities and State Government agencies to identify and resolve water-related catchment issues
- Support community monitoring projects to contribute useful water quality data for community and agency application in raising awareness and resolving issues and
- Maintain networks and partnerships to share data and information, and to support the continuity of the program across the state.

The five objectives are implemented through various activities in partnership with local community groups, local government authorities and government agencies. The activities range from stormwater monitoring in the light industrial area, tree planting on local reserves, rivers and wetlands, writing and implementing management plans for coastal reserves to designing and painting street banners and stormwater drains.

Jen Mitchell *has lived in the area for over seven years. She has been working with the Geographe Catchment Council since 1999 developing and implementing river action plans across the catchment. She began work as the Ribbons of Blue Regional Coordinator in 2000. The Ribbons of Blue position covers the Geographe and the Cape to Cape catchments. The position involves working closely with schools and community groups, giving them the skills and opportunities to assist in conservation, management and rehabilitation of our unique environment, building a sense of social, civic and environmental responsibility.*

STEPPING STONES: CREATING HEALTHY HABITATS RETURNING LIFE TO THE SUBURBS!

Arlene Moncrieff,
Greening Australia (WA)

Loss of biodiversity from our urban areas occurs on a daily basis thanks to a myriad of threatening processes. With this loss we become increasingly disconnected from nature as opportunities for meaningful interactions with the natural world are lost. Greening Australia (WA)'s Stepping Stones: Creating Healthy Habitats program is working with urban communities to return life to the suburbs. Stepping Stones seeks, not only to restore the habitat of native species, but also to influence people's attitudes and behaviour towards the suburbs in which they live. By building partnerships within the community Stepping Stones aims to improve the health of the environment as well as the health and vitality of communities. Stepping Stones is both a process for change and a learning journey. It is underpinned by an action-learning model which leads participants through three phases of learning-"Discovery-Understanding-Action'. Throughout these phases participants develop an understanding of the importance of their own gardens as potential 'stepping stones' of habitat to assist plants and animals to move through the landscape. Through a series of hands-on activities this workshop will introduce participants to the Stepping Stones process and learning journey.

Arlene Moncrieff *currently works as the Environmental Education Manager at Greening Australia (WA) which is based in Fremantle, Western Australia.*

VIRTUAL HABITATS

Arlene Moncrieff,
Greening Australia (WA)

The South West of Western Australia is internationally recognised as one of 25 global hotspots for biodiversity, mainly due to its high floral diversity and species richness. Close to eight thousand plant species are found in just the south west of WA, and eighty five percent of these are found nowhere else in the world. This means that we have some of the most rare and diverse plant and animal species right here on our doorstep. So how do we ensure our younger generations are aware of the uniqueness of this part of the world and begin to develop a sense of place for where they live? Enter the Grow Us A Home website, an exciting, innovative and interactive site using animation, colourful graphics and supporting text to introduce users to some of the biodiversity values found on the Swan Coastal Plain and Darling Range. Recently extended to include the Bunbury region, this workshop will explore the relevance of this website across a number of educational contexts.

Arlene Moncrieff *currently works as the Environmental Education Manager at Greening Australia (WA) which is based in Fremantle, Western Australia.*

FIRE – THE FORCE OF LIFE
NEW INVESTIGATIVE EDUCATION RESOURCES - FOCUS ON FIRE DIVERSITY SUSTAINING BIODIVERSITY

Liz Moore, Senior EcoEducation Officer,
Department of Conservation and Land Management,
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The management of fire is controversial and the subject of much heated debate! What are the key scientific principles of fire management? How does fire diversity promote biodiversity? What can we learn from Aboriginal people who used fire as a tool to manage the landscape? How can we reduce the threat of wildfire to people, property and conservation values? This workshop will address these and other burning questions and present valuable, new teaching resources to help teachers and students (land managers and fire scientists of the future) contribute usefully to this debate.

Fire management on natural lands in Western Australia is the responsibility of the Department of Environment and Conservation (DEC). With other agencies, it is developing "Bushfires and Biodiversity, A geographical perspective"; includes maps, structured tasks, CD for Western Australia's new Geography Course of Study. This workshop will provide an overview of this new resource.

Attend this workshop and take away with you:

- *The Day the Flames Came, Dwellingup 1961*, an educational DVD that tells the story of a devastating wildfire and discusses the lessons learnt for fire management today.
- *Fire for Life* EcoEducation program resources. Provides classroom resources, hands-on fieldwork for Science, Society & Environment, Geography students;
- Compendium of illustrated *LANDSCOPE* articles covering a spectrum of fire management issues: impact of wildfires, prescribed burns and a photographic essay of wildfires;
- Poster illustrating research on balga trees and Nyoongar Aboriginal burning.

This workshop has wide application for educators from Australia and overseas.

Liz Moore *- I am currently Senior EcoEducation Officer for the Department of Conservation and Land Management (WA). I have worked for this Department since 1994. During this time I have developed EcoEducation programs and resources that promote biodiversity conservation. Programs include Professional Learning days, resources for teachers, written resources for the classroom and excursions and camp activities at field sites in the Perth metropolitan area, the south-west of WA and elsewhere. Prior to 1994 I worked on contract for Perth Zoo, Department of Environment, and overseas in toxicology. I have a degree in Zoology and a Master of Science.*

THREATENED FAUNA SPECIES, A PROGRAM FOR RECOVERY – *WESTERN SHIELD*

Liz Moore, Senior EcoEducation Officer,
Department of Environment and Conservation,
Locked Bag 29, Bentley Delivery Centre, Bentley, WA 6983
Email: Elizabeth.Moore@dec.wa.gov.au

Can you name Australia's largest and most successful fauna recovery program? Attend this workshop and you will find out why it is based in Western Australia (WA). You will also pick up a wealth of free educational resources including a DVD with fantastic footage of WA's threatened species. Furthermore discover how you and your students can become actively involved in threatened species recovery and what fieldwork opportunities there are at our EcoEducation centres.

The Department of Environment and Conservation (DEC) in Western Australia has the mandate to manage and conserve biological diversity on behalf of the citizens of WA. *Western Shield*, the department's flagship fauna recovery program, has been in operation since 1980. *Western Shield* works towards the recovery of all threatened fauna through a program of baiting to control introduced species (European Red Fox); monitoring recovery of fauna; fauna reconstruction and species recovery via captive breeding/translocations; research and development of feral cat control and education and public relations.

DEC's EcoEducation program on threatened species provides education for both primary and secondary school students, teachers and the wider school community through professional learning camps for teachers *'Be a Nature Conservation Officer for a Night'*, excursions for students '*Back from the Brink*' and '*Marsupial Monitoring'*, a video and printed materials '*Western Shield* Action Pack' and information via our website NatureBase (www.naturebase.net).

This workshop has wide application for educators from Australia and overseas.

Liz Moore *- I am currently Senior EcoEducation Officer for the Department of Conservation and Land Management (WA). I have worked for this Department since 1994. During this time I have developed EcoEducation programs and resources that promote biodiversity conservation. Programs include Professional Learning days, resources for teachers, written resources for the classroom and excursions and camp activities at field sites in the Perth metropolitan area, the south-west of WA and elsewhere. Prior to 1994 I worked on contract for Perth Zoo, Department of Environment, and overseas in toxicology. I have a degree in Zoology and a Master of Science.*

SPEAK OUT! - SPEAK RIGHT!

Peter Murphy
Preston Environment Group

Nothing irks me more when browsing the letters column in our daily's only to find contributing conservationists using the language speak of the logging industry and their government acolytes. In other words the **'dumbing down'** of the English language associated with the logging of native forest by subduing an unsuspecting community by stealth - appears to be succeeding. For instance take the word **'harvesting'** (a favorite of the logging industry). Harvesting according to the Collins English Dictionary is described as: "the gathering of ripened crops being the product of cultivated plants." Now in recent times, even hard core forest activists have dropped their guard, and now use the harvesting word frequently – when of course the correct term 'logging', according to the Collins English Dictionary is described as: "the work of felling, trimming, and transporting timber." Other sanitized words describing the continued plunder of native forest (also adopted by some conservationists and green politicians) are 'residue' 'thinning' 'regen forest' and 'forestry restoration'. Whatever happened to the term 'forest ecosystem'? But the biggest **'dumb down'** in recent times would have to be forest speak which oozes throughout the WA Forest Management Plan 2004-2013 (FMP).
Here are a couple of beauties:

- **Shelterwood system**: When regeneration is sufficiently established most of the remaining trees are then removed (logged) to allow regeneration to develop.
- **Gap creation**: A discrete opening (clearfelling) in the overstory canopy.
- **Pushing, or push down treatment**: Involves the pushing down (poisoning and bulldozing) of banksia and sheoak that are impeding regeneration establishment.

Not much of an improvement on the 1987 and 2002 Forest Management Plan when forest speak was akin to a Monty Python script with these couple of rippers:

- **Compatible uses**: Uses that do not conflict with the priority use.
- **Conditional uses**: Uses that conflict to an extent with the priority use, and are only permitted so long as there is no significant harm to the priority use.

By the way who can remember the ridiculous Orwellian oxymoron '**Forest Protection Society'**?
However one logging speak term that has been warmly embraced (without a murmur) by WA peak forest conservation groups is **'Forest Habitat Zones'.** Now back in the 1987 FMP the then term was MPA's, or Management Priority Areas, then in the 1994 FMP it became known as TEAS, or Temporary Exclusion Areas. TEAS were strips of native forest unlogged between logged forest coupes, but were later logged when the surrounding forest become '**FAT'** enough to resemble TEAS - got it! Forward to 2004 and yet we have another definition for forest strips left unlogged between coupes – Forest Habitat Zones (FHZ).
Now the ironic thing is that the architects of the FMP 2004 – 2013 are up front and comfortable with the FHZ definition:

- **Forest Habitat Zones are strips of forest temporarily put aside from logging until they can be eventually logged as regenerating forest are able to replace the purpose of Fauna Habitat Zones (pg 97 FMP).**

Of course the major concern is - why are WA's peak forest conservation groups tripping over each other to endorse, embrace and assist the logging industry to implement forest strips that will eventually be logged anyway? Perhaps an article aired on the ABC 7/10/03 may shed some light on this forest speak phenomena. The article went on to explain how a joint venture between Forestry Tasmania, Melbourne University, and the Bureau of Rural Sciences will identify what the community thinks are acceptable ways to log native forest.
In other words, what the propaganda project sets out to do is measure peoples emotional responses to different ways of logging. As the logging industry cash up to flex their corporate muscle in stifling public opinion by issuing writs to those who speak out – the same strategies are being applied in corporate boardrooms in making sure we also speak wrong.

Thanks to Jill Redwood for inspiration in writing this article. **Note**: Preston Environment Group is campaigning to stop logging in Arcadia forest in the South West of Western Australia. For more info go to www.savearcadiaforest.tk

Peter Murphy *- Born a conservationist. Spent past 25 years trying to create more public awareness on the death of the WA jarrah forest by a thousand cuts from: logging, mining, dieback, feral animals, weed invasion, climate change and government bureaucrats. Currently: Convenor of the Preston Environment Group who are spearheading a campaign to save a small colony of rare mainland quokka who face extinction from logging in the Arcadia jarrah forest near Bunbury. Greatest achievement: Instrumental in creating the Wellington National Park between Bunbury and Collie. Current ambition: To increase the Wellington National Park to 20,000 hectares by the inclusion of Arcadia forest. Long term ambition: To see a more ecologically sustainable timber industry by sourcing all of our timber needs from plantations.*

GLOBAL COMMUNITIES FOR SUSTAINABILITY (GCS): SHARING CONCERNS AND PROMOTING PROBLEM SOLVING SKILLS AND ESD VALUES

Prithi Nambiar, MA, MDE ,Executive Director,
Centre for Environment Education-Australia Inc.

