

15th Biennial National Conference



Environmental Education up the
Track:
Hot Topics for our Community

Referred Journal

Charles Darwin University
9th – 12th July 2008
Northern Territory

**15th Biennial Australian Association for Environmental Education Conference -
Environmental Education up the Track: Hot Topics for our Community**

9th – 12th July 2008, Charles Darwin University, Northern Territory

The Conference is sponsored by



Australian Government

**Department of the Environment,
Water, Heritage and the Arts**



Australian Government

AusAID



Northern Territory Government



Charles Darwin
UNIVERSITY



MACMAHON



arwin
City Council

ISBN 978-0-9578335-2-4

First Published 2008

This publication is intended to be distributed to as many people and organisations as possible.

Published by AAEE National Conference Committee.

Contact Dr. Jennifer Pearson on j.pearson@ecu.edu.au if you require further information

Introduction

The National Conference at Charles Darwin University in Darwin July 1-5 chose the title of Environmental Education up the Track: Hot Topics for our Community to provide an opportunity to extend discussions build networks and improve understanding of topics in Education for Sustainable Development (ESD) on local, national and international levels. This was achieved by engaging a broad range of community members and visitors in experiences that stirred complacency and extended commitment to best practice strategies for environmental education. A significant feature of the conference was the engagement and involvement of Indigenous Australians and isolated communities across Northern Australia. There was also the facilitation of developing links with the Asia region through sharing experience. Another feature was the Youth Conference, lead by Millennium Kids Inc that connected youth organisations and groups across the nation using video link ups.

Hot topics included climate change, trans-cultural eco-literacy, water issues, green business, waste management, ecological footprint and biodiversity. Thematic presentations, skill-based workshops and field studies facilitated smaller groups and presenters were encouraged to be innovative in the way they engage participants. A strong focus on intercultural and inter-generational perspectives directed the conference with opportunities for special interest groups to network and develop projects that work towards ESD for the rest of the decade.

The collection of articles in the peer reviewed journal represent some of the many rich discussions that occurred over the conference. The editorial team is listed and I would like to thank them most sincerely for their volunteer time in helping prepare this work.

Editorial Committee

Dr. Jennifer Pearson (Editor), School of Education, Edith Cowan University Australia.

Dr Sally Birdsall, Senior Lecturer, School of Science, Mathematics and Technology Education, Faculty of Education, The University of Auckland.

Ms Mia Christensen, Environmental Educator, EnviroCom Australia.

Dr Tony Fetherston, Senior Lecturer, School of Education, Edith Cowan University Australia.

Dr Ruth Hickey, Senior Lecturer, School of Education, James Cook University, Cairns Campus.

Dr Coral Pepper, Lecturer, School of Plant Biology, University of Western Australia.

Associate Professor Keith Skamp, School of Education, Southern Cross University.

Dr Sandra Woollorton, Senior Lecturer, Regional Professional Studies, Edith Cowan University Australia.

Ms Birut Zemits, Lecturer, School of Education, Charles Darwin University.

Contents

Articles	Pages
1 Master Builder Green Living –An innovative approach to improve the capacity of builders to respond to sustainability issues in construction Dr Philip Alviano and Mary A Gates.....	1-7
2 Growing new Skills; Best practice PD for developing a state-wide EfS community of practice Ms J. Bishop, Mr M Cattanach, Ms A Brown and Ms P Cattanach.....	8 -20
3 Familiarity breeds context – delivering environmental education through local awareness Ms Michele Dale & Ms Moni Carlisle	21-27
4 The importance of place in environmental education Rebecca Miles	28-37
5 Indigenous environmental principles and resource management systems in Sub-Saharan Africa Santosh C. Saha	38-49
6 Action competence in New Zealand schools: Improving the capacity for understanding student learning in EFS Faye Wilson-Hill, Barry Law, Chris Eames	50-56

Master Builder Green Living – An innovative approach to improve the capacity of builders to respond to sustainability issues in construction

Dr Philip Alviano and Mary A Gates

The increasing importance in the marketplace of sustainability features in both domestic and commercial construction has seen the development of the Master Builder Green Living program to improve the ability of building practitioners to respond to these requirements. In the commercial sector builders are increasingly asked to respond to developer or tender requirements that require them to meet a number of sustainability objectives. At the domestic level many consumers only contact with the building industry is through a builder. The program provides builders with practical solutions on sustainability relevant at all stages of the construction process in an easy to digest format which in turn increases the likelihood of effective implementation.

Consumers interested in addressing sustainability issues during the construction or renovation of their homes can seek out these builders. By bringing together like minded individuals the chances of improved sustainability outcomes for everyone are increased. Through education the Green Living Master Builder becomes a key advocate for the adoption of sustainable solutions.

On successful completion of assessment the participants are awarded a nationally recognised AQTF (Australian Quality Training Framework) unit of competency. Career pathways are opened subsequently for the builder who seeks opportunities in the field of sustainable construction. Over 200 building practitioners have been trained by Master Builders Victoria.

Introduction

The Master Builders Association of Victoria is a member organisation that represents approximately 7000 commercial and domestic builders. As a registered training organisation it is also responsible for providing industry training to more than 14,000 participants annually. The majority of this training is linked to legislative requirements in the fields of Occupational Health and Safety. In order to encourage and facilitate individual career pathways and development, the majority of courses are linked to accredited outcomes particularly units of competencies and or qualifications from national training packages.

Building and Construction Industry practitioner needs inform the selection and development of the training courses. Many of the participants come from a range of educational backgrounds that range from unskilled construction workers through to tertiary qualified project managers. In the past this has resulted in a general lack of training culture. The diversity of cultural and education backgrounds can also be a challenge and in this case participants are provided with comprehensive training support in the form of a Workplace English Language and Literacy (WELL) program. Participants are also challenged by the realities of tight project timelines and the cost of time release offsite means that there is a need for flexibility such as offering short blocks of half days or days over a period of weeks.

While the majority of this training is linked to legislative requirements there is an increasing awareness that sustainability outcomes are becoming an increasingly important part of the building process. As a result Master Builders Victoria in

partnership with Sustainability Victoria has developed a multifaceted education strategy. This consists of a full time Sustainability Officer whose broad brief is to 'educate' the industry and help to stimulate the adoption of sustainable practices. This takes a variety of forms including;

- Site visits to provide advice
- Telephone advice
- The development of training programs and units to be incorporated into other training programs
- Research and reports back to members on the findings
- Presentations and question and answer sessions at trade nights and section meetings in regional Victoria.

The Master Builder Green Living Program

Often the first point of contact for people contemplating the construction of new houses or renovations is through a builder. Domestic builders have experienced an increase in questions from their clients about sustainability issues, helping to raise the awareness amongst builders of the importance of incorporating sustainability into their operations. This has subsequently driven the demand for increased information from Master Builders which led to the development of the program.

The question then becomes one of presenting the required information in a format that is accepted by participants that usually do not have a strong academic background. There is a large amount of information available on improved sustainability outcomes in the construction sector. The challenge is to be able to translate this information from the academic to a series of goals, strategies and techniques understandable to and accepted by builders.



The Master Builder Green Living program is designed to provide builders involved in the residential sector with improved management and business skills to enable them to pursue energy innovations in their constructions. These include the necessary tools and information to identify design features of energy efficient structures that not only meet minimum standards but set a new benchmark in the housing sector for energy innovation. The builder is also able to improve their customer service by providing informative advice to clients about sustainable solutions in the design and construction of their dwelling.

This innovative program focuses on sustainability issues relevant at all stages of the construction process from important design considerations through materials selection and site management to interior fit out and health considerations. The information is easy to digest and focuses on common sense, practical solutions that are not necessarily expensive.

The other benefit for the builder is the linking of the program and work practices with a unit of attainment from the national training system which encourages further training for a nationally recognised qualification. The program was developed by the Institute of Sustainable Futures for Master Builders through an Australian Greenhouse Office grant in 2005. Since then the program has been further developed by Master Builders Victoria. Over the last 2 years, Master Builders Victoria has seen over 195 builders complete the 2 day training program and sign a written commitment to incorporate sustainability objectives into their day to day operations. Master Builders Victoria has also assisted other Master Builders to present the program in Western Australia, Tasmania, New South Wales and the Australian Capital Territory.

Builders who have completed the Master Builder Green Living program can be identified as builders that view sustainability issues as an important part of their business, so that consumers interested in addressing sustainability issues during the construction or renovation of their homes have the ability to seek out these builders. By bringing together like minded individuals the chances of improved sustainability outcomes for everyone are increased.

The Training Course

The Master Builder Green Living Program consists of a 2 day course, an accreditation system and the provision of a number of resources. It focuses on the often used, reduce, reuse and recycle message and considers the need to reduce impacts, energy consumption and water use in the first place. The program then explores a group of ideas that have a big impact on minimising the environmental impact of the house, without necessarily imposing an increased cost. These ideas are referred to as “dead set winners”.