Building on the Sustainable Schools Program, CEE Australia and AAEE are jointly working on an innovative program that seeks to develop processes that support action for sustainability. While at the moment there are many different activities at the school level that are focused on environmental conservation, waste recycling and energy economy, its now time to take these activities to the next level. We need to introduce the concept of global citizenship to schools and communities and focus on the universal relevance of sustainability concerns. The DESD hopes to enable a shift in values that favours sustainability but unless education provides exposure to realities in different socio-economic contexts in the real world, this shift in perceptions and values is unlikely to happen. The GCS project seeks to enable learning processes by providing such exposure to schools and community groups in both first world and developing country contexts.

Prithi Nambiar *currently works as Executive Director of Centre for Environment Education-Australia, a not for profit organization engaged in environment and sustainability education. Prithi set up CEE Australia in Sydney in 2001 with support from CEE India. CEE-Australia develops innovative educational programs with a conservation and sustainability focus and with a view to enabling the sharing of experiences between India and Australia as well as among countries of the Asia-Pacific region. Prithi has developed and managed programs in the area of environment and sustainable development for CEE India since 1993. Her special area of interest is media and she has developed, scripted and edited several films including two films commissioned by UNESCO on DESD. Prithi has also written extensively on conservation and development issues. She is a member of the World Commission on Protected Areas (WCPA).*

VEGETARIANISM AS A HEALTHY START TO SUSTAINABILITY

Yamini Narayanan and Dora Marinova
Institute for Sustainability and Technology Policy, Murdoch University

The paper exposes how a deep sustainability is compromised by engaging in eating lifestyles that fundamentally engages in violence, exploitation and misuse of valuable resources. It uses two examples of food consumption related to spirituality and sustainability.

The first is the link between vegetarianism, spirituality and sustainability through a Gandhian perspective, building on Mahatma Gandhi's argument that the spiritual progress of nations and human beings relies on how they treat animals. The ecological cost of meat production and consumption is likely to reach dangerously unsustainable levels. The inhumane treatment of animals through mass production spreads pollution and often leads to inefficient use of water, land and other natural resources. Gandhi is revered worldwide as a peace-loving nationalist but his strong stand for vegetarianism has remained largely invisible. He was firm that ahimsa or commitment to non-violence extended equally and unconditionally to the treatment of both human beings and animals. However, both economic and environmental exploitation and violence are evident in American-style fast food diets, which are becoming alarmingly and rapidly popular world over, including India.

The second example is from contemporary movements such as Slow Food from Italy, which advocates the local production and protection of cultural and spiritual traditions related to food. In doing so it safeguards domestic and wild animal and vegetable species from exploitation as well as rejects the Western obsession with efficiency.

The paper concludes that a healthy start to environmental education for sustainability is to re-assess and examine what and how we eat.

Yamini Narayanan *is a PhD candidate at the ISTP. Her thesis examines spiritual approaches to urban community development, in the context of sustainability. She has completed a Postgraduate Diploma in Print Journalism from the Asian College of Journalism in Chennai (Madras) and a B.A. (Hons) in English literature from Lady Shri Ram College for Women, University of Delhi.*

Dora Marinova *is an Associate Professor and Head of the ISTP at Murdoch University where she teaches in the areas of demography and women and development. She is currently supervising 14 PhD students on topics related to sustainability. Her research interests cover technology policy and development, sustainable business and partnerships. She has published over 60 refereed journal articles and book chapters and has conducted research for Western Australian and Commonwealth Government departments.*

SUSTAINABILITY THROUGH LITERATURE

Dawn Naylor

Recently, I purchased Jennie Baker's Book entitled *Belonging* (2004). The book is similar to one she wrote in 1991, entitled *Windows.* In both books, Baker transforms an environment as viewed from the window of a house. However in *Windows*, this environment went from rural to urban and in *Belonging*, the environment is reversed from urban to semi- rural. Remembering that the books were written some 13 years apart suggests a change in thinking by Baker and begs an inquiry into the thematic impact of children's literature. This workshop explores the degree to which recently awarded or shortlisted children's books tackle the theme of sustainability. Participants will review notable children's literature from the past ten years and investigate how sustainability is tackled and how books can be used.

Dawn Naylor *is currently a lecturer in Language education at Edith Cowan University and a Phd student. Her research interests include optimal conditions for teaching and learning in adults and children, language integration and metacognition. Prior to teaching at university Dawn has been in education for the past 20 years as classroom teacher and head of Junior school at several independent k-12 schools.*

VALUES EDUCATION FOR RELATIONAL SUSTAINABILITY: A CASE STUDY OF LANCE HOLT SCHOOL AND FRIENDS

Kathryn Netherwood, Jennie Buchanan and Laura Stocker

Lance Holt School, a primary school in the West End of Fremantle, has a long history of education around explicit core values that correspond strongly to sustainability. Since 2002 the school has developed programs explicitly around sustainability themes emphasising relationship to place and community such as Coastcare, Sustainable Living and Mapping Sustainability Values. Sustainability education at Lance Holt School has taken an integrated and relational approach. We aim to bring the concepts, values and practices of sustainability explicitly into the curriculum of our school and into daily practice wherever possible. We interconnect sustainability across the teaching and learning program, and incorporate heads, hearts and hands in this process. We share responsibility across the many sectors of the school community as a means of building partnerships and citizenship. We have also developed partnerships with local government, Indigenous elders, universities and other members of the broader community to build relationships and resources. Values education is at the heart of our approach to sustainability education and we encourage the children to engage deeply with what it means to be human in relation to the world around us. In 2005/6 the school led a cluster of schools in the National Values Education Good Practice Schools Project. This project focused on sustainability and connection to place. We continue to explore sustainability and to lead other community schools in sustainability education, both urban (Kerry Street Community School, Moerlina School) and regional (Nyindamurra Family School in Margaret River and Strelley Community School in the Pilbarra).

Kathryn Netherwood *is the Coordinator and Year 2/3 teacher at Lance Holt School, Fremantle. She is currently the cluster coordinator for the Children's Place and Mapping Group in the National Values Education Good Practice Schools Project. She has worked in remote and Indigenous schools in South Australia. Kathryn's special interests are in values education, community participation in schools, literacy and numeracy. Kathryn's two children, Tori and Zak, have attended Lance Holt School.*

Jennie Buchanan *has been the Project Manager for the recent sustainability values project at Lance Holt School. She has an academic and professional background in youth and community work. She has researched, together with Dave Palmer, the history of community development in Western Australia. She has taught Indigenous studies at Notre Dame University. Jennie has two children, Mattie and Callum at Lance Holt School where she is also on the Council. Jennie has grown up on the Fremantle coast and her family spends alot of time canoeing, boating, surfing and picnicking at the beaches and river.*

Laura Stocker *is a marine ecologist and a Senior Lecturer in Sustainability at Murdoch University. This year she teaches 'Wangkiny Boodjah', 'Introduction to Sustainability', 'Ecologically Sustainable Development', and 'Marine Conservation Policy and Coastal Sustainability'. Laura's 10 year old son Declan and 28 year old step-daughter Amy have attended Lance Holt School where Laura was the Chair of the School Council from 2002-2005. Laura loves to snorkel, surf and sail with her family and friends.*

BE WORRIED

Dr Neil Preston1, Ed Nieman2
Fremantle Hospital1, Main Roads WA2

"Be worried. Be VERY worried."

April 3, 2006: TIME magazine is telling us that the Earth is melting. Climate change is a big problem. Now!

This paper is not about climate change, it is about why we can't change our behaviour. It is about the difficulty of understanding new concepts. It is about why, in general, we are slow learners. It is about the psychology behind paradigm change. It is about a better Ecopsychology.

There is now a 'technology of behaviour'. Modern technologies now allow cognitive scientist to understanding how our brains/minds actually work. Three major findings have emerged:

1. the mind is inherently embodied: the concepts used in our thinking come from our inherent bodily make-up and experience as we mature from babyhood to adulthood
2. thought is mostly unconscious: this is because the brain learns from 'experience'
3. abstract concepts are largely metaphorical: most learning is implicit

Much can be understood from the above. Since the Enlightenment, we have been told that it is irrational to go against your self-interest. Modern economic theory and foreign policy are set up on this assumption. This myth has been challenged by cognitive scientists such as Daniel Kahneman. Dr. Kahneman won the Nobel Prize in Economics in 2002, even though he was a psychologist.

As the weather crashes, we are forced to look at new ways of behaviour. We need to understand what is holding us back mentally from changing our behaviour.

Ed Nieman *currently works as the Project Officer – Sustainability on the New Perth Bunbury Highway project, Major Projects Directorate, Main Roads Western Australia, in Perth. His area of interest is the actualizing of sustainability principles and ethics into the work environment. He is involved in developing strategies, processes and initiatives to actualize sustainability that align with Main Roads WA values and areas of strategic focus.*

TEACHING & PLACE: A MUTUAL RELATION

Genevieve Noone
Centre for Research on Education in Context
School of Education, University of New England

We are in relation with the environment. As teachers, an understanding of our own relationship with the environment enables us to better engage pupils in understanding their relationships with the environment. People interact and engage with both the human and non-human in place; with both the built and natural environments. Relationships with the environment are mutual. These relationships influence how we interact with and affect other people and the environment and vice versa. Our understanding of the environment, and of place in general, derives from our experiences in many different environments. Teachers in particular, are a very mobile profession, and may teach in many different places over the course of their career. This presentation will look at data collected in a study of first year teachers. The teachers were asked to reflect on the built and natural environments in the places which they were appointed to. The reflections involved the collection of objects, sketches and oral discussions about their environments. And while the direction given for their reflections asked the teachers to focus on their personal experiences, often they included significant others in their stories about their environment suggesting that an individual's experience of the environment is entwined with the experiences of others. A better understanding of how teachers develop relations with the environment will enable them to better understand these relations in reference to (i) their movement from place to place, and (ii) the engagement of pupils in exploring their relationships with the environment.

Genevieve Noone *is currently a full-time PhD candidate in the Centre for Research on Education in Context, at the University of New England (Armidale, Australia). Her current research explores the relations between place and becoming-teacher, and is centred on the study of five graduate (first year) teachers appointed to rural schools in northern New South Wales. She is interested in the application of alternative methodologies in sociological research and has been using and developing arts-based methods for data collection, analysis and the presentation of research. Her research interests centre around the relationships between teachers, pupils and their environments.*

A LEVER LONG ENOUGH: LEADING EDUCATION FOR SUSTAINABILITY

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This paper reports on qualitative research investigating leading education for sustainability. The paper addresses the international and national sustainability agenda. It acknowledges the impact of the UN papers 'Our Common Future' (1987) and 'Agenda 21' (1992) to describe the critical role of education to help bring about the extensive social changes necessary for sustainable development. The three pronged concept of sustainability is applied in two ways: to the content of a curricular program and to the process of leading school change for the future. Sustainability is at the heart of educational reform, and has been described as an intellectual paradigm about the complex nature of human and natural systems crucial to addressing the complexities of a knowledge society. The lever of sustainability is leadership. Education for sustainability is ultimately about organisational and individual capacity building. It seeks a transformative role for education. In a workplace undergoing constant change, challenges exist to bring about any shift in curriculum emphasis, and innovative suggestions from educators are generally proposed to accomplish explicit goals. While change is difficult to achieve in senior schools it is possible to embed change as a result of sustainable leadership.