The Training Course is structured in a manner that follows the building cycle. It commences with a look a number of environmental issues such as greenhouse gas production and biodiversity loss and the impact of construction on these issues.

It then looks at the importance of project planning by emphasising the importance of thinking about sustainability features right from the beginning of the project. This is where features can be easily incorporated into the building project at minimal additional cost as they are integrated at the design phase.

The importance of design is then introduced, in particular passive solar design ideas. Once again the focus is on providing ideas that will reduce operational energy use and environmental impact without necessarily introducing additional costs.

The next few topics address the environmental issues to be considered during the construction phase such as on site management, waste management and erosion and

sediment control. Materials selection used in the framing and structure and the building envelope becomes important when we consider, where these materials come from, their recycled content and embodied energy. Concepts such as sustainably sourced and grown timber resources are also introduced.

Methods to reduce water and energy use are then explored by focusing on the big users and easy methods to reduce consumption. The importance of design considerations are not forgotten as a series of activities allow the participants to apply the ideas to real plans. These practical activities deliver a number of other outcomes such as group work and the sharing of ideas.

Once the construction of the building is completed the issues to be considered during interior fitout are explored. As well as again looking at the importance of materials selection and embodied energy, indoor air quality is introduced as a topic that an increasing number of people are concerned about when they think about the emissions given off by solvents, glues, carpets and paints used in their homes.

The final topic covers business strategy and discusses methods to incorporate what they have just learnt into their day to day operations to make the whole process as easy as possible. In order to sell their increased knowledge of sustainable construction the accreditation process is discussed and a number of ideas of how to best use the brand to differentiate their business from others in the market are introduced.

Resources

The goal of the program is to increase the chances of builders incorporating sustainability considerations into their developments. A number of resources are issued to participants during the course in order to make this process as easy as possible.

As well as a set of training notes, a checklist is distributed as part of the Green Living domestic builder course. It is designed for the builder to use with their client to determine the range of environmentally friendly options to be incorporated into their development. This not only helps to remind the builder of the options available but also helps to clarify the client's requirements. The checklist follows the construction process and considers outcomes concerned with passive solar design, materials selection (environmental impact and embodied energy), water and energy conservation, recycling and indoor air quality.

All participants are also issued with a list of useful resources which is continually updated on the Master Builder Victoria Green Living webpage (www.mbav.com.au/training/greenliving.html). This list of useful suppliers and resources is once again designed to make the process of finding environmentally preferable materials as simple as possible. If the sourcing of a product or service becomes too difficult it is likely to be dismissed by the builder.

Participants are also given a copy of the "Your Home" manual (Australian Greenhouse Office 2005) a technical guide to environmentally sustainable homes.

The guide provides participants with additional information that they can read at their leisure or use as a future reference.

Once builders complete the program they continue to be supported through e-newsletters and an annual workshop. The newsletter, which is sent out tri-monthly, is able to keep Master Builder Green Living builders updated on regulatory changes, events that may be of interest and useful new products and resources. A one day workshop is also held annually which includes guest speakers from government who are able to provide insight into proposed regulatory changes, industry speakers and useful product suppliers. There is an opportunity for the builders to seek clarity by having their questions answered. Each year a number of builders are also asked to speak about their own developments. This is often well received by the attendees as they are able to hear from a real builder about some exciting projects, how they overcame various problems and what they found useful along the way.

Accreditation

Only Master Builders members who complete the two day training program and sign a written commitment are able to refer to themselves as Master Builders Green Living Builders and to use the associated branding. The signing of a written commitment significantly increases the chances of the person putting a verbal commitment into action (McKenzie-Mohr and Smith 1999). The commitment includes:

- submission of an annual report to Master Builders that includes information and details on the total number of residential projects and Master Builder Green Living projects (including checklists) completed,
- an estimate of the amount of material recycled or diverted from landfill
- an assurance that sand, soil, screenings, concrete and chemicals were confined to the building site (completion of annual report declaration).

The annual report is required from the builder in order to continue to maintain their accreditation and is considered to be evidence of sustainable strategies being put in place. On provision of this evidence participating builders can continue their accreditation and also be eligible to receive a nationally recognized statement of attainment for the unit of competency demonstrated - BCGBC4020A Build thermally efficient and sustainable structures (domestic).

Sustainable Construction – Commercial

With the increased popularity of ecologically sustainable developments and ‘Green Buildings’, there is an increased requirement for commercial builders to be more familiar with these concepts. This hands-on course provides guidance on how to understand and respond to developer or tender sustainability requirements and for site managers and contractors to comply with environmental requirements on site. At the end of the course participants will have produced their own environmental policy and management plan which can then be adapted for other projects.

This program is similar in structure to the domestic program but differs by focusing on issues related to commercial developments. There is more emphasis on site management, environmental policies and site management plans, ratings systems

such as Greenstar and uses case studies of commercial buildings. The program is supported by a DVD produced by the Master Builders Victoria.



Achievements and Results

As of July 2008 198 builders have completed the Master Builders Green Living program and 39 the Sustainable Construction – Commercial program in Victoria. Importantly 86% of those who completed the Master Builder Green Living course have signed a written commitment to incorporate sustainability objectives into their day to day operations. Results compiled from reports submitted by the builders as part of the accreditation process indicate that;

- On average each of these builders are working on 8 projects per year covering 1072 building sites.
- 73% of these sites are recycling 47% of their waste.
- All these sites are controlling discharges to the storm water system.

Conclusion

Feedback from course participants has been excellent indicating that the information is presented in a format that they respond positively to. In evaluations completed at the end of each course 99% of participants rate the course as very good or excellent. There are also numerous comments on how useful they found the discussions and ideas shared with other like minded builders.

Providing training in a practical easy to follow format that is complemented by a variety of tools, ensures that builders feel more confident when discussing environmentally friendly practices with their clients. Providing improved training for builders in a format they are comfortable with and identifying builders, who have an interest in providing more sustainable housing, increases the chances that consumers who want these outcomes make contact with the appropriate person.

This approach results in an improved level of cooperation between client and builder which in turn increases the range and likelihood of these practices being incorporated into new developments. A builder who is not confident in dealing with sustainability issues is likely to be dismissive of questions asked by their clients.

References

- Australian Greenhouse Office. (2005), *Your Home – Design for lifestyle and the future*, Commonwealth of Australia.
- McKenzie-Mohr, D. and Smith, W. (1999), *Fostering Sustainable Behaviour*, New Society Publishers, Canada.

Growing new Skills; Best practice PD for developing a state-wide EfS community of practice

Ms J. Bishop, Mr M Cattanach, Ms A Brown and Ms P Cattanach.

This paper outlines a unique approach to Professional Development (PD) in Education for Sustainability (EfS) being undertaken in South Australia. This PD approach was initiated in early 2007 to build a community of educators with expertise in education for sustainability who can support the Australian Sustainable Schools Initiative South Australia (AuSSI SA) implementation throughout the State. The objectives of the workshop series are to build EfS knowledge, understanding and skills; provide opportunities for hands on practice and build decision making capacity. A collaborative working group was established to develop the PD program which is called Growing new Skills (GnS). GnS aims to meet the needs of both formal and informal educators. The program combines presentations by national and international EfS leaders, seminars, workshops, both online and face to face discussion groups, a buddy system, journal writing and narrative performance stories to facilitate education officers to share their learning and build social networks that support EfS implementation in their work practices. GnS was developed by the users for the users and evolved through an ongoing process of evaluation, reflection and refinement. Evaluation tools and some of the key findings are presented in this paper. EfS principles were applied to the workshop development process as well as the content of the workshop. The process of developing the series was as significant in terms of transforming thinking as the material presented in the series itself. For more information on the PD series go to the GnS website which is best located by typing the following keywords into your search engine: Growing new Skills DEH.

Best practice professional development from an EfS perspective: An Introduction

A ‘best practice’ EfS approach to PD should be underpinned by a number of key principles which have been articulated in *The Guide Beside* by educators like Sterling (2001, 2003) and the Australian Research Institute in Education for Sustainability (ARIES). The key principles include:

- A transformative approach
- Systemic thinking
- Networking and participatory learning

EfS PD facilitates a collaborative and transformative approach to professional learning, unlike more content focussed expert driven traditional teaching methods (VAEE, 2008), referred to as a ‘transmissive’ education (Sterling, 2001). Transformative education seeks to create deep, lasting change through participatory and responsive learning processes. Sterling argues that this deep level of learning inevitably leads to a changed worldview and greater appreciation of the complexity and interconnectedness of the world (Sterling, 2003). By adopting a transformative approach, the process of developing PD is valued equally with the PD content. This acknowledges that the development of the PD itself can foster transformation. It is an opportunity for all to learn and ensures the approach to developing and delivering PD is consistent with the practice we are trying to foster (Hocking, Ray & Day, 2006).