Coral Pepper *works in educational research and she is the Standards project manager in the School of Education at Murdoch University. Coral's professional interests are in Education for Sustainability, Educational Leadership and Science Education. Her presentation reports on her doctoral studies.*

AUSTRIA ON ITS WAY TO EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD) – SUSTAINABLE SCHOOLS IN THE AUSTRIAN PROGRAM "ECOLOGISATION OF SCHOOLS – EDUCATION FOR SUSTAINABLE DEVELOPMENT ÖKOLOG"

Guenther Pfaffenwimmer, Birgit Karre

In preparation of the world summit Rio + 10 in Johannesburg in 2002 and inspired by the EU Gothenburg process on sustainability, the Austrian government developed a National strategy on Sustainable Development accepted by the Council of Ministers in spring 2002. In this document two chapters focus on the important role of education and research in sustainable development.

The Ministry of Education and the Ministry of Environment decided to develop together an Austrian Strategy on Education for Sustainable Development (ESD) starting in 2003. Supported by a participatory process with different stakeholders from all over Austria, a group of experts formulated this strategy in March 2006.

One approach to support the implementation of ESD in Austrian Schools is the program "Ecologisation of Schools – Education for Sustainable Development ÖKOLOG". Schools working together in this program try to integrate sustainability in their every day life. ÖKOLOG is the first and main Austrian program for schools at the interface of Environmental Education and School development. It is based on the "Environment and Schools Initiatives" (ENSI) approach to EE and ESD taking into account the challenges and opportunities of school autonomy and school program development.

Schools define ecological, technical and social conditions of their environment and, on the basis of these results, define objectives, targets and/or concrete activities and quality criteria, to be implemented and evaluated.

Students as well as all the other key stakeholders at school are involved in a participatory way and collaboration with authorities, business and other interested parties is encouraged.

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IMPLEMENTATION AND LESSONS LEARNED OF *SERASI* PROGRAMME IN SABAH, MALAYSIA

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The SERASI or Sekolah Rakan Alam Sekitar Programme is a programme on environment-friendly schools introduced in 2003 in the state of Sabah in Malaysia. It is implemented as part of the government's efforts to promote the concept of green schools in the country. SERASI is a holistic approach that connects schools with the local communities, families, the government, non-governmental organisations and the private sector. The objectives of SERASI are to enhance awareness on the importance of environmental protection and conservation in schools; instil positive and caring attitude for the environment amongst the students, teachers and staff as well as the local communities; to encourage innovation towards the creation of a school's environment that emphasises on environmental protection and conservation; and acknowledge the continuous efforts by schools in promoting environmental education programmes. This paper will present the background of SERASI, its progress and lessons learned based on its implementation for the last three years.

Susan Pudin *is an Environment Control Officer with the Environment Protection Department Sabah, Malaysia. Her tasks at work are mainly focussed on environmental education and awareness, and she has been involved in this field since the year 2000. She is also actively involved in the Sabah Environmental Education Network (SEEN) which was established in March 2005. She is currently on study leave to pursue her masters by research in environmental education in University Malaysia Sabah.*

THE IMPORTANCE OF THINKING AND ACTING LOCALLY IN EDUCATION FOR SUSTAINABILITY

Talia Raphaely[1] and Ron Boucher[2]
[1]Institute for Sustainability and Technology Policy, Murdoch University & Sustainably Speaking
[2]Geraldton Greenough Regional Council (GGRC)

In March 2005, the Geraldton Greenough Regional Council commenced an ongoing Waste Reduction and Environmental Activities Grants Programme to assist and encourage Mid West schools to embark on, continue, or expand sustainability education initiatives.

Using participatory methodologies, the Programme supports and facilitates transformative, creative education that engages learners in new ways of conceiving, being and exploring the relationships between their lives, the environment and social systems so they become actively involved, and ultimately decision-makers, in an ongoing change process towards sustainable regional lifestyles and communities.

Based on an iterative implementation model of continual improvement, a number of guiding principles inform the Grants Programme including:

- Transformative education,
- Local is best,
- Value for all stakeholders, and,
- Promoting and encouraging partnerships building a regional network for sustainability education, a shared vision and greater sense of unified regional purpose.

To date the Programme has over 20 participants including schools in Greenough, Geraldton, Mingenew, Chapman Valley, Dongara, Mullewa and Northampton.

A book produced initially at the end of the Programme's first year (December 2005), will be published annually to document and celebrate the sustainability initiatives of regional teachers and students and to encourage and assist those undertaking similar processes.

This paper will describe the model and guiding principles used in the design and implementation of the Grants Programme. It will also discuss the value and importance of local level sustainability education initiatives using a number of case studies to illustrate this and the Programme's application and progress to date.

Talia Raphaely *is currently doing a PhD in attitudinal and behavioural change for sustainability through Murdoch's Institute for Sustainability and Technology Policy. She also has a consultancy, Sustainably Speaking, which concentrates on sustainability communication, education and promotion and behavioural change interventions and strategies.*

BUNBURY ECOHOME

Sandii Rogers, Project Coordinator

South West Regional College of TAFE in collaboration with the local building industry created Bunbury ecoHOME to change the culture of the building industry so that sustainability became a higher priority.

Bunbury ecoHOME exhibits unique leadership in the investigation and demonstration of innovative and sustainable land development and construction practices to all stakeholders with quantified data outcomes.

Students designed a financially viable 'live in model' home, which embodies the latest advances in environmental, social, economic and technological elements of sustainability, reduces energy and water use and encourages household recycling by the occupant.

The home was constructed on an award winning research and demonstration model "Clean Site" by building trade students, their trainers and the local building industry.

Over 200 SWRC of TAFE students were involved in creating ecoHOME.

SWRC of TAFE delivered a comprehensive and balanced education campaign to all stakeholders in the South West building industry. The project provided a catalyst to raise community awareness of sustainable development.

"Education for All" is the purpose of the project, the real home and the website at www.bunburyecohome.com

To ensure that sustainability is developed as integral component of curriculum the project included the development of a range of teaching materials and web-based resources relating to sustainable design and construction and a series of professional development lectures for staff.

The home was open for public tours in Feb-March 2006 and is now tenanted. Energy and water consumption will be monitored for twelve months. Bunbury ecoHOME will provide evidence that sustainable designed homes reduce environmental impact and the cost of living.

THE BUSINESS CASE FOR AN ETHIC OF LOVE A DIALOGIC PARTNERSHIP MODEL FOR SUSTAINABILITY, SOCIAL JUSTICE AND MINORITY STAKEHOLDER GUIDANCE IN INDUSTRY/COMMUNITY CONFLICT

Dr Dyann Ross

There is a life and death struggle occurring between vested interest groups who appear to stand on opposite sides of the sustainability challenge (Holdsworth & Caswell, 2004). The sustainability challenge simultaneously and differently confronts ecosystems, communities, civil governance, and industry profitability. This struggle is most evident in the business practices of mining industries (MMSD, 2002) as these variously impact on neighbouring communities and environments (Holliday et al, 2002). There is also a largely silent struggle occurring regarding who is seen to be a stakeholder (Cooper, 2004), how they are valued and who therefore has a legitimate right to have a say and influence the agendas of Governments and Industry.

The paper puts the argument for a business case for an ethic of love (hooks, 1994; Ross, 2002) by outlining the underpinning theoretical framework for partnerships which are sustainability focussed, civilly engaged and socially just. It also presents the details of a dialogic model for Industry, Government and Community stakeholder engagement where conflict is occurring. While acknowledging other literature of value, the aim is to show gaps in the theorising which have left the onus for social responsibility on industry stakeholders and left impacted communities in a largely victim or secondary role. The literature also tends to leave unchallenged governments' handmaiden relationship with industry, where this occurs at the expense of the environment's sustainability and social justice for its people.

CAN EE AND ESD BE DEMOCRATIC EDUCATION?

Karsten Schnack
Professor, The Danish University of Education

Nature is not environment. Environment is nature seen through human interests. Therefore, environmental issues are cultural and societal issues, and environmental questions are, like questions about health or sustainability, value-loaded. This makes it at the same time very important and problematic to deal with environment and sustainability as content in democratic education.

In Germany a discussion has been running between two of the most prominent and influential philosophers ('didacticians') of political education, Wolfgang Klafki and Hermann Giesecke, about the ethical legitimacy of specifying a concept of democratic formation. Is it paternalistic to make a kind of declaration of content that goes beyond the knowledge and skills of the subjects?

In Denmark a former minister of education severely criticized a new one for asking the schools to make the content of education green. The argument was that education is not about such matters. The subjects have their own educational aims built into them, and education for other goals is not legitimate.

The paper will argue that there is a third way between this classical, liberal view and a conception of education as behaviour modification that cannot distinguish education from indoctrination.

One implication is, however, that you accept that decisions about content will be open to discussion among the educators, teachers and learners. This kind of democratic reflexivity is a condition in late modernity, and it is an argument for genuine participation.

Karsten Schnack *is a professor in curriculum and educational theory at the Danish University of Education. He has for many years been engaged in developmental work and conceptualization of critical, democratic environmental education. Nationally and internationally he has taken an active part in the debates among different approaches to environmental education, health education, and education for sustainable development. He has been a key figure in the development of ideas of action competence, conflicting interests, critical thinking and student participation.*

A LOOK AT SEVENOAKS SENIOR COLLEGE YEAR 11 AND 12 PRACTICAL GEOGRAPHY COURSES WHERE THE MAIN THEME IS SUSTAINABILITY

Presented by students at Sevenoaks Senior College

This is will be a PowerPoint presentation by Year 11 and 12 students of work samples of their 2006 Practical Geography courses of study.

Secondary school teacher, Fettes Falconer, has designed the Practical Geography courses of study around the theme of ecological, economical and social sustainability.

Practical Geography is a CAF subject (Common Assessment Framework) that along with TEE (Tertiary Entrance Examination) Geography is soon to be phased out in favour of the new Geography course of study. Fettes Falconer has been tinkering with the old Practical Geography courses of study with the new Geography course in mind. The new Geography course starts in 2007.

Many learning concepts (outcomes based education) of the new Geography course of study have their genesis in the old Practical Geography syllabus. At Sevenoaks Senior College the transition from the old to the new will hopefully be nearly seamless as a result of the experiences gained in teaching the Practical Geography Common Assessment Framework.

SUSTAINABLE SCHOOLS

Jonathan Shankar-Noble, David Butler (DECS), Sue Coad, Jo Bishop (DEH)

The South Australian Sustainable Sites Initiative (SASSI) is guided by a Management Framework and Toolkit. The session will introduce and show the transition from environmental education to a model of sustainability education using parts of the Framework and Toolkit. There is an emphasis on the relationship between student voice, community connections, site management understanding sustainability and how these aspects interrelate to development a culture and ethos of sustainability at schools and sites. Dr Stephen Sterling's systems and ecological thinking around sustainable education has greatly influenced the growth of SASSI. The professional learning process will be demonstrated. There will be discussion as to how this process can be made relevant to individual needs.

SOUL EDUCATION: A MANDALA FOR LIVING AND LEARNING

Dr Patricia Sherwood (ECU, WA)

A splendid opportunity to work creatively and artistically with nature, colour, and images to experientially create a Mandala embracing the earth, plant, animal and human realms to inspire your spirit, nurture your soul and energize your body. A beautiful resource process for humans of all ages, for the moments when we need to sustain ourselves from the inside, when all else falls away. An experience one can use in education to promote sustainability of the human soul encountering a fragile and vulnerable planet, so that our personal journeys to inner sustainability may be reflected in our actions in the world to nurture sustainability.