We cannot learn how to facilitate collaborative transformative approaches for change through conventional sit-and-listen training – we need professional learning that itself is active and collaborative, and involves changing ourselves. (VAEE, 2008)

In order to be transformative, PD must also adopt a range of tools that will be engaging and appeal to people with different learning styles.

Adult educators can be presented with endless facts and information, but without motivation, inspiration or empowerment little change will take place. Therefore, to be most effective, opportunities to learn should make full use of the sense and a diversity of practices. (Clover, Follen & Hall, 2000, p. 9)

A central aspect of transformative education is the strong focus on participatory learning. This will be achieved by involving participants in the ongoing development of PD programs, and also by providing opportunities for participants to contribute to the decision making around how newly developed skills, knowledge and understandings will be applied to practice in their workplace. A further aspect of EfS within an adult learning context is recognising and valuing prior learning and knowledge (Clover, Follen & Hall, 2000). All PD should acknowledge that participants are at different stages of a journey in their understanding and practice.

Systemic thinking from a PD perspective requires being mindful of multiple influences on Environmental Education (EE). This includes seeking opportunities to work with and influence other parts of the system that may seem outside the intended audience, encouraging participants to consider their part in the broader system and opportunities to expand their sphere of influence. Systemic thinking is also linked to an inquiry based approach to learning by encouraging critical and holistic thinking, a keen eye for connections and patterns, valuing of multiple perspectives and open-mindedness (Sterling, 2003).

PD should also foster collaboration, networking and partnership development, to maximise opportunities for transformation of and within education structures. Networks and partnerships are important vehicles for sharing responsibilities and learning how to most effectively address issues (Tilbury & Cooke, 2005). Networking also fosters greater coordination amongst an often fragmented sector.

Despite the wide knowledge of best practice PD among EE and EfS practitioners, limitations such as insufficient budget and time allocation, lack of cohesion of partner organisations and rigid reporting requirements often dictate that best practice PD is not used.

Elements of best practice professional development in education for sustainability have been applied in NSW through the *Our Environment - It's a living thing Professional Development Program* (Tilbury & Ross, 2006) and in Victoria with *The Guide Beside* (VAEE, 2008).

This paper will outline a PD approach that was developed and implemented in South Australia that includes the elements of best practice PD with an emphasis on participant involvement in the development of the program which goes some way to addressing common pitfalls in the development and implementation of PD.

The South Australian Context: Growing new Skills

The need for PD

There was a range of sources that identified the need for PD in EfS, including:

- Environmental educators identified and expressed the need to have professional development around best practice in EfS and how to integrate principles and practices into existing program delivery.
- The Adelaide and Mount Lofty Ranges Natural Resources Management Board (AMLR NRMB) had reviewed its education program and wanted to develop the capacity of its team of 11 education officers to better integrate with the delivery of AuSSI-SA and to implement EfS principles and practices in working with schools.
- The recognition that many EE practitioners in SA had a limited understanding of the philosophy of AuSSI-SA and little exposure to EfS principles and practices.
- The identified need by staff from agencies including Department for Environment and Heritage (DEH), AMLR NRMB & Department of Education and Childrens Services (DECS) for a community of EfS practice that would nurture and support the professional development of EE practitioners in SA.

Partnerships for change established: PD working group

With a clearly established need for PD articulated by a range of stakeholders, it was fortuitous that funding for an extended PD series was made available. A widely distributed invitation was issued asking educators to join a working group to develop and implement a PD series by environmental educators for environmental educators.

The various hats worn by working group members meant that representatives from AuSSI- SA, DEH, the AMLR NRMB, the South Australian Murray Darling Basin Natural Resources Management Board (SA MDB NRMB), DECS, Urban Forests Biodiversity Program, KESAB, Asian Pacific Network for International Education and Values Education (APNIEVE) and the Australian Association for Environmental Education SA Chapter were all involved. There was a strong willingness among the stakeholders to work openly together to address the PD needs previously identified.

Once the group was established, more specific PD needs were identified:

- To influence senior decision makers (government and non-government) about the relevance and importance of EfS from a policy perspective as well as a best practice response to education needs.
- To demonstrate best practice PD to EE practitioners in SA.
- To strengthen networks and partnerships, particularly in the context of systemic thinking, to support individual programs and practitioners to work together, complement each other, avoid duplication and work towards an

overall consistent goal of supporting schools on a journey towards sustainability.

- To empower participants in bringing about change within their spheres of influence.

It was significant that partner organisations committed to releasing staff to attend the planned series of PD workshops. This enabled working group representatives to engage meaningfully and effectively with the process of planning the PD series.

The name ***Growing new Skills*** (GnS) was decided upon by the working group and a graphic designer was engaged to develop an appealing and professional banner and brand for the series.



Diagram 1: The GnS banner

Overall the series has run over twelve months with a further two months of planning before the first session. In the first nine months of planning and delivering the series a project facilitator was engaged to plan and facilitate meetings. This assisted significantly with maintaining the focus and momentum of the working group.

Features of the GnS PD Series

Multi level approach

In keeping with best practice PD principles, the working group developed a range of opportunities to support workshop participants to explore and integrate ideas, concepts, skills and philosophies introduced at workshops.

- Workshops were designed to support a range of learning styles. (*Further details about the approach of workshops and their content are provided below*).
- An informal and bi-monthly discussion group meeting was held which allowed workshop participants to discuss readings and workshop content in more detail.
- A buddy system was initiated to provide an informal opportunity for workshop participants to pair up with a colleague for support, advice and shared learning throughout the workshop series.
- An online forum space was provided on the GnS website to allow sharing of new ideas, questions, and concerns.

- Reading material was provided including the AuSSI-SA guide (DECS, 2007), a range of documents prepared by ARIES and Stephen Sterling's book *Sustainable Education; Revisioning Learning and Change* (Sterling, 2001).
- Corporate breakfasts were included as part of the GnS process as an initiative to influence senior decision makers in government and non-government positions about the principles and philosophies behind EfS and AuSSI. It also outlined their relevance and importance in terms of international and federal policy. Guest presenters at the workshops, including Daniela Tilbury, ARIES and Greg Manning, DEWHA, were invited to present at these breakfasts. Anecdotally, these breakfasts were a resounding success, nurturing increased support from some senior decision makers for the GnS PD series, for stronger partnerships between organisations working to implement AuSSI-SA and for the implementation of EfS principles and practices in work plans.
- Learning journals were provided to all GnS participants and provided a valuable space for clarifying an individual's ideas and to support transformative processes.
- A dedicated website was made available by DEH to host workshop materials, including presentations and papers. This assisted participants to reflect and revisit ideas presented.

Workshop approach

The workshop approach and content was influenced not only by the working group, but also through ongoing evaluation and feedback collected from workshop participants. It is significant that the working group was made up of individuals from a wide range of organisations. This diverse professional network ensured a wide range of views from the EE community could be considered in planning workshops. Evaluation will be discussed in a later section.

In general the features of GnS workshops included:

- Highly regarded researchers and practitioners such as Daniela Tilbury (ex ARIES), Greg Manning (ex Department of the Environment, Water, Heritage and the Arts) and Sue Lennox (OzGreen) provided a theoretical perspective, but also grounded this in practice. The reputation, position and experience of the guest speakers was greatly valued and provided a broader context to the EfS journey in South Australia.
- Time for personal and group reflection to discuss and consider how new ideas could be integrated into current practice.
- Sharing opportunities for participants to present elements of their current practice that aligned with EfS theory and practice, in both a formal and informal manner. This helped to engage participants, grounding the workshops in practice as well as theory.
- Workshop times were variable to provide opportunities for a broad range of EE practitioners to attend. Workshops were either half day (morning or afternoon) or full day, with most held during school term; although some were run during school holidays. Workshops were also centrally located and timed to avoid peak hour traffic and encourage public transport use.

- Different learning styles were catered for by providing visual and concrete materials, group and individual activities, presentations and movement opportunities. Examples include the introduction of different types of listening through the use of listening cards (DECS, 2008) and using basic craft materials such as plasticine, paper and ice cream sticks to develop a visual metaphor to present individual and group learning to the group.
- Informal networking time was provided to support the strengthening of networks and to informally explore opportunities for developing partnerships. This included breaks with food and, on several occasions, social drinks at the end of the session.

Workshop content and participants

Below are the titles of the workshops, which were held approximately monthly, between June 2007 and May 2008. Although specific details of content of the workshops are beyond the scope of this paper, interested readers can view more detail at:

<http://www.environment.sa.gov.au/education/pages/about/gns.html>

The first two workshops were designed to provide the broader policy, philosophical and theoretical framework for EfS and AuSSI-SA. Subsequent workshops explored in more detail the practical application of EfS in the work of EE practitioners with schools.

Workshop titles:

- 1: Education for sustainability - what & how?
- 2: An overview of the Sustainable Schools Program (AuSSI-SA) in SA
- 3: EfS tools: Learning in practice
- 4: EfS tools: Facilitating change in schools
- 5: EfS tools: Planning and evaluating in schools
- 6: EfS tools: GnS in our practice
- 7: EfS tools: Schools as community hubs
- 8: EfS tools: Empowering young leaders
- 9: EfS tools: Working with curriculum
- 10: GnS ~ Where to from here?

Participants in the PD program included government and non-government education officers, communication officers, environmental policy officers, teachers and tertiary students.

Evaluation

Evaluation of the GnS workshop series was designed to meet reporting needs, evaluate the effectiveness of the PD in achieving stated aims as well as to shape the ongoing development and delivery of the series. A program logic framework was

developed in the initial stages of the development of the PD to guide the series evaluation. A number of formal and informal evaluation tools have been used.

A feedback form was provided at each workshop, with results compiled for consideration during planning of future workshops. A suggestion box was also available at early workshops.

Informal conversations between working group members and workshop participants also played an important part in informing the planning of future sessions.

To fully assess the success and value of the series, workshop ten; '*GnS ~ Where to from here?*' had a major evaluation component built-in. It was based against the program logic and designed to identify gaps that could be filled by future workshop series. Tools used to evaluate the success of GnS were facilitated group discussions, human graphing, and other visual tools such as graphing activities on wall charts. A selection of results from this summative evaluation is included below.

Human Graphing

Participants were asked the question; 'What significance did you place in Youth Voice as part of your program's implementation before GnS?' They were asked to represent their answer by standing along an imaginary scale ranging from 'not at all' to the left and 'quite a lot' on the right (Diagram 2). Participants were asked to now consider their views after being involved in the GnS workshop series (Diagram 3).

For some participants, further discussion revealed that Youth Voice initiatives were not on their radar at all before GnS. Hence, the series has significantly raised the importance of this EfS and AuSSI-SA element onto the agenda of EE practitioners. Four Youth Voice initiatives have been co-developed by GnS participants through the impact of GnS.



Diagram 2: Attitudes to youth voice before GnS



Diagram 3: Attitudes to youth voice after GnS

Other visual tools

Two other visual tools were used to measure the extent to which participants had developed their understanding of EfS principles and practices: a target diagram and a 'before and after' line graph.

A series of targets were placed in easy view of participants (Diagram 4 shows one of these). Participants were invited to reflect on the statement relating to EfS in each region of the target diagram and report against the following statements:

- 'haven't heard of it' (put a dot on the region outside the target)
- 'have heard of it'
- 'can define it'
- 'can identify it'
- 'could facilitate/ teach others to understand it' (put a dot in the inner most circle of the target).

The diagram below demonstrates that at conclusion of the ten GnS workshops most participants felt they could either teach others how to do future visioning, or at least identify future visioning. The results for critical thinking and reflection were promising with most participants responding they could identify critical thinking and reflection. For systemic thinking most participants reported that they could define systemic thinking at best.

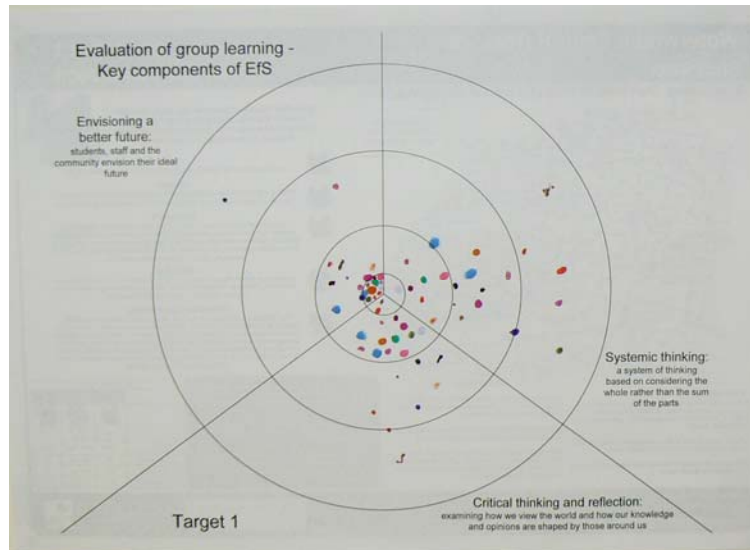


Diagram 4: Target graphing to establish current understanding of GnS participants

The target graphing approach used here is useful for identifying gaps in knowledge and skills, however it does not factor what level of understanding participants had before GnS as measured in the human graphing activity.

Line graphing allows participants to report their understanding before and after involvement in GnS workshops. A series of questions were posed in relation to participant's views about the worthiness of schools embarking on an ongoing enquiry into sustainability (see Diagram 5). Note that one participant added the point that this question was '*not even on my radar*' rather than being something that they had thought was not important. All participants reported that after GnS they considered the notion of a school enquiry into sustainability as very worthy.

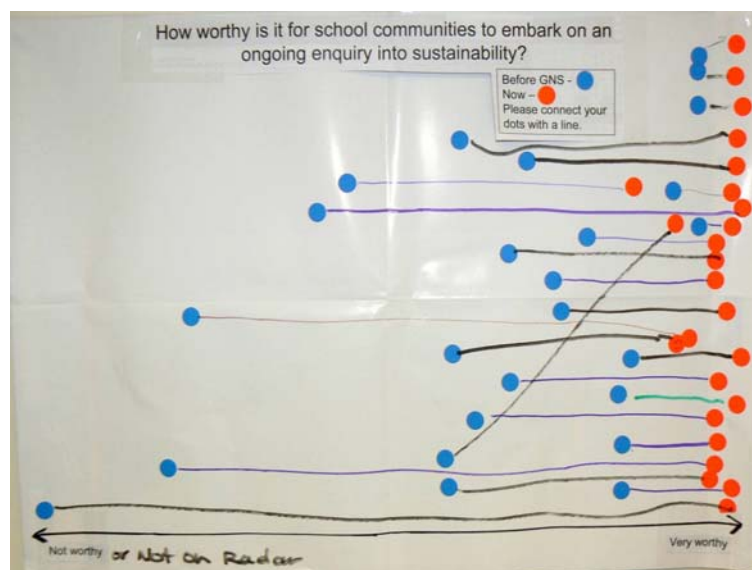


Diagram 5: Participant views about schools embarking on an enquiry into sustainability, before GnS (blue dots) and after GnS (orange dots).

Confounding factors

It should be recognised that a range of parallel processes were occurring during the same period as the GnS workshops. In response to EE practitioners at GnS recognising the need for clarity around roles and responsibilities for the implementation of AuSSI-SA, a series of meetings were held which incorporated further clarification of the principles and practices explored in GnS workshops.

In addition, the eleven AMLR NRMB staff were involved in further exploration of EfS and AuSSI-SA during a period of consultation and planning for the future delivery of their education programs.

Although these processes would have contributed to the development of ideas, skills and understandings during the GnS workshop period, the role of GnS workshops in preparing individuals to participate in meaningful discussions about AuSSI-SA implementation and improved EfS aligned education delivery models cannot be understated. It should also be noted that GnS provided the momentum for other change processes to occur.

A snapshot of evaluation findings

The following dot points highlight some of the key findings from the many evaluation elements, including those mentioned in the previous sections, of the GnS workshop series to date:

- Most participants are now actively developing Youth Voice elements in their practice.
- Future visioning is a tool that many participants have now incorporated into their practice.
- AuSSI-SA components such as ‘encouraging schools to embark on an enquiry into sustainability’ and ‘schools developing values to support a sustainability ethos’ are valued more highly by participants after participation in GnS.
- The multi-level approach of the GnS workshop series (e.g. group and individual learning activities, discussion group, learning journals, use of concrete materials, collaborative learning and kinaesthetic activities) enabled practitioners to engage in a manner that was useful and effective for them.
- Participants developed a deeper appreciation of the need to cater to a range of learning styles in the delivery of PD.
- Increased support for EfS and AuSSI-SA has developed amongst senior managers in some organisations.
- The community of practice that has developed around the GnS series should be maintained; as an important forum for improving practice, supporting professional development, and maintaining healthy networks and partnerships.

Keys to success

Members of the working group used the results of the evaluation process to identify elements that they consider to be integral to the success of the GnS PD series, which are outlined below.

The support of managers from DEH, AMLR NRMB, SA MDB NRMB and KESAB to allow staff to attend the series was essential. Work plans for staff in these organisations had to be adjusted to allow staff the time to engage meaningfully in the GnS series. Managers also supported staff to implement new practices learned from the series into their scheduled work, which added to the relevance of participants learning. Most importantly, the future planning of education programs at organisations such as the AMLR NRMB and SA MDB NRMB is imbedded with EfS and AuSSI-SA principles and practices.