Dr Patricia Sherwood *is director of Sophia College of counselling which specialises in holistic counselling focusing on the artistic therapies and the transpersonal. She has published in the field of sustainable community development, holistic mental health, and soul education. she is currently working on a book: The Teacher as Healer: working with the wounded child, which aims to provide a holistic model of classroom management. Patricia has a clinical practice which focuses on children adolescents particularly in relation to issues relating to recovery from anxiety, trauma, and anger. Dr Sherwood also supervises postgraduate students at Edith Cowan University where she specialises in phenomenologically based research.*

SOUL EDUCATION: INSPIRING A NEW PASSION FOR LEARNING.

Dr Patricia Sherwood (ECU, WA)

This paper explores the emergence of this new discipline. It posits a model for profound and moving soul education flexible enough to promote the flourishing of different developmental soul needs through out the lifespan. A range of vibrant teaching tools and skills are presented which engage the languages of the soul including colour, sound, movement and gesture. An inspirational presentation for teachers who want to understand deeply how to engage the passion of their students to create a life-long interest in understanding our world and those around us. Essential, if we are to awaken our students to the world within and without them that connects us and calls us all to create a sustainable future.

Dr Patricia Sherwood *is director of Sophia College of counselling which specialises in holistic counselling focusing on the artistic therapies and the transpersonal. She has published in the field of sustainable community development, holistic mental health, and soul education. she is currently working on a book: The Teacher as Healer: working with the wounded child, which aims to provide a holistic model of classroom management. Patricia has a clinical practice which focuses on children adolescents particularly in relation to issues relating to recovery from anxiety, trauma, and anger. Dr Sherwood also supervises postgraduate students at Edith Cowan University where she specialises in phenomenologically based research.*

SCIENTISTS-IN-SCHOOLS: INCREASING THE LEVEL OF ACHIEVEMENT OF UNDERREPRESENTED STUDENTS

Dr Dorothy Sisk
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Scientists-in-Schools (SIS) is collaborative research study of Lamar University and Beaumont Independent School District funded for five years by the U.S. Department of Education. The project focuses on teacher training, identification of high potential low income students; engagement of scientists in developing Environmental Science curriculum; and providing Science seminars for students and teachers. Project Outcomes include: increases in student achievement; in the number of science courses the students take; in the number of the high potential students that can be identified as gifted; and in the number of students that graduate and seek admission to college with science as a major. Data Collection includes: Stanford Science Achievement Tests (pre-post), grades, Science Attitude Scale (pre-post), Inquiry Scale (pre-post), and student interviews. Students were randomly assigned to experimental/ control groups in four middle schools and three high schools designated as art-risk schools. In the four year period of the project, eighty teachers were involved and 300 at-risk secondary students. Results include significant positive differences in achievement by the experimental group; significant positive differences in attitude toward science; 25% of the students qualified for the gifted program; 100% of the 60 students in the first year experimental group graduated, applied to colleges, and 52% selected science as a major. In addition, all 60 of the students took four science courses during their high school. The session will focus on the use of inquiry as an organizing strategy, and examples of curriculum developed by the teachers will be shared.

Dorothy Sisk *is a professor in the College of Education and is responsible for teacher training in environmental science working with K-l2 students and teachers.*

FROGS ALIVE!

A COLLABORATION BETWEEN THE MUSEUM AND ART GALLERY OF THE NORTHERN TERRITORY, TERRITORY WILDLIFE PARK, AQUAGREEN, AAEE AND FROGWATCH NORTH IN DARWIN

Kate Smith, MAGNT

MAGNT has dedicated March of each year since 2000 to showcasing native frogs and highlighting the inevitable arrival of the cane toad to Darwin.

The program is a collaboration between government agencies, community groups, private enterprise and AAEE.

At the end of February of every year since 2000, members of these various organizations have headed out to several locations to do some 'frog bothering' – all in the name of sustainable education.

MAGNT is visited by 250,000 people per year and thus has a great reach for educating its visitors about the biology, habitat and importance of frogs.

In the last few years our thrust has been to give people the opportunity to see living frogs and cane toads and to be able to differentiate between them. Various aquaria are landscaped and frogs placed in them with interpretation stating scientific name, length, colouration, habitat and food preferences.

Coupled with this exhibition there are several public presentations during the month of March including a Frog Forum in the MAGNT Theatrette and a Frog Ramble, held at Knuckey Lagoon in the past two years and attended by over 100 people. Education kits for primary and secondary students exist on line as well as upon request.

An early childhood program called Little Explorers has also been devised in 2006 and has proved to be immensely popular with the child care centres of Darwin.

This is a wonderful example of how groups from all sectors of society can come together to present a valuable sustainable learning environment for people across the ages, cultures and learning capabilities.

Kathryn Smith *has lived and taught in the Northern Territory since 1989 and like many others continues her love affair with all that the Top End has to offer. Kate is an active member of a very successful community group called FrogWatch North founded by Graeme Sawyer and Ian Morris.*
As soon as Kate commenced work at MAGNT in 2000, Graeme and Ian provided the catalyst for a highly successful exhibition of live frogs of the Top End entitled ***FROGS ALIVE!*** *This exhibition is held annually during the Wet Season in the Discovery Centre at MAGNT. Each year over 2,500 students and their teachers book into FROGS ALIVE! to closely investigate the biology of frogs and the life cycle of frogs. For the past five years, Cane Toads have been a focus of this exhibition, successfully educating visitors to the Discovery Centre about our local frogs and the threat posed by the Cane Toad's invasion into the Northern Territory. Kate proudly provides this presentation on behalf of the Museum and Art Gallery of the Northern Territory and FrogWatch North.*

THE FUTURE FOR SUSTAINABLE SCHOOLS.WHAT CAN BE DONE AND WHAT IS NEEDED?

Syd Smith BA MEd Consultant Environmental Education; Education for Sustainability
Jillian Cupitt Narrabeen North Primary School

With the introduction of the Sustainable Schools Program in most Australian states and territories much has been achieved in a relatively short time. In many ways there is a similarity in the activities undertaken by schools including goals to reduce water and energy consumption, an increase in recycling or the reuse of materials and a new thrust to increase biodiversity in school grounds and neighbourhoods. But maybe these activities, while important and valid in one sense, are merely the tip of the iceberg. Are we, for example, really preparing students for a future which asks the burning hard questions about sustainability? Does a more sustainable future mean surviving with less, because if it does then it will be a hard message to sell to a population that is accustomed to a high standard of living. If it does not mean living with less then how can we develop smarter processes and better infrastructures to even maintain current lifestyles both for ourselves and for other nations? This workshop will examine some future activities that schools and their communities could introduce. It will encourage further ideas from the group as well. Already some schools have begun to take on these issues and some of their initiatives will be discussed and presented as ideas to be adapted nationally. It will also examine the future role of education bureaucracies who will also have to adjust to these new developments and make changes to their administrative frameworks.

Syd Smith *currently works as a private consultant in Environmental Education and Education for Sustainability. In 2001he introduced the Sustainable Schools Program to NSW schools while employed by the Curriculum Directorate of the NSW Department of Education and Training. With funds provided by the Australian Department of Environment and Heritage and the NSW Department of Environment and Conservation the program was piloted in approximately 200 schools in NSW and evaluated externally in 2004. Syd has worked as a primary and secondary teacher, a director of schools and a curriculum consultant in Secondary Education and Environmental Education. He is a Board Director on the Keep Australia Beautiful NSW Council, Chair of CEE Australia and Treasurer of AAEE. In 1994 he worked at the ABC's Radio National.*

Jillian Cupitt *is a teacher at Narrabeen North Primary School and is a leader in the Northern Beaches area of Sydney in introducing revolutionary changes to environmental education programs in her school and to working closely with a number of community groups in the district.*

OVERLAY MAPPING – A METHODOLOGY FOR PLACE-BASED SUSTAINABILITY EDUCATION

Dr Laura Stocker and Gary Burke

Sense of place derives from a dialogue between our selves and the economic, social, cultural and ecological layers of life. In this methodological paper, we describe an overlay mapping technique that can be used to creatively derive an understanding of the sustainability values and uses of a place. Overlay mapping is a visually and analytically powerful technique for finding out, teaching and learning about sustainability. Being graphical, it incorporates several knowledge, perception, language and communication capacities. It can be applied at many scales in a wide variety of situations and used by a diversity of people with or without conventional literacy skills. It can be adapted to utilize digital mapping technologies. For educators, the initiating questions are: "How do we sustain a place, and how does the place sustain us?" Location of key sustainability 'hotspots' provides the framework for discussion. The overlay mapping technique uses four transparencies, each representing one of the layers of sustainability. Key locations are drawn on each transparency placed over a base map (a satellite map, road map, or an Indigenous painting). The four transparency layers are then placed onto the base map together to find synergies or interacting "hotspots", and/or missed opportunities for synergies or even negative interactions. Through participatory process the method can build a negotiated or composite understanding of place and its sustainability traits. It allows us to see, understand and ultimately manage a place more sustainably. We discuss use of overlay mapping by Murdoch University sustainability students.

Laura Stocker *is a marine ecologist and a Senior Lecturer in Sustainability at the Institute for Sustainability and Technology Policy, Murdoch University where she began teaching sustainable development in 1990. This year she teaches 'Wangkiny Boodjah', 'Introduction to Sustainability', 'Ecologically Sustainable Development', and 'Marine Conservation Policy and Coastal Sustainability'. The overlay mapping process described above is used in 'Ecologically Sustainable Development' (as well as at Lance Holt School - see Netherwood, Buchanan and Stocker, this conference).*

Gary Burke *is a PhD candidate at the ISTP at Murdoch University. He is researching frameworks, techniques and strategies for development and implementation of sustainability policies at the local government level, particularly with reference to Environmental Management Systems (EMS) such as ISO14001. He received a Bachelor of Economics from UWA in 1973 and a B.A. (Hons) in Population Resources and Technology from Murdoch University in 1991. He has published on the problem of feral animals and weeds in WA, as well as community-based education. He worked as a private multimedia consultant specialising in health, conservation and Indigenous issues.*

COMMUNITIES OF FEAR: WHAT CAN ENVIRONMENTAL EDUCATORS LEARN FROM INACTIVE AND OBESE CHILDREN

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Educators, under the influence of health policy makers, have, in part, produced communities of fear that prevent young children from being physically active. In the name of health, messages about safety, health promotion and child advocacy have forced children and their frightened parents to accept inactivity and obesity as the norm.

Health policies and the associated educational programs, over the past two decades, have unconsciously limited/restricted/prevented young people from being physically active and thus interacting with their friends and families in the natural and built environments of their communities. In an attempt to develop healthy, safe and sustainable communities we have produced fearful, unhealthy and unsustainable communities. Will environmental educators and their policy makers countenance similar mistakes?

In our democracy fear and consumption are increasingly controlling our lives and even more so the lives of the most vulnerable, the young and the aged. Whether it is communicated by print or digital media messages of security, be isolated from others, be fearful of strangers and those who look different, and stay-at-home to be safe, pervade our everyday lives. Play inside, stay clean, and most importantly being seen to be safe are synonymous with watching screens. Communities that physically meet, greet and play together are at risk.

Children's physical activity levels are now controlled by an extensive range of policies and health inspired educational practices that promote fearful and inactive children. These 'dangerous' health policies will be discussed and the relevance to environmental education considered.