Funding was necessary to pay for the project facilitator (up until workshop 5), materials, venues, catering and for interstate guest speakers' travel and accommodation. The funding was a critical component to the success of the project. The project facilitator was required up until the fifth workshop, and was employed for approximately four hours per week. The funding level for GnS will not be maintained in the future and the implications for this will be discussed in the conclusion.

A diverse working group that includes a mix of managers and on-ground staff provided varied insight into the PD planning process. Our approach was informed by research and best practice as detailed in the introduction to this paper. Authors such as Sterling (2001) and Tilbury & Ross (2006) as well as the work of ARIES provided a theoretical basis for the design of workshops.

Continuous evaluation and adaptation of the workshop approach and content was possible through the use of feedback forms, informal conversations with participants and a suggestion box which enabled participants to make anonymous suggestions at workshops.

The locus of control for the GnS series was with the working group and participants; i.e. the responsibility for, control over and choice of learning activities was made by the group for the group. This avoided a top down approach, and enhanced the engagement of the group in the process. Further to this, planning for workshops by the working group was open and transparent. Several times during the series open invitations were made to other participants to join the working group.

A constructivist approach was used by the working group; i.e. there was recognition that participants came to the GnS series with their own unique experiences and understanding. The sharing of personal experiences, the use of learning journals and quiet reflection time assisted participants to connect new ideas with their existing knowledge and to come to their own understandings.

Conclusion

The GnS PD process developed by EE practitioners in SA has achieved many of its intended aims. Looking back, it is clear that the most important guiding question was not ‘*What will be the content of the GnS series?*’, but ‘*What process should be used to develop and implement the series?*’ The working group believes the most significant transformational element of the GnS series has been the process of developing the PD, rather than specific outcomes.

The critical transformational element of the process was that the PD was developed by the participants for the participants, which insured that the existing knowledge and experience of the group was accessed, and the most relevant contextual information about participants needs was available.

The notion of collaborative learning was also an extremely important part of the process, with participants sharing previous experiences and integrating new ideas through a process of sharing each others’ interpretations of the new ideas.

A final element of the process that was critical to the success of the series was the fostering of a strengthened community of practice, which came about through; time allocated for networking and planning for action in teams, the collaborative learning activities previously mentioned, social drinks and the discussion group.

A benefit of modelling good PD development practice has been that participants have already integrated some of these elements in the development of their own PD programs as part of their work as Environmental Educators.

The funding commitment for GnS is now much reduced for this particular group of participants. A low cost alternative has been agreed upon by working group members to meet participant expectations of future PD support in EfS delivery. Workshops will be held four times per year, with the ongoing content to be suggested and developed by the working group with input from all participants. The discussion group will meet bi-monthly for social drinks and dinner and continue to providing an informal space for deeper discussion of EfS learning and practice.

Other elements that the working group plans to investigate as GnS continues are action research projects and the collection of stories of significant change, which will provide a structured manner for participants to document changes to their practice so that learning can be shared across the network.

References

Clover, E. Follen, S. And Hall, B. (2000). *The Nature of Transformation. Environmental Adult Education*. (2nd edition). Ontario Institute for Studies in Education, University of Toronto.

Department of Education and Children’s Services (DECS) (2007) *Education for Sustainability: a guide to becoming a sustainable school*, Department of Education and Childrens Services, South Australia.

Department of Education and Children’s Services (DECS) (2008) *Listening using advocacy and inquiry*

www.decs.sa.gov.au/northerncountry/files/links/Listening_to.doc

accessed October 2008.

Hocking, C. Ray, S. and Day, T. (2006). *What does professional development and learning for environmental sustainability facilitators look like?* Practice change for sustainable communities: Exploring footprints, pathways and possibilities. Proceedings of APEN International Conference, 6-8 March 2006 at Beechworth, Victoria, Australia.

Sterling, S. (2001) *Sustainable education: Revisioning Learning and Change*, Devon, United Kingdom: Green Books.

Sterling, S. (2003) *Whole Systems Thinking as a Basis for Paradigm Change in Education: Explorations in the Context of Sustainability*, Phd Thesis, University of Bath, submitted 2003.

Tilbury, D. and Cooke, K. (2005). *A National Review of Environmental Education and its Contribution to Sustainability in Australia: Frameworks for Sustainability*. Canberra: Australian Government Department of the Environment and Heritage Australian Research Institute in Education for Sustainability.

Tilbury, D. and Ross, K. (2006) *Living Change: Documenting good practice in Education for Sustainability in NSW*. Macquarie University, Sydney, and Nature Conservation Council, NSW.

Victorian Association for Environmental Education. (VAEE) (2008) *The Guide Beside, Creating Sustainable Futures Now*, <http://www.vaee.vic.edu.au/guidebeside/about.htm>, accessed September 2008.

Familiarity breeds context – delivering environmental education through local awareness

Ms Michele Dale & Ms Moni Carlisle

With community concerns about environmental issues such as global warming receiving scientific and political priority, there is a corresponding demand for mainstream environmental education initiatives. The plethora of information available regarding broad environmental issues can be intimidating to educators keen to foster an informed sense of stewardship in their students. We discuss how using local examples to illustrate more general environmental science provides a sensible and necessary approach to environmental education. Natural resource management based on sound science requires knowledge of local biodiversity and sustainable agriculture. A case study in Far North Queensland is presented where the Regional NRM body (Terrain NRM) facilitates partnerships with community and industry groups to provide teachers with access to relevant and accurate information, providing support and building capacity for educators. We describe how local learnings at the catchment scale build social capital around community awareness and vitality.

Keywords: natural resource management, capacity building, education, natural history, local, environment, sustainable agriculture.

Introduction

Terrain Natural Resource Management (NRM), a non-profit organisation, is one of 56 bodies across Australia responsible for protecting and managing Australia's natural resources. Queensland has twelve regional NRM bodies in fourteen regions. The regional bodies are run by boards that represent a wide range of community interests, employing paid staff and volunteers. The bodies are responsible for developing regional plans, accredited by both State and Federal governments, which identify the major NRM issues in the region, outlining strategies for addressing them and specifying the contributions of stakeholders. The Regional bodies obtain and provide funds for on-ground projects to implement the plan.

Like many other regional bodies, Terrain NRM, as part of their regional plan, has identified community awareness and engagement as one of their highest priority goals:

“A community that is knowledgeable and informed of natural and cultural resource management and conservation issues and which actively participates in the sustainable management and conservation of natural and cultural resources in the region.” *Sustaining the Wet Tropics: A Regional Plan for Natural Resource Management 2004-2008*. (FNQNRM Ltd & Rainforest CRC, 2004)

Thus, Terrain NRM has a vested interest in partnering with educational institutions to facilitate the incorporation and delivery of regionally relevant information about NRM issues in sustainable education programs. Building these ‘communication corridors’, has been crucial for capacity building across the Wet Tropics and Queensland education communities.

Why go local?

The use of local examples to provide context for general pedagogy has been shown to improve environmental education outcomes and student performances across other disciplines. In their examination of connections between childhood involvement with the natural environment and adult environmentalism, Wells and Lekies (2006) contend that children who participated in ‘wild’ nature activities such as hiking or camping were more likely as adults to not only express positive attitudes to their environment, but also actively engage in pro-environment behaviours. Factors that decreased or did not contribute to behavioural changes included participation with more ‘domestic’ activities such as harvesting vegetables or planting, and time spent in nature with others (e.g. parents, teachers, siblings).

The authors speculated that the reduction in positive behavioural changes may be due to a lack of spontaneity involved in these factors. When local (rather than exotic or remote) examples are used in the classroom, children have a much greater likelihood of encountering these outside the classroom, when they are more likely to experience greater independent and informal interaction with the material. Ham (2007b) notes that if we wish to influence attitudes about a place or concept (e.g. biodiversity), we must first influence the beliefs a person holds about that same thing. This is where the provision of relevant and timely information to children about our natural world can begin to make an impact on their attitudes later in life. Richard Louv (2008), author of *Last Child in the Woods*, notes a growing body of research indicating that direct exposure to nature is essential for healthy childhood development and for the physical and emotional health of children and adults.

As the regional body for NRM, our education program is strongly focused on facilitating the exchange of local knowledge. People with a sound understanding of local issues have a much greater likelihood of and capacity for responsible stewardship of natural resources.