Andrew Taggart *is currently Dean and Professor of ECU South West. His research and professional involvement has been in Health and Physical Education, teacher education and curriculum development. He generally works with teachers to better understand their work and how curriculum innovation and change can be nurtured and sustained. Over the past decade his research has focussed on teacher renewal through curriculum development, sport and adolescents, physical activity for young people and the development of learning communities.*

BIODIVERSITY CONSERVATION AND LOCAL PLANNING IN THE SOUTH WEST OF WESTERN AUSTRALIA

Natalie Olsen[2], Danielle O'Neil[1]
Perth and South West Biodiversity Projects, Western Australian Local Government[1],
South West Biodiversity Project, Western Australian Local Government Association[2],

The Perth and South West Biodiversity Projects are multi-faceted projects aiming to improve local government's appreciation and understanding of biodiversity, and how Local Governments can plan sustainably to protect biodiversity. Local Government is seen to be at the 'coalface' of biodiversity conservation. They are land managers, land use planners, decision makers, developers and have key roles in influencing the general public. Both projects work to improve the skill in Local Government to recognise how activities and decisions can be used to improve biodiversity conservation; and to promote a planning framework to evaluate existing plans, and to strategically and sustainably plan for existing and future land use planning

Working collaboratively with Local Government to improve awareness is seen to be one of the most important aspects of the projects. Awareness raising and educating Local Government staff and Councilors is crucial for establishing a solid basis for sustainable and strategic planning in the 43 Local Government areas. The South West of WA is one of 34 Global hotspots, and one facing unseen tradeoffs between competing land use pressure and conservation.
A targeted Grants program is available to the participating Councils to assist them with developing and implementing projects such as assessment and management of bush land reserves to aid biodiversity planning. The project will also deliver biodiversity assessment templates and planning guidelines to encourage Councils develop their own biodiversity conservation strategies.
The Projects both include the State Government as project partners and acts as an important conduit to Local Government.

Natalie Olsen *currently works as a Project Officer on the South West Biodiversity project with the Association, and has been working on the project since 2005. Natalie is hosted by the City of Bunbury meaning she can be directly involved in the South West communities in the SWBP area. Natalie has a background in Urban and Regional Planning and Natural Resource Management.*

Danielle O'Neill *currently works as Project Manager for the Perth Biodiversity Project with the Western Australian Local Government Association. Danielle is based in West Perth and oversees the participation of 30 Local Governments in the Project. Danielle is on short-term secondment from the City of Wanneroo, where she has been actively involved in Local Government biodiversity conservation projects since 2003.*

EVALUATION OF THE CLEAN DRAINS RIVER GAINS CAMPAIGN AT THE CITY OF MELVILLE, WA

Amy Krupa[1], Ana Terrazas[2],
Phosphorus Awareness Project Coordinator[1], Stormwater Officer at SERCUL[2],

This paper examines the changes to stormwater awareness, attitudes and behaviour of community and business in the City of Melville as a result of the implementation of the Clean Drains River Gains campaign.

The stormwater awareness campaign was first developed by CSIRO to reduce nutrients and other pollutants entering the Swan Canning Estuary via urban and industrial stormwater drains. It has been taken up by the South East Regional Centre for Urban Landcare (SERCUL) and aims to take stormwater and pollution education to the next level.

It not only raises awareness of the link between drains and natural waterways via the stenciling, letterbox drops and posters; but also provides quality information through the webpage, media and static displays on how individuals and groups can make positive **behavioral changes,** how to undertake these changes and the positive impact these changes will have on the quality of the environment.

The paper includes the pre and post intervention surveys results. The initial survey was mailed to residents in two Catchments areas within the study area prior to implementation of the 'Clean Drains River Gains' campaign. The stormwater awareness program is being implemented in the City of Melville in the first semester of 2006. A post-intervention survey will be carried out to determine the change in awareness and behaviour towards stormwater issues resulting from the campaign.

A statistical analysis of pre and post intervention survey results will be conducted by the UWA Statistical Consulting Group, these results will be available in June 2006.

Ana Terrazas *currently works as a Stormwater Officer with the South East Regional Centre for Urban Landcare (SERCUL), in Perth. Her area of interest is monitoring and evaluating education programs that aim to change the behaviour of the community whose activities are thought to impact on stormwater quality and waterway health. She has been involved extensively in coordinating, developing and implementing environmental projects in Mexico*

KNOWLEDGE AND UNDERSTANDING OF AN ENVIRONMENTAL SYSTEM USING TWO DIFFERENT TYPES OF COMPUTER-BASED MODELS - A PILOT STUDY

Kate Thompson[1], Peter Reimann[2]
CoCo Research Centre, University of Sydney[1], CoCo Research Centre, University of Sydney[2]

One of the aims of environmental education is to teach environmental knowledge and provide students with the skills to understand other environmental problems. We build on theories of mental models in order to account for the problems that students face when learning about environmental systems. These theories relate to the role that knowledge and understanding play in such problems. Misconceptions in science are common, and studies have found that students demonstrate a lack of understanding about important environmental issues. In addition, environmental systems are usually complex systems, which are generally poorly understood. Complex systems are often described using the strategies of multiple representations, system dynamics modelling or agent-based modelling. All of these strategies have been studied, but the results are not conclusive.

The purpose of this study is to examine a range of instructional strategies aimed at enabling understanding of a complex socio-environmental system (a socio-environmental system is one that incorporates society's use of, or human impact on, the environment). It aims to examine strategies leading to the acquisition of knowledge and understanding in the areas of the nature and function of ecosystems, how they are related, and the impact of people on environments. This paper reports on the results of our pilot study carried out in August 2006 with Year 10 school students. We then discuss future directions for this work.

Kate Thompson *currently works as a Postgraduate Fellow at CoCo Research Centre in the Faculty of Education and Social Work at the University of Sydney, where she is also enrolled as a full time PhD student. Kate's background as an environmental scientist has informed her work as a researcher in environmental education. Her PhD is compares school students' understanding of an environmental system after they have been shown different types of computer-based models. Her interests include the use of technology in environmental education, including different types of computer-based models, mobile devices, and the internet.*

A NATIONAL REVIEW OF ENVIRONMENTAL EDUCATION AND ITS CONTRIBUTION TO SUSTAINABILITY IN AUSTRALIA

Daniella Tilbury [1], Kristina Cooke [2] Rebecca Pearson [3]
Australian Research Institute in Education for Sustainability

There is growing recognition amongst the international community that sustainability is essentially an on-going learning process that actively involves stakeholders in creating their vision, acting and reviewing changes. Education, in the context of sustainability is now understood to be a change process rather than a message that must be achieved.

This paper presents the findings of a recent review of environmental education and its contribution to sustainability in Australia prepared by the Australian Research Institute in Education for Sustainability (ARIES) for the Australian Government Department of the Environment and Heritage under the Natural Heritage Trust. It assessed current practice and needs across the school education, community education, business and industry education and further and higher education sectors in order to address each strategically. The study indicates that current practice both in Australia and overseas has made modest progress since the mid-1980's despite an increase in sustainability initiatives worldwide. There also appears to be a low profile of learning for sustainability within national sustainability frameworks.

For sustainability to occur, a learning for sustainability approach is required that changes the mental models that have driven communities to unsustainable development and uses a new learning approach to help us explore sustainability and build the skills needed to enable change, including mentoring, facilitation, participative enquiry, action learning and action research. A strategic national framework in learning for sustainability will strengthen the contribution of environmental education towards sustainability within Australia. It would be relevant to all those involved in the design and delivery of Environmental Education to map out a vision and provide coordination for consistent and coherent action plans involving multiple stakeholders in change across every aspect of society.

Daniella Tilbury *is the Director of the Australian Research Institute in Education for Sustainability.*

Kristina Cooke *currently works as the Deputy Director for the Australian Research Institute in Education for Sustainability. Holding a Masters of Environmental Studies from Macquarie University she has previous involved in the design, delivery and evaluation of sustainability education programs within the business and industry sector with a particular focus on Australian manufacturing.*

Rebecca Pearson *currently works as a Project Researcher at the Australian Research Institute in Education for Sustainability (ARIES). She has extensive communications and project management experience having spent 11 years in the media industry. She will complete her Masters in Environmental Education in 2006 through Macquarie University in Sydney and is currently working on a number of projects for ARIES including the National Review of Environmental Education and its Contribution to Sustainability in Australia.*

'ENVIRONMENTAL STORY' AND WHOLE SCHOOL REFORM FOR SUSTAINABILITY

Ron Tooth
Principal Pullenvale Environmental Education Centre

The story of school leadership and whole school reform outlined in this paper is based on a narrative inquiry into the way a primary school principal used the Storythread approach to move a whole school community through a process of profound organizational change within an 'arts for academic achievement framework'. This was a major learning journey that challenged established views about curriculum and learning and opened up new pathways into constructivist thinking about the nature of teaching, leadership and sustainable education. This paper traces the development of the Storythread approach from an embryonic idea in 1978, through its growth at Pullenvale Environmental Education Centre until now when its role as a catalyst for whole school change is being recognised. Storythread is a pedagogical form of the ' environmental narrative' genre that blends a 're-centred' arts inquiry process with a 'decentered' analytical and scientific approach to achieve deep learning in real contexts and places. 'It is the power of this combined 'arts' and 'scientific' pedagogy that lays a strong foundation for students developing a deeper 'sense of place' as a context for responsible and sustainable living. Storythread is currently being used to support a cluster of eight schools in developing links between values education and environmental education for sustainability. This is a continuation of a *Values Education Good Practice Schools Project* (VEGPSP*)* that was funded throughout 2005 and 2006 as part of the Federal Government Values program.

Ron Tooth *- Under Ron's guidance, Pullenvale Environmental Education Centre (PEEC) has become internationally regarded in the field of environmental education. Since PEEC's inception in 1981 as a Field Study Centre, Ron has sought to define, develop and record the environmental education and story process that has developed at the Centre, the Pullenvale Storythread Approach. Storythread is now under copyright to Education Queensland. Ron's contribution to environmental education has been recognised with an Education Queensland Australia Day Award. Ron has a Master of Educational Studies and is presently completing his Doctorate thesis focusing on Storythread and Whole School Reform.*

ENCOURAGING SCHOOL / COUNCIL INTERACTIONS IN SUSTAINABILITY EDUCATION

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The Sustainable Schools Program has been active in NSW for many years. The program was evaluated in 2005 and in this evaluation it was noted that local government was an important partner in delivering sustainability programs with schools. The Local Government and Shires Association (LGSA) has undertaken a program to highlight successful school/council partnerships and interactions in the area of sustainability education and has documented these on the website *www.sustainablecommunities.lgsa.org.au* in order to support council and school sustainability educators.

This paper or workshop will document the outcomes of this project and explore the ways local government can better work with schools. The learnings from this project will be very useful to the Sustainable Schools Team in NSW and the paper will show how the Sustainable Schools Team from within NSW Department of Education & Training (DET), the NSW Department of Environment & Conservation (DEC) and LGSA have collaborated.

The paper will show how local government through-out NSW is working with the government and non-government school sector and will provide tools for all in the local government sector to improve ways in which they can work with schools to improve sustainability outcomes.

The paper will also report on the use of website technology to improve the capacity of local government to better deliver sustainability programs in partnership with schools.

Case Studies have been developed that will be highlighted at this conference. Research commissioned by the NSW Chapter AAEE on the status of environmental education in local government has provided much of the baseline data for this project and the findings from this research will be incorporated into this paper.