“...interpreters who make compelling presentations of strongly **relevant** themes stand the greatest chance of having enduring impacts on their audiences.” – Sam H. Ham (2007a) (our emphasis)

Stewart (2006) argues passionately for the embedding of the curriculum of environmental education in local environmental issues, basing the pedagogy on an appreciation of local biodiversity. He cites the inability of the general public to name more than a handful of local species (trees, birds, mammals, insects or any other life form) as an indication of gaps in Australian environmental education. He suggests that a fundamental principle of “first know your surroundings” underpins values of care for people and nature. This is supported by other authors including the work of Lindemann-Matthies (2005) who found that the more ‘wild’ (common local) plants and animals the children noticed, the more they appreciated these species. She noted that both teachers and students enjoyed the ‘nature on the way to school’ program which provided students with direct experience in the local environment (Lindemann-Matthies, 2006). Mike Weillbacher (1993) noted that without a relationship with local organisms in their local environment, people might not notice what happens to them, bemoaning the decline of ‘outdoors’ experiences and studies of individual species with the move towards education about big-picture issues.

In developing a teaching unit about education for sustainability for pre-service teachers, Kennelly and Taylor (2007) acknowledge that whilst factual knowledge in education for sustainability (EFS) is important, they were more concerned with the processes of learning than with the acquisition of factual information. The authors note that during the course of a 30-40 year career, teachers would have to cope with ever changing information about the environment. Our program of supporting teachers at the school level with locally relevant regional expertise complements this approach.

Whilst involving local community sources of information provides many benefits to educators, it is important that the scientific integrity of knowledge gained is maintained. Within Terrain NRM, Education Resource Officers (ERO's) have access to current best practices through the partnerships that regional NRM bodies have with scientific institutions such as CSIRO.

There is a need for environmental education initiatives to be designed more strategically. Learning programs designed for targeted audiences relating to the ways in which they contribute or could potentially contribute to specific environmental problems is crucial. Though numerous environmental issues today are commonly shared across nations (climate change being of particular concern), mobilising participation, knowledge and empowerment for individuals to act to address environmental problems is easiest through local concerns.

“Formal and non-formal EE must respond by organizing themselves to reach these strategic audiences, both in time and space, with carefully developed messages tailored to the interests, tendencies and preferences of each audience and targeted at the specific problematic behaviours in question. It represents a change from viewing and practicing EE as more or less a voice piece for "loving and respecting nature," to viewing and practicing EE as a more systematic and planned persuasive communication program (Ham, 1997).”

Designing programs in which behaviours can be identified, connections easily accessible and tangible results allows for greater interaction. This requires a demonstration of relevance to the individual. Using local examples provides this link. Climate change, national resource management issues are all remote to children and they need to see the relevance to their current lives, and in addition, the relevance of any local actions they take to the bigger picture.

Environmental education is enhanced by the integration of NRM regional initiatives across Australia. Planning for regional management is supported by a rich, evidence-based, body of literature which supports the ideas of why local? Local councils play a pivotal role in providing environmental management and services to their communities as they are able to provide connections. Local government is to be recognised as a key participant in NRM, especially on account of its close connections to the community, community needs and concerns and opportunity for community participation. School populations represent a significant sector of the community. Recognising the education community and the valuable role they play in our local communities' capacity building around environmental issues is significant.

Harvard naturalist Edward O. Wilson observations support the idea that nature teaches children how to learn if understood within their local context. Wilson coined the term "biophilia", defining it as "an innate tendency - an instinct if you wish - to affiliate with nature, to observe it, to live near it, to understand it, to have it within reach" (Wilson, 2005). Integrating environmental education programs that incorporate our 'innate tendencies' can only strengthen our connections between classrooms and community.

As a regional NRM body, Terrain has invested strategically in engaging and supporting educators in the region to provide relevant and accurate information to their students via existing community resources.

The Terrain NRM Education Program

The involvement of Terrain focuses primarily on providing a communication corridor between community NRM resources and educators, mainly school teachers. The intent of our programs is to build capacity for teachers to implement and maintain a sustained NRM education program.

Like the ecosystems we strive to sustain, our resources are finite. There are only three part-time Education Resource Officers (EROs) to cover the Wet Tropics region, and we therefore seek to optimize our outcomes via sustainable delivery mechanisms. Our primary focus so far has been professional development workshops for educators (largely teachers, although we recognise that other members of the school and general community may share this role). In this way, we hope to reach more students through a multiplier effect than we would by working directly with classes. Interestingly, this appears to be an unexpected approach, as our EROs frequently receive requests from teachers to speak directly to the students.

In 2007, the Terrain Education team developed and delivered five professional development workshops around the themes biodiversity and sustainable agriculture. Usually, there were about 20 participants, one third of whom were 'Community in the Classroom' (CinC) representatives ('expert' speakers), and the remaining two-thirds were primary and high school teachers. The CinC representatives spoke for ten minutes each, with a focus on how they could assist teachers with classroom programs or information. Participants received relevant local material, often combined in one manual, and were invited to provide comprehensive feedback on their experience, expectations and requirements.

The workshops were evaluated using a simple feedback form to find out what expectations the participants had of the workshop; whether these expectations were met; how useful the following were: each section of the workshop, meeting the CinC representatives, handouts; participant opinions about the format and timing of the workshop, and how the workshop could be improved. These data were either quantitative, qualitative or both where appropriate. Monitoring our success is difficult: so far, our assessments of attitudinal and short-term behavioural changes are largely based on these anecdotal responses.

Workshop satisfaction

Such workshops, whilst intense experiences for all involved, were overwhelmingly rated positively by those who attended, the ratings of all participants indicating that we met or exceeded their stated expectations in all cases.

“It is good to be able to access information from professionals who are keen to help as we are all aware that teaching children and helping make them aware of their environments and how to sustain a healthy environment.” – Participant, *Sustainable Agriculture in the Wet Tropics Workshop*, Innisfail 12 September 2007.

“Another excellent workshop with a focus on hard data, current practices and educational idea – other groups could learn from your excellent format and informative speakers” – Participant, *Sustainable Agriculture in the Wet Tropics Workshop*, Innisfail 12 September 2007.

The workshops were by necessity kept short to minimize non-contact time for staff; this is not necessarily a bad thing and the non-interactive format, whilst of concern to us as facilitators, was universally supported in feedback:

“I appreciate getting a large amount of information efficiently and am happy to sit, I don’t need interactivity” – Participant, *Sustainable Agriculture in the Wet Tropics Workshop*, Innisfail 12 September 2007

Highlighting suitable educational resources

Recognising that familiarity with local flora and fauna is the first step in appreciating the importance of our biodiversity asset, Terrain has promoted the development of local biodiversity resources. Seldom do existing resources highlight readily identified or accessible examples and features of flora or fauna at the catchment level. As a result, it is not uncommon for children to learn about South American or African animals before they have studied Australian animals, in spite of the fact that the Wet Tropics is considered an international biodiversity hotspot! Similarly, some early primary students studied the endangered pandas for Threatened Species Day, without realising there are actually fewer cassowaries (a local icon) left in the wild than pandas in China. Though this paper is not aimed at implying any support or opposition to Australia’s debate on a national school-based curriculum, the risk of such to environmental educators is the loss of immediate and practical application between classroom and “outside” application to instil lifetime practices.

Regional Bodies are ideally placed to access a combination of the knowledge of both the scientific community and the local landcare/catchment groups to fill this void. A manual and online identification guide to ‘desirable locals’ (local native plant species that are common and readily identifiable) has been produced (www.desirablelocals.com.au) for one of the catchments in the region.

One of the benefits of raising awareness of local flora in this way is the increased popularity of local native plant species in school gardens. Such plantings, which may take the form of frog, butterfly, bird or bushfood gardens not only have positive

impacts on local biodiversity and weed management, but also provide teachers with a readily available resource from which to conduct future lessons, regardless of the paucity of the physical environment in or around the school. Again, educational resources that are linked to these very specific local species are required.

Participants at the workshops continually confirmed that resources in hardcopy were appreciated because they could be easily shared and discussed:

“Able to pass on to other interested parties”...“I showed this [‘Desirable Locals’ workbook] to a friend and she was fascinated by info (e.g. nectaries, etc.)” – Participant, *Disturbed by Larry Workshop*, Innisfail 19 March 2007.

“Workbook is handy in getting other teachers interested.” – Participant, *Sustainable Agriculture in the Wet Tropics Workshop*, Innisfail 12 September 2007

It is not, however, the intention of our Education Program to produce resources. There is no shortage of excellent resources available, although the mere logistics of sifting through the bounty is daunting enough to deter some educators from engaging with the material. The role of the ERO’s is to assist in this process and provide a stepping stone to an appropriate level of support for the needs of educators locally. For example, the Wet Tropics Management Authority produced a freely available CDROM ‘Rainforest Explorer’ (also available online at http://www.wettropics.gov.au/st/rainforest_explorer/index.htm) (WTMA, 2006); this brings together a wealth of educational material relevant to the Wet Tropics and linked to the current Queensland school curriculum. This particular resource is heavily promoted since it provides a comprehensive single point of entry for local educators.

When community resources are used to supplement curriculum materials, quality control is important. As the facilitator of the CinC resources, regional NRM bodies must ensure that teachers are provided with expert assistance that emphasises and expands on the scientific principles in the information being relayed. For example, a presentation on organic farming can lead to discussions about pesticide chemistry, biodiversity, soil chemistry and structure, botany, weeds etc. Simply listening to one person describe their practices is of little value if it is not contextualized or related to bigger issues. Our workshops try to provide teachers with a balanced range of CinC contacts as well as background information that is linked to curriculum activities.

A scientific approach to NRM education also ensures that issues are discussed, as much as possible, impartially. Due to the systems nature of NRM, involving complex social and environmental connections, it is necessary to understand and minimize the tendency to see various components of the system as ‘good’ or ‘bad’, e.g. planting gardens to encourage ‘beautiful’ butterflies is a popular activity in schools that is at odds with the disdain experienced, usually by adults, at the discovery of ‘ugly’ caterpillars! Similarly, labelling certain plant species as ‘weeds’ runs into difficulty when they turn out to be part of the local native biodiversity. In this case, simply discussing factual information, such as whether or not a plant ‘belongs’ to a particular ecosystem, and acknowledging our own resource management requirements (e.g. this species is necessary for agriculture, or to

temporarily rehabilitate a degraded ecosystem), allows students to take a holistic and scientific approach to complex problem solving. The regional bodies, by the very nature of their partnerships, have access to information based on input from the general and scientific communities.

Encouraging a broader perspective

NRM necessarily does not solely revolve around traditional environmental concerns but also encompasses social and economic issues. ERO's also distribute information and conduct workshops on sustainable agriculture. The same rationale applies to the inclusion of local knowledge in agricultural education as with environmental themes. Whilst agriculture is obviously an important component of the Wet Tropics community, it is no less necessary to communities in more urban settings and is readily demonstrated through popular teaching tools such as vegetable gardens and farm visits. Again, the important principle is ensuring the information is locally relevant, whether the community is urban or rural.

In the Wet Tropics, for example, in spite of the dominance of the sugarcane and banana industries to the local economy, these are not routinely included in agricultural lessons by teachers, who defer to the traditionally more familiar chicken and cattle farming systems. Resource material in the manual accompanying the workshop, *Sustainable Agriculture in the Wet Tropics*, contained locally-sourced information regarding the sugar and banana industries, including the botany of the plants and historical information. On a more general level, workshop participants were directed to Agaware modules (Anonymous, 2006-2008), developed by the Agaware Group in consultation the Queensland Studies Authority, which provide excellent links to curriculum-based activities about sustainable agriculture.

Students who experience well-structured workshops accessing sound scientific information via community experts demonstrate their ability to understand and relay complex ecological issues.

“We are not putting the frogs in the frog ponds ourselves because they could spread a virus and we would like to attract frogs instead of taking them out of their natural habitat” – Student, *Planting Demonstration Afternoon, Mourilyan State School Innisfail* 23 November 2007

In a couple of other schools, students expressed concern about conflicting messages received where revegetation plantings have been done, but months later they were asked by teachers not involved in the usual classroom programs to remove ‘weeds’. These were in fact local native plants regenerating naturally under the resultant developing canopy; the students knew this but were unable to convince their teachers to change their directives to remove the plants. Whilst these inconsistencies are currently problematic, a systemic approach to embedding sustainable, locally relevant NRM education in the curriculum will address these concerns in time. Students themselves consistently demonstrate an ability to understand such apparent contradictions when armed with sound background knowledge.

Community benefits

Successful NRM education using local emphasis in schools has many flow-on effects to the general community, which meets one of the primary goals of the regional NRM body. Almost surreptitiously, the knowledge gained by educators has more than one application:

“I found them [resources provided] useful not only as a teacher, but as a parent as well. Great education resources are available!” – Participant, *Disturbed by Larry Workshop*, Innisfail 19 March 2007.

“I have planted many of the ‘desirables’ in our school garden. Teaching students about native/local fauna.” – Participant, commenting six months after attending the *Disturbed by Larry Workshop*.

“Sustainable agriculture practices are important but agricultural education is an important general area of study, the end result is not necessarily agriculturalists” – Participant, *Sustainable Environments Workshop*, Atherton 3 November 2007.

“I’ve been doing more ‘eco friendly’ lessons and some of the kids have even encouraged their grandparents to buy Macarangas and Bleeding Hearts from the nursery as a result of them.” – email from Supply Teacher, Babinda 31 May 2007.

Conclusion

Our preliminary work with educators suggests that many are receptive and enthusiastic about incorporating local content into their classrooms. Early anecdotal feedback from educators attending professional development workshops highlighting appropriate local educational resources indicates that such workshops are a useful and efficient delivery mechanism. In their evaluations, participants said they appreciated the opportunity to develop their knowledge of natural resource issues and many were then able to use this knowledge to inform their lesson plans. There were also indications that these local learnings were filtering out to the wider community. A key benefit of the workshops from Terrain’s perspective was the opportunity to provide educators with a contextual basis for more generic information regarding environmental sustainability, as well as ensuring the scientific integrity of material presented at the workshops.

Regional bodies such as Terrain are well-placed to provide this professional development if they have sufficient opportunity and the capacity to do so. In the spirit of systems research, we believe that our role in facilitating improved community knowledge of the complex human and ecological systems that constitute NRM requires a constant cycle of thinking, acting and learning together with educators and NRM stakeholders. As we progress towards more efficient and targeted methods of delivery, we need to ensure local NRM issues are a priority for our communities and future land managers, whilst refining monitoring and evaluation tools that capture the elusive and subtle changes we hope to make.

References

- Anonymous. (2006-2008, 21 June 2007). Agaware Learning Modules. Retrieved 11 August, 2008, from <http://www.staq.qld.edu.au/item.asp?pid=1153>
- FNQNRM Ltd, & Rainforest CRC. (2004). *Sustaining the Wet Tropics: A Regional Plan for Natural Resource Management 2004-2008*.
- Ham, S. H. (1997). Environmental education as strategic communication: a paradigm for the twenty-first century. *Trends*, 34(4), 4-6.
- Ham, S. H. (2007a). *Can Interpretation Really Make a Difference? Answers to Four Questions from Cognitive and Behavioural Psychology*. Paper presented at the Interpreting World Heritage Conference.
- Ham, S. H. (2007b). From interpretation to protection: Is there a theoretical basis? *Journal of the Association for Heritage Interpretation*, 12(3), 20-23.
- Kennelly, J., & Taylor, N. (2007). Education for sustainability for the K-6 curriculum: a unit of work for pre-service primary teachers in NSW. *Australian Journal of Environmental Education*, 23, 3-12.
- Lindemann-Matthies, P. (2005). 'Loveable' mammals and 'lifeless' plants: how children's interest in common local organisms can be enhanced through observation of nature. *International Journal of Science Education*, 27(6), 655-677.
- Lindemann-Matthies, P. (2006). Investigating nature on the way to school: responses to an educational programme by teachers and their pupils. *International Journal of Science Education*, 28(8), 895-918.
- Louv, R. (2008). *Last Child in The Woods: Saving our Children from Nature Deficit Disorder* (2nd ed.): Algonquin Books.
- Stewart, A. (2006). Seeing the trees and the forest: attending to Australian natural history as if it mattered. *Australian Journal of Environmental Education*, 22(2), 85-97.
- Weilbacher, M. (1993). The renaissance of the naturalist. *The Journal of Environmental Education*, 25, 4-7.
- Wells, N. M., & Lekies, K. S. (2006). Nature and the life course: pathways from childhood nature experiences to adult environmentalism. *Children, Youth and Environments*, 16(1), 1-24.
- Wilson, E. O. (2005). Biophilia and the conservation ethic. In D. J. Penn & I. Mysterud (Eds.), *Evolutionary perspectives on environmental problems* (pp. 364). Somerset, NJ: Aldine Transaction.
- WTMA. (2006). Rainforest Explorer CDROM. Cairns: WTMA.

The importance of place in environmental education

Rebecca Miles

As many in the field of environmental education would appreciate, “to know anything about the world is to know its places” (Gruenewald, 2006, p. 4). David Sobel (1996) suggests that, in teaching about environmental education, using local places to teach about environmental concepts, such as ecosystems or a catchment area, provides students with a context for what they are learning. Cameron (2008, p. 303) further argues that “by implication, education, environmental sustainability and intercultural dialogue should not just take place into account, but they should be deeply grounded in place”. As well as providing an opportunity for environmental education to become more participative, and encourage intercultural dialogue and community action, education that is grounded in places encourages students to look critically at their places, both natural and constructed, and consider the interconnections that occur within and through these places. Further, allowing students to investigate the influence of social, political and economical decisions on natural places incorporates the socially-critical and political action goals of environmental education. This paper aims to give an overview of place-conscious education and its place in environmental education, in particular suggesting that environmental education has a central role to play in promoting a place ethic.