***Sue Martin**: Project Officer LGSA Councils working with School Project, prior to taking this position was the environmental education officer at Baulkham Hills Council and is currently on the National & NSW Executives of AAEE.*

***Robert Verhey**: Strategy Manager - Environment at the LGSA since 1993, has been involved with a range of waste policy issues and environmental education issues. Prior to this was a secondary school teacher for 14 years*

YOUTH ENVIRONMENT COUNCIL OF SOUTH AUSTRALIA

Youth voice and engagement in decision-making and the environment has taken off everywhere. How can it be sustained and remain credible in the face of all the competing interests of young people? This is an enormous challenge in the context of the many and sometimes conflicting values that are presented to today's youth. During our interactive workshop we will explore ways in which we can all meet these challenges.

TEACHING ENVIRONMENTAL SCIENCE TEXAS-STYLE

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Environmental education in southeast Texas is being promoted through numerous programs at Lamar University. In-service and pre-service teachers are exposed to environmental issues through field experiences in southeast Texas and beyond through tuition-free grant-funded graduate courses. The Teaching Environmental Science Institute (TESI) is a cooperative effort between 20 universities, the Texas state environmental commission (TCEQ) and other government agencies, industries and NGO's. In southeast Texas, teachers visit refineries and paper mills to see how they are reducing their impact on the local air and watersheds. Rice farm researchers demonstrate new techniques for reducing pesticide and fertilizer run-off and impact of non-point source pollutants. Other field experiences include water quality testing; and canoeing and airboating in coastal marshes and swamps to observe biodiversity. Since 1996, TESI has promoted environmental awareness in southeast Texas as more than 100,000 southeast Texas school children have had TESI alumni as their classroom teachers.

In recent years, environmental field courses related to the international JASON Project have taken teachers outside Texas and given them first hand experiences in Panama's rain forests and coral reefs, the desert ecosystems in Death Valley California and Arizona, islands and kelp forests of the California coast, the Mississippi river delta's wetlands, and in coral reefs and mangrove swamps in the Florida Keys. Teachers return from the field and teach their peers and students using their newly obtained first hand experiences and hands-on activities in environmental science curricula developed by the JASON Project.

James Westgate *is a Professor of Earth & Space Sciences at Lamar University. He serves as the Director of the Teaching Environmental Sciences Institute, a summer environmental field course for in-service teachers now in its 11th year. He is also the Assistant Director of the JASON Alliance for southeast Texas, a non-profit organization which provides environmental educational experiences for up to 10,000 southeast Texas 4th-8th graders annually, using curriculum and live broadcast experiences from the international JASON Project.*

CLIMBING LITTLE GREEN STEPS

Maree Whelan Gosford City Council and
Danielle Hargreaves, Wyong Shire Council

Climbing Little Green Steps symbolises the journey involved when providing a sustainability program to preschools and early childhood centres. During 2004, Gosford and Wyong Shire Councils located on the New South Wales Central Coast developed such a program using funding provided by the NSW Department of Environment and Conservation.

It was evident that resources were unavailable in the areas of early childhood and sustainability on the Central Coast. The aims of the program were to:

- Target the 3-5 year age group ensuring a foundation for future school based programs
- Introduce sustainability and environmental education to early childhood on the Central Coast
- Develop a relationship and partnerships with early childhood centres and staff
- Build capacity with professional development for centre staff and parents

The program was multi faceted in method and provided local centres with resources to support early childhood centre staff, capacity building opportunities for centre staff and facilitated networks by distributing information to centres.

There has been increasing interest from stakeholders in Little Green Steps. Research and evaluation of the program will provide groups such as environmental educators, key stakeholders and early childhood centres with valuable findings. Research findings will be used to develop other tools such as a Training Manuals and Case Studies for these groups.

This workshop will report on evaluation findings and the importance of councils providing environmental education support in this area.

LOVIN' YA LIMITS

Robyn Williams
Persistence of Vision

'Be prepared to be surprised' is the catch-cry of Open Space Technology one of my preferred approaches to facilitating sustainability. In early 2006, I was engaged to present a Living Smart programme of themed workshops. Living Smart is an award winning, community based sustainability programme offered through the City of Fremantle.

This was a pilot - Inclusive Living Smart - for people with disabilities; mild and/or moderate, intellectual and/or social, and/or physical, and included four deaf participants and an Auslan interpreter. I was surprised in each dynamic session as people who engaged with knowledge, interest, humour and authenticity, and whose limits were defined only by willingness. We were all in it together.

The Lovin' Ya Limits workshop will be presented in the experiential style used during the Inclusive Living Smart programme.

Content will be drawn from presentations and conversations with Erik Leipoldt, Kerry Allan-Zinner and panel members from *"How to use disability experience towards a flourishing world"* (A Trilogy of Events hosted by Citizen Advocacy).

Through information sharing, exercises, discussion and games, conference participants will explore learning to love your limits as a metaphor for creating a sustainable future for people on a planet collapsing in slow motion.

Robyn Williams *facilitates communication for sustainability through Persistence of Vision, a profession which is growing from her activist work in environmental and social justice issues. With a passion for turning peace, justice and ecology into action, she instigated Sustainable September in 2003, which is co-organised with the WA Collaboration for Sustainability. Robyn is mother of Cyd, and a co-founder of Pinakarri Community in Hamilton Hill where she lives with 35 other people. She is a co-convenor of the Australasian Facilitator's Network in WA and a member of the Sustainability Practitioners Association. Robyn gave up her driver's license late last century and is happy to be a radical pedestrian.*

FACILITATING THE DEVELOPMENT OF ECOLOGICAL LITERACY

Sandra Wooltorton

In this paper I will present some understandings of ecological literacy, and propose a method for facilitating it in schools and community contexts. Ecological literacy is a life skill which comprises practical knowledge of place. Its outcomes are observable and include connection with, and enhancement of one's environment. The method I present for facilitating ecological literacy uses collaborative learning. The process is cyclical, experience-based and includes artistic, critical and practical ways of reflecting upon the experience. As a learning method it can be incorporated into school programs as part of regular classroom practice. It provides a framework through which teachers can incorporate environmentally sustaining practices into children's regular classroom work. It fits with an approach that is referred to as Environment as an Integrating Context (EIC), which produces improved maths and literacy results on standardised testing. As a learning method it also provides a basis through which community-based environmental education programs can be organised for improved outcomes.

Sandra Wooltorton *is an experienced school teacher and is currently a university teacher educator at Edith Cowan University's South West Campus. She holds a PhD in Sustainability and Technology Policy (Murdoch).*

THE WORSLEY SUSTAINABLE ENERGY SCHOOLS PROJECT

Sandra Wooltorton and Richard Jeffreys
On Behalf of the Project Team

The Worsley Sustainable Energy Schools Project is an innovative sustainability education project which connects four schools, the Australian Association of Environmental Education, two universities and a corporation. Worsley Alumina Pty Ltd., as part of their corporate sustainability responsibility, are providing renewable energy systems to the schools including photovoltaic, wind and biodiesel equipment. The type and size of the systems is based on each school's physical location, size and local community context. The schools have also committed themselves to reducing their power consumption by 20% per capita over a five-year period. This will involve introducing energy efficiency programs developed and run by the students themselves. The schools have also committed to reorienting their educational programs and operations towards sustainability, and incorporating the sustainable energy initiatives into their curriculum. The project is managed by a team comprising representatives of the organisations involved, using participatory decision-making. The team has committed itself to supporting the four schools for five years as a learning community.

In this paper, we introduce the Worsley Energy Challenge, describe the renewable energy systems and sustainable energy programs developed so far, review our project development and analyse our progress to develop recommendations for others contemplating a similar undertaking. Intended project outcomes for the school children and the associated communities include energy literacy, ecological literacy and practices conducive to a sustainable future.

Sandra Wooltorton *is an experienced school teacher and is currently a university teacher educator at Edith Cowan University's South West Campus. She holds a PhD in Sustainability and Technology Policy (Murdoch).*

Richard Jeffreys *is a highly qualified and very experienced school teacher with many years of engagement in environmental education activism. He is currently working on a variety of sustainability education projects.*

A TALE OF TWO SCHOOLS

Michael Caulkins
Simon Fraser University, Vancouver, Canada

This paper reports on a research development initiative between the Faculty of Education, Simon Fraser University (SFU), with two schools and school districts in the Greater Vancouver Regional District of British Columbia. The goal of the project was to develop and investigate the implementation of an *ecological framework* for environmental education – one which encompasses aspects of community *and* environment and has the potential to bring the teaching of *ecological literacy* into the mainstream of teaching and curriculum within the public school system of British Columbia. We have chosen the term '*ecological education*' rather than '*environmental education*' (EE) to describe our project as this alternative conception encompasses a broader range of philosophical, epistemological, and social justice issues related to our conceptions of *environment*. 'Ecological education' implies an emphasis on the inescapable '*embeddedness*' of human beings and their technologies in natural systems. Rather than seeing nature as other, ecological education involves the practice of viewing human beings as one part of the natural world and human societies and cultures as an outgrowth of interactions between our species and particular places (Smith and Williams, 1999). The paper will tell the story of two schools through case study and ethnography.

THE LEARNING ENVIRONMENT IN PLACE-BASED, COMMUNITY ORIENTED, EDUCATIONAL PROGRAMS

David B. Zandvliet, Sandra Birrell
Simon Fraser University, Vancouver, Canada

This paper reports on the development of two research tools that can be used to describe the learning environment in place-based education programmes which offer a unique and authentic learning experience for students. The study began as an inquiry into the effect of direct community experiences on socio-constructivist ideas about learning. We wanted to investigate the role that the development of perceptions of place, community and belonging in students has on the learning process. We are interested in the impact of the potentially unique nature of teacher-student interactions created in these experiential programmes. As an integral part of this survey development, we explored teacher and student perceptions of their learning environment in experiential, interdisciplinary programmes as we identified, adapted and developed learning environment factors drawn from several existing and widely used instruments. Pilot studies compared student perceptions of the learning environment within single discipline, classroom-based learning environments with perceptions of the learning environment within interdisciplinary, outdoor and place-based learning environments using the newly developed instrument. In general, the study results describe how student participation in this type of programme might change students' and teachers' expectations for learning in a range of place based or community oriented learning environments.

PERCEIVING AND PROTECTING BIODIVERSITY

Birut Zemits
Charles Darwin University

Australia's multicultural population has brought perceptions of place and understanding of ecosystems from other natural and urban environments. Often these perceptions are influenced by media representations or hearsay rather than education or direct experience. This is particularly true for the Top End of the Northern Territory which is associated with 'tropical exotic' images in the minds of many who come here to work and study.

How various groups and individuals perceive natural environments that surround them is analysed within this paper, based on research undertaken with Charles Darwin University's Higher Education students and migrants studying English language. The research raises questions about how perceptions can influence an individual's will to support actions that protect biodiversity in a region that they do not have a long-term connection with.

Birut Zemits *is a lecturer in migrant education, Applied Linguistics and Ethnographic Film at Charles Darwin University. She is also completing a PhD in film through the Fine Arts faculty at CDU. Part of this project entails exploring perceptions of biodiversity across cultures. An active AAEE member and delegate for the NT, Birut is helping to organise the next conference in Darwin in 2008.*

POSTER ABSTRACTS

Abstracts are included in alphabetical order.

GROWING CONNECTIONS: A CASE STUDY ON THE IMPORTANCE OF BUILDING RELATIONSHIPS WITH THE LOCAL ENVIRONMENT

Trudi Bennett[1], Daniel Burton[2]
with input and inspiration from the teachers and children at Bold Park Community School

Emotional connection with place, and the relationship that forms through connection, is pivotal to environmental action. It is important that we, as teachers, allow children time to play and explore natural environments in order for them to discover different ways to connect with, and be in, nature. With the aid of reflection, this connection becomes part of children's lives, evoking them to feel genuine concern and protectiveness towards local environments. The upper primary children at Bold Park Community School have been investigating the identity of Galup (Lake Monger) through a variety of experiences in natural environments, and became passionate about the ecological health of the lake after they witnessed thousands of dead fish lining the shore. This research examines the importance of slowly building a relationship with the local environment to develop positive attitudes and values that will enable children to engage in environmental action.

Trudi Bennett *is currently teaching at Bold Park Community School in a social constructivist and integrated learning environment. Bold Park is a progressive school that is inspired by early childhood programmes in Reggio Emilia, Italy and is extending their educational philosophy to middle school. The teachers at the school are currently researching how children connect with their local environment and the importance that plays in developing environmental activism. Trudi also has an educational background in sustainable development and has worked for a number of years with children at Scitech Discovery Centre. She is passionate about the environment, spiritual connection with nature and sustainable lifestyle.*

A HERMENEUTICS OF RESPECT: ELABORATING AN ECOPSYCHOLOGY FOR LOVING LIFE AND LOVING LIVES

Michael Booth
Institute for Sustainability and Technology Policy
Murdoch University

In his last paper Michael Booth (who passed away from a degenerative lung disease on 1 September 2006) explores the issue about respect for self and others which forms a core ingredient for ever-evolving selves and sustainable interconnected systems. Respect however tends to become a limited and superficial aspect of contemporary Westernized lifestyles. Michael draws from personal experiences to warn that deep and genuine respect via which we recognise the uniqueness and worth of the other – is an endangered practice and the understanding (or hermeneutics) of respect should go beyond words to a mutualised, spiritual sense of community, companionship, care – indeed love.

Respect for invisible and unspoken experiences, which cannot readily be monitored, becomes unlikely for instrumentally motivated people. We are also led to trust (or mistrust) mostly on a simple basis of categories (e.g. plumber, doctor, teacher or researcher) rather than from summing up impressions of a person or for that matter a community.

Michael argues for respect to be built around giving time and spatial opportunities to others: "Giving them my attention involves me in their (for me) time-consuming details. To justify the importance of respectful behaviour I need the time to show that people paying attention to others makes a difference." The paper concludes with challenging the boundedness of academic disciplines and arguing for a post-disciplinary science. Seeking precision is immensely valuable, but completeness needs something more, especially in the pervasive social spheres of human and 'more-than-human' nature required to understand and respect a person.

Michael Booth *worked as an educator and researcher with ISTP at Murdoch University. He taught 'Self and Sustainability' and a research methods unit, as well as many honours and postgraduate students. 17 of his postgrads have received their doctorates, (some you have probably met or heard of) and they mostly worked on sustainability and educational issues including Buddhism, permaculture, aesthetics, subjectivity and consciousness.*

His most recent writings were on 'Practical Wisdom and Public Engagement' and on the 'Magic of Sustainability', a book being produced by ISTP staff. He was recently finishing a book on sustainable relating with Joan Eveline, UWA.

Michael passed away suddenly just prior to the conference on 1 September 2006 – he will be sadly missed.

THE NATURALISTE MARINE DISCOVERY CENTRE A NEW MARINE EDUCATION RESOURCE FOR WESTERN AUSTRALIA

Michael Burke
Department of Fisheries, Government of Western Australia

The Naturaliste Marine Discovery Centre is a new marine education facility that has been developed by the Department of Fisheries in Western Australia. This poster presentation will outline how the Centre will provide students and the general public with a new resource to learn more about our aquatic environment and the science and the management behind the State's fisheries.

The Naturaliste Marine Discovery Centre will provide students and teachers with a fantastic opportunity to explore the marine biology and ecology of Western Australia's coastal and inland waterways; the impact of recreational and commercial fishing on people and communities; and the importance of knowledge-based management to ensure healthy and abundant fisheries.

Visitors will be able to go on a tour through the specially designed exhibition, following the path of the Leeuwin Current – the 'heart beat' that drives WA's climate and aquatic ecosystems. Visitors will also have the unique opportunity of being able to observe research scientists at work in laboratories through public viewing windows. In addition to this, there is an indoor aquarium room with research and display aquaria.

Education programs developed for the Naturaliste Marine Discovery Centre make use of the exhibition hall, dedicated laboratory classroom and the surrounding marine and coastal environment. The education programs and activities are intended to be a fun and meaningful learning experience about ecologically sustainable behaviour, aquatic ecosystems and the 'Fish for the future' philosophy.

Michael Burke *is the Community Education and Volunteer Coordinator at the Department of Fisheries in Western Australia. Working with a team of experienced environmental educators and volunteers, his role is to coordinate the Department of Fisheries education programs and engage with education stakeholders and the broader community about fisheries aquatic environment issues.*

UNDERSTANDING WHO MESA IS AND WHAT WE DO

Angela Colliver / Presented by Kerrie Trees
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The purpose of this session is to is to present a vision and framework for who the Marine Education Society of Australasia is, how we conserve and protect marine and coastal environments and what we offer teachers and students in schools

Angela Colliver *has a Bachelor of Arts and a Graduate Diploma in Education. She has taught in all school contexts, including universities and is the author of numerous environmental education publications. Angela is the President of the Marine Education Society of Australia and the National Convenor of the Australian Marine Education Alliance.*

SHOWCASING THE AUSTRALIAN SUSTAINABLE SCHOOLS INITIATIVE – OPPORTUNITIES AND PARTNERSHIPS

Angela Colliver
Department of the Environment and Heritage
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The purpose of this session is to present a vision and framework for what the Australian Sustainable Schools Initiative (AuSSI) is, and what it offers teachers and students in schools in Australian States and Territories.

The National Environmental Education Statement for Australian Schools: '*Educating for a Sustainable Future'*, presents a vision and framework for the implementation of a national environmental education for sustainability programme which each state and territory can adapt to its own priorities.

AuSSI is an action learning initiative that is currently being implemented in across Australia with the objective of schools adopting sustainable management practices for the whole school community. The programme highlights the opportunities created by innovative partnerships between schools, their communities, local business and across government at all levels.

Angela Colliver *is the Department's Assistant Director Environmental Education. She manages the continued development of the Australian Sustainable Schools Initiative in collaboration with the States and Territories and supports the implementation of the new 'National Environmental Education Statement for Australian Schools: Educating for a Sustainable Future'. Angela has a Bachelor of Arts and a Graduate Diploma in Education. She has taught in all school contexts, including universities and is the author of numerous environmental education publications. Angela is the President of the Marine Education Society of Australia and the National Convenor of the Australian Marine Education Alliance*

THE RISE AND RISE OF SOUTH WEST ENVIRONMENTAL ACTIVISM

Peter Eckersley
Eckersley Rural Consulting

While environment groups in some cases experience the typical lifecycle of any community group, the resilience of many passionate environmentalists is evident in the longevity and success of many South West groups. These are mapped over time and space, their main focus and style summarised and contact details given in the hope that many more kindred spirits can join them.

THE IMPORTANCE OF TRADITIONAL KNOWLEDGE FOR SUSTAINABILITY: AN ANALYSIS OF EQUESTRIANISM

Margaret Gollagher and Dora Marinova
Institute for Sustainability and Technology Policy
Murdoch University

The dominant discourse of sustainability is strongly influenced by dedication to progress: that is, moving beyond existing ideas to scientifically derived bigger and better ones in order to provide a brighter future. As a counterbalance, sustainability theorists often turn to indigenous, local and/or traditional knowledge to illustrate the biases inherent in this attitude. The effort invested in perpetuating traditional knowledge over many generations is designed to preserve or sustain, rather than promoting constant transformation.

The importance of traditional knowledge for sustainability is discussed in this paper through the example of classical equitation, a form of traditional knowledge, to illustrate possible ways of imagining and organising relationships between humans and the more-than-human world. Equitation is used to demonstrate that the technological cleverness driving 'progress' can never completely replace the wisdom of traditional knowledge, although they may complement each other. Through equestrianism, we consider relations based on power and control with those which rely on synergy and empathy. Specifically, the power associated with progress is compared with the patience of traditional knowledge. The analysis is used to argue that the discourse of sustainability should encompass a diversity of views and knowledges if it is to fulfill its promise. The educational implications from this study expand beyond the traditional schooling and university system to areas such as corporations and the business world which are commonly perceived as proponents of technological progress.

RESOURCES DEMAND OF CHINA AND SUSTAINABLE DEVELOPMENT OF WESTERN AUSTRALIA

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The recent rapid growth of the Chinese economy, combined with urbanisation and changes in the consumption structure are increasing Chinese demands for iron, oil, gas and coal. At present, China is the world's second-largest oil importer, and its combined share of the world's consumption of aluminum, copper, nickel and iron ore has reached about 20%. China's economy could grow at 8-9 percent per year for the next 20 years. Along with this continuous expansion, China's resource demands will also be escalating.

These changes have greatly influenced China's public policies, especially energy and resource policy, including foreign activities to strengthen cooperative relations with resource-intensive countries. Australia, and Western Australia (WA) in particular, is an ideal target for China. China can get a stable, quality resource supply from WA, and WA, in turn, has gained commodity boom and financial benefit. However the effect (short-term and long-term) produced by this supply-demand relation is very complex and with implications for WA's sustainable development strategies.

The paper first studies the status quo of resources demand (China) and supply (Australia), and explores the consistency between the demand and the supply. It then analyses different effects produced by resource trade. The boom in the resource sector will continuously propel WA's economic growth but on the other hand, may disturb WA's strategic aims of sustainability. The paper discusses some potential conflicts and predicts some trends in the Sino-Australia resource trade. In conclusion, it presents suggestions to policy-makers as well as for educating the broader community.

KEYWORDS: Resource demand, China, Australia, sustainability

NGO AND DIFFUSION OF ENVIRONMENTAL KNOWLEDGE IN CHINA

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Over the last twenty years, environmental deterioration has become serious in China. However, Chinese governments are concentrating on economic growth while private institutions are pursuing financial benefits. Thus, they have not paid much attention to environmental issues in the country. In the educational system of China, the environmental curriculum is still incomplete. This makes it difficult to diffuse environmental knowledge effectively to students and the general masses in China. The lack of environmental knowledge is an important reason why many Chinese citizens and organisations have poor awareness of environmental protection.

Against this background, non-government organisations (NGO) in China have increasingly started to play a special and important role in diffusing knowledge and promoting environmental protection. The first environmental NGO in China, Friends of Nature, was established in 1994. At present, there are more than 40 environmental organisations registered. They have become quite influential in policy making and environmental education, and are the key to understanding China's environmental movement and education.

This paper examines the history, functions and mechanisms used by Chinese NGOs in environmental education. It starts with an overview of the history, structure and activities of Chinese environmental NGOs, and then explores NGOs' roles in environmental education and knowledge diffusion. Some unfavorable factors which impede the work of NGOs are also discussed. The Friends of Nature case study is presented to investigate the operational mechanism of environmental education and knowledge diffusion by NGOs in China. Finally, the paper draws implications for more effective diffusion of environmental knowledge in China.

Keywords: NGOs, Environmental Knowledge Diffusion and China

TIGER SNAKES: HOW A SCHOOL AND WILDLIFE CENTRE TACKLED AN ENVIRONMENTAL ISSUE

Léonie Rennie, Rekha B Koul, Rosemary Evans
Curtin University Of Technology

In an effort to increase the collaboration in environmental science education Herdsman Lake Wildlife Centre applied and was awarded a grant by The Australian Science Teachers Association's School, Community, Industry Partnerships in science (SCIps). The project involved co-operation of the nearby Chrysalis Montessori Primary School to develop an educational program for the community. The main aim of the project was to increase the science awareness of the school and wider community. There are many tiger snakes in the area and safety and conservation issues are the key to the program. This presentation reports a qualitative study of the program and its implementation. Issues relating to cooperation between the wild life centre and the school, and the involvement of the community are explored and implications drawn.

Rekha B Koul *has taught in high school for a short time, followed by teaching at undergraduate level and finally over twelve years of research/extension activities aimed at women as main beneficiaries at Agricultural University Kashmir, India. She obtained her Doctorate in Science Education from Curtin University of Technology, Australia. At present Rekha is working on a few learning environment projects in Australia. Her most recent research has involved studies of classroom learning environments, teacher interpersonal behaviour and cultural sensitivity in science teaching.*

COULD FEMINIST VALUES HELP SUSTAINABLE DEVELOPMENT: CASE STUDIES FROM SOUTH WEST AUSTRALIA

Silvia Lozeva

This paper will provide an insight look into the motivation of people, and women in particular, to engage in environmental protection. As some scholars have pointed out the need for sustainable development can be expressed in economical terms, such as preservation, or human productive capacities or it can be views as a need to express our traditional human values, such as care for the others and care about nature, which have been proclaimed by the second wave of feminist movement.

If we agree that sustainable development is development that meets the needs of present without compromising the ability of future generations to meet their own needs, then we could fall within the economic mode of need satisfaction and production. By examining interviews taken with women and men working and /or supporting environmental organisations I will attempt to give an insight look on this problem. This paper will also provide example of strong leadership abilities and prompt examples of activism by listing the work of men and women involved in environmental engagement in South West Australia.

Key words: motivation, environmental activism, leadership, sustainable development, feminism

Silvia Lozeva *is a postgraduate from Sofia University in Gender Studies. She has studied the migrant experience of women in public participation in the Czech Republic. With large international experience in five different countries she has also developed strong interest in the environment and in the way different agents and stakeholders perceive the environment. Her current research interest is in the field of environmental values. Her most recent paper will provide an insight look into the motivation of people, and women in particular, to engage in environmental protection. Silvia Lozeva has also graduated in Labour Studies from the University of National and World Economy in Sofia.*

LEARNING FROM NATURE: THE ECOMIMICRY PROJECT

Dr Alan Marshal

Nature. Sometimes labeled the greatest educator of all. But what does it actually mean to be a student of nature? More than a few intellectual movements have honoured and revered Nature as the master teacher. This paper explores what this actually involves with regard to the recent rise of the theory and practice of biomimicry. Biomimicry is the process of designing technologies to mimic living Nature in some way. The philosophical undercurrent is that humans should learn from Nature as they design sustainable technologies. If biomimicry is "learning from Nature", then we have to ask how designers and engineers are influenced by the particular views and models of nature they use? Human studies of Nature do not just involve the uncovering of Nature's inherent truths. These truths are debated and negated, inflated and negotiated; both within science and outside of it. Thus, any body claiming to be "learning from Nature" is actually learning from negotiated concepts of nature. The implications of this are discussed. For instance, Is there space in the practice of biomimicry for a) traditional knowledges of nature to be considered?, b) for non-expert communities to be involved in the design of technologies that are supposed to be beneficial to them c) for local biological settings to be mimicked rather than those on the other side of the world?

ENVIRONMENTAL EDUCATION IN TEACHER EDUCATION: EXPERIENCES AND PERCEPTIONS OF PRE-SERVICE TEACHERS

Rebecca Miles[1], Dr Amy Cutter-Mackenzie[2],
Charles Sturt University[1], Monash University[2]

In the field of environmental education, teacher education has been repeatedly labelled the "*priority of priorities"*. Contrary to policy expectations, lack of pre-service teacher education has been identified as a significant barrier preventing and/or limiting the implementation of environmental education in primary schools. Additionally, research suggests that there has been limited progress towards the inclusion of environmental education in school and teacher education. This paper documents student teachers' perceptions and experiences of environmental education in their respective teacher education programs in rural New South Wales using a two-staged combined methods qualitative/quantitative approach.

Key findings showed that whilst many students were interested in teaching environmental education (85%) most of them did not feel they were knowledgeable about environmental education (93%) or prepared to teach it through their teacher education (98%). Moreover, the data collected show that the environmental education knowledge and preparedness of participants was quite low, despite many holding positive beliefs about the goals, teaching and importance of environmental education and the priority of environmental education in the school curriculum. The implications of this research indicate that if universities wish to produce graduate teachers who are prepared and knowledgeable in the delivery of productive environmental education, it is imperative that they include knowledge-based training in environmental education.

Rebecca Miles *has recently begun full-time PhD candidature at Charles Sturt University, Bathurst campus, in NSW. She is interested in research on socio-ecological education, and 'pedagogies of responsibility' within teaching and teacher education. She has also worked as a casual relief teacher and as an educational designer with Charles Sturt University.*

LIVING STREAMS; DESIGNING PARTNERSHIP PROJECTS FOR SCHOOLS AND COMMUNITIES

Dr Jennifer Pearson
Teacher Edith Cowan University, Science Education and Technology & Enterprise Education, Western Australia.

This is a case study of a school group who presented a successful proposal to local government outlining the rehabilitation of a cement drain system in a park to a living stream. The school worked with the local landcare group to investigate the issues of rehabilitation and visited pristine local sites to learn from community members about rehabilitation processes. The proposals enabled the school and local community to embark on a 5 year plan with considerable support from the local council for site works. Partnerships can achieve significant outcomes for students, community members and connectedness to local government initiatives to engage in rehabilitation projects.

Jennifer Pearson's *teaching has spanned primary, secondary and tertiary education positions. She has also worked with Landcare groups to support schools as they engage in Environmental Education projects. Supporting groups to be proactive about caring for communities is at the heart of her work. Jennifer is involved in the Science Teachers Assoication as the journal editor and is the Convenor of AAEE Chapter in WA. Her research perspectives cover both Science and Technology & Enterprise Education in Early Childhood and Primary communities as they engage in EE.*

BIODIVERSITY EDUCATION IN CAMBODIA

Dr Brad Pettitt
ISTP, Murdoch University

In biological terms, Cambodia is one of the richest countries in the world. It contains a remarkable diversity of wild animals, plants and habitats, including, for example, more than 1,000 species of fish and approximately 11 million hectares of forest cover. In recognition of the national and global importance of this biodiversity, 25% of Cambodia is currently under protection: one of the highest levels anywhere in the world.

As Cambodia moves towards greater development and prosperity, however, there needs to be a clearer understanding of how to manage and use this natural heritage wisely. Natural resources are the mainstay of Cambodia's economy: more than 80% of Cambodians depend directly on natural resources for subsistence and income. With pressures on biodiversity and the environment increasing, there is a risk of Cambodia losing much of this natural wealth to the detriment of present and future generations.

In 2006 Darwin Initiative and Fauna & Flora International launched a Masters of Biodiversity Conservation in response to the clear need for more qualified and experienced Khmer nationals to guide Cambodia towards sustainable resource use and development and uphold the nation's international commitments to conserving its biodiversity. In January 2006 I went to Phnom Penh to teach part of this Masters course.

This paper will discuss why such a Masters course was needed and will examine the challenges of teaching biodiversity conservation and natural resource management in a cross-cultural setting. It will critically reflect on the techniques used in teaching the course and will highlight some key lessons learnt.

FAITH ORGANISATIONS: PARTNERS IN THE EVOLUTION OF EDUCATION FOR SUSTAINABILITY

Dimity Podger

Education for sustainability (EfS) has been identified as an instrument or approach to education that contributes to the transformation of society towards a sustainable future. Over time, understanding, conceptualisation and practical approaches to educating for sustainability have evolved. The dedication of a United Nations Decade of Education for Sustainable Development (the Decade) following the 2002 World Summit for Sustainable Development underscores the important role placed on education in moving towards sustainability, and provides an opportunity for further development.

UNESCO, the lead agency for the Decade, has identified faith groups as key partners in addressing the goals of the Decade. However, little work has been done within the EfS field to understand and learn from the views and experiences of faith groups with regard to developing EfS.

This poster presentation shares emerging findings from the author's PhD research. The research has engaged two faith organisations, the Bahá'í Community of the US and Soka Gakkai International-USA, in an exploratory study of their community education initiatives and those specifically addressing EfS. The goals of the research are to investigate both the contributions of EfS best practice understandings to the faith organisations' initiatives, and the faith organisations' philosophical, conceptual and practical contributions to the evolution of EfS.

In addition to presenting research findings, this poster will briefly share examples of the EfS initiatives of the two faith organisations, such as national and grassroots EfS workshops and seminars, special editions of community children's magazines, character education curriculum, and institutional capacity building programs.

Dimity Podger *(MEnvSt, BAgEc) is a PhD Candidate with the Graduate School of the Environment, Macquarie University, Australia. Assoc. Prof. Daniella Tilbury, Macquarie University, and Prof. Swee-Hin Toh, Griffith University, are supervising her research. Prior to commencing her PhD, Dimity, with Daniella Tilbury, co-facilitated an action research project with university lecturers with the goal of changing curriculum to develop graduate skills for sustainability. Recently she was involved in mentoring ARIES staff in action research and EfS. Dimity welcomes feedback and comments and can be contacted on (02) 9850 7977 or by email at dpodger@gse.mq.edu.au.*

FROGS: CONNECTING COMMUNITY WITH THE ENVIRONMENT

Johnny Prefumo
The Frog Doctor

LABORATORY LEARNING ENVIRONMENTS AND TEACHER-STUDENT INTERACTIONS IN PHYSICS CLASSES IN THAILAND

Dr Toansakul Santiboon
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This study describes students' perceptions of their physics classroom learning environments and their interactions with their teachers in upper secondary school classes in Thailand. Associations between these perceptions and students' attitudes toward physics were also determined. The learning environment perceptions were obtained using the 35-item *Physics Laboratory Environment Inventory* (PLEI) modified from the original *Science Laboratory Environment Inventory* (Fraser, McRobbie, & Giddings, 1993). Teacher-student interactions were assessed with the 48-item *Questionnaires on Teacher Interaction* (QTI) (Wubbels & Levy, 1993). Both these questionnaires have an Actual Form (assesses the class as it actually is) and a Preferred Form (asks the students what they would prefer their class to be like - the ideal situation). Students' attitudes were assessed with a short Attitude scale. The questionnaires were translated into the Thai language and administered to a sample of 4,576 students in 245 physics classes at the grade 12 level. Statistically significant differences were found between the students' perceptions of actual and preferred environments and teacher interpersonal behaviour in Thailand. Associations between students' perceptions of their learning environments and teachers' interpersonal behaviour with their attitudes to their physics classes also were found. It was found from interviews with a sub-sample that particular categories of comments could be identified, physics being a difficult subject, evaluation and assessments not being related to the tertiary entrance examination, and teachers' plans. These factors appear to be affecting student achievement in physics. Based on all the findings, suggestions for improving the physics laboratory classroom environment and teacher interpersonal behaviour with students' perceptions are provided.

STUDENTS' PERCEPTIONS OF THEIR TEACHERS' INTERPERSONAL BEHAVIOUR IN PHYSICS CLASSES IN THAILAND

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