Overview of environmental education

To become educated as humans means that we must learn how to engage with others to consider questions of how to live on this planet, how to live just and sustainable lives without destroying the immensely diverse systems that makes life possible (Martusewicz & Edmundson, 2005, p. 71).

The international discourse of environmental education is, comparatively speaking, a young field within a wider educational discipline. However, in only several decades it is a discourse that has evolved from a discipline ‘on the outskirts’, into a field that is all-encompassing and increasingly gaining mainstream momentum. The 1970s saw an increase in social concern about the environment which led to calls for education to be part of the solution. Through a series of conferences and workshops (Stockholm 1972, Belgrade 1975, Tbilisi 1977, Rio de Janeiro 1992, Johannesburg 2002) and the establishment of international environmental programs (United Nations Environment Program 1972, International Environmental Education Program 1975) and reports (Brundtland Report 1987; Agenda 21 1992; UNESCO 2002¹) the development of environmental education has been promoted as “one of the most critical elements of an all-out attack on the world’s environmental crisis” (UNESCO-UNEP, 1976, p. 2).

Despite growing public interest in environmental issues, there are many concerns and critiques of the environmental education field that need to be addressed. Issues such as the institutionalisation of environmental education, the domination of marginalising colonial and western discourses in environmental education, the silencing of many sectors of the global society, particularly those in developing nations and the emphasis on a western rationalist, ‘scientific’ and instrumentalist view of education are just some of the criticisms of the field (Fien, 1993; Gough, 1997; Greenall Gough, 1993a, 1993b; Gruenewald, 2003a, 2004, 2008; Stevenson, 1987, 2007). However, education grounded in the local places that children belong to and know is one way of addressing

some of these concerns and critiques. Place-based, or place-conscious, education with a focus on one's own place in relation to other places provides a significant opportunity for environmental education to meet criticisms of marginalisation and enable educators to represent non-western and diverse views of education, science and knowing, environment, and place. Fostering strong connection and attachment to local places, as well as understanding the interrelation between one place and another, is an instrumental element to transforming environmental education into an integrating context across the curriculum and the community. Furthermore, by using learning experiences that are grounded in place, students are given contextualised opportunities to explore the ecological, social and political dimensions of environmental education.

Within education, the importance of recognising the role of people as place makers suggests that schools could take a “more active role ... in the study, care and creation of places” (Gruenewald, 2003b, p. 627). Moreover, in environmental education, by taking a more active role in the ‘study, care and creation’ of places, students and teachers can begin to reflect on how “places, and our ideas about them, became what they are”, as well as allowing students to take a part in the process of shaping what their places will become (Gruenewald, 2003b, p. 627).

The following section highlights the importance of place, and place-conscious education, to the future of effective and meaningful environmental education. Following this is a brief example of two primary schools that are using their school grounds as places of environmental learning

Place-conscious (environmental) education

To know anything about the world is to know its places (Gruenewald, 2006, p. 4).

Place-conscious education is education that is “grounded in the resources, issues, and values of the local community and focuses on using the local community as an integrating context for learning at all levels” (Powers, 2004, p. 17). A committed proponent and developer of place-based education programmes in the USA, the Rural School and Community Trust define place-based learning as:

learning that is rooted in what is local – the unique history, environment, culture, economy, literature, and art of a particular place. The community provides the context for learning, student work focuses on community needs and interests, and community members serve as resources and partners in teaching and learning. Place-based educators have discovered that this local focus has the power to engage students academically, pairing real world relevance with intellectual rigour, while promoting genuine citizenship and preparing people to respect and live well in any community they choose (Rural School and Community Trust, 2003)

The purpose for becoming conscious of places in education is to “extend our notions of pedagogy and accountability outward, toward places”, making learning more relevant to “the lived experiences of students and teachers ... so that places matter to educators, students and citizens in tangible ways” (Gruenewald, 2003b, p. 620). Although place-based education is often used interchangeably with a number of terms – community-based learning, rural education, project-based learning, service-learning, sustainability education – it encompasses a broad hope by educators to:

‘tear down’ school walls so that the community becomes integral to all facets of student learning – that is, that the school is open and inviting to the community and the community welcomes student learning occurring in many dimensions (Powers, 2004, p. 18).

Place-conscious education is used to refer to the “philosophical orientation that embraces place as a construct fundamental to the purpose, process and structure of schooling” (Gruenewald, 2005, p. 263). Experience in place shapes our culture and identity, and our experiences of place, particularly socially constructed spaces (i.e. schools, highways, suburban streets), are in turn mediated by our culture. As Gruenewald (Gruenewald, 2003b, p. 625) contends, “we live our lives in places and our relationship to them colours who we are”. These socially constructed spaces are often perceived as a “natural part of our social landscape” that we take for granted, failing to see how they are cultural products. In doing this:

we accept their existence as non-controversial or inevitable, like the falling of rain or the fact of the sunrise ... when we accept the existence of (social/cultural) places as unproblematic... we also become complicit in the political processes, however problematic, that stewarded these places into being and that continue to legitimize them” (Gruenewald, 2003b, pp. 626-627).

Although often used interchangeably with place-based education, the latter in fact being more commonly used, place-consciousness is preferred here over the term place-based education, as place-based education has connotations of being *about* the locality, whilst place-consciousness suggests both consciousness of one’s immediate place as well as “an awareness of other places beyond one’s own local environment” (Gruenewald, 2005, p. 263) which fosters an understanding of the interrelatedness between places. An example of place-conscious curriculum that provokes an awareness of the interrelatedness between places (see also Gruenewald, 2005) would be a study of the flora and fauna within a local nature reserve that targets both the indigenous plants and wildlife as well as an investigation into the various plants and wildlife that have come from other places, the reasons they have come to be in that place, and the impact they have on that place, such as the introduction of Laughing Kookaburras to Western Australia and Tasmania, or European songbirds to Australia more generally.

As Powers (2004, p. 18) argues, education that is conscious of and uses place(s) allows students to “see the relevance of what they are learning and therefore become more engaged in the learning process”. Additionally, evaluations of place-based education programs have shown “strong promise for improving student learning and community engagement ... students who are engaged in real-world learning are more likely to succeed than are those who learn equivalent material from more abstract textbooks” (Powers, 2004, p. 18).

Within education, the importance of recognising the role of people as place-makers suggests that schools could take a “more active role ... in the study, care and creation of places” (Gruenewald, 2003b, p. 627). Moreover, through taking a more active role in the “study, care and creation” of places, students and teachers can begin to reflect on how “places, and our ideas about them, became what they are” as well as allowing students to take a part in the process of shaping what their places will become (Gruenewald, 2003b, p. 627).

Environmental education promoting a place-ethic

Within environmental education, place-conscious education focuses on both the social and ecological environments wherein learning occurs. David Sobel (1996) suggests that in teaching about environmental education concepts, using local places, such as ecosystems or the watershed, provides students with a context for what they are learning. On the other hand, learning about the ecosystems of a rainforest for students living in semi-arid plains, for example, does not provide students with a reference point nor allow the local place to become the 'classroom'.

In a move away from the predominantly science-based and behaviour-changing emphasis of much environmental education, Sobel (1996) argues that simply teaching children about environmental problems and issues will not make these children grow up to be adults who have environmentally responsible behaviours. In fact, by emphasising environmental problems we may well be doing the opposite and are "cutting [children] off from their roots" (Sobel, 1996, p. 1). By focussing on global problems rather than local places, Sobel (1996, p. 2) asks "what really happens when we lay the weight of the world's environmental problems on eight and nine year olds already haunted with too many concerns and not enough real contact with nature?". This is further supported by Arenas (1999, p. 2), who argues that without a pedagogy of place "children cannot comprehend, even less feel a sense of commitment towards, issues and problems in distant places until they have a well-grounded knowledge of their own place". Sobel (1996, p. 10) maintains that "what is important is that children have an opportunity to bond with the natural world, to learn to love it and feel comfortable in it, before being asked to heal its wounds". If (environmental) educators develop a sense of place in children that fosters attachment and bonding with the natural world, and is grounded in the resources and context of the community, then these children will not only develop a sense of the place that they are in, they will also (hopefully) develop care and concern for other places as well. There are several studies into 'significant life experiences' (SLE) that show experiences in nature, along with the encouragement and sharing of knowledge with a mentor, as having significant impacts on that child's future environmental ethic, attitude and behaviour (Chawla, 1998; Huby & Bradshaw, 2006).

John Cameron (2003, p. 99) promotes 'place responsiveness' as holding a "creative tension between deep experience and critical awareness" in an ethic of place, claiming that education has a central role to play in promoting this place ethic. Suggesting that a place-responsive society "is one whose institutions and customs nurture and support a rich, deep connection with place and places", he argues that mainstream Australian society does not at present do this (Cameron, 2003, p. 13; see also Plumwood 1999). In discussing an ethical place education, Cameron (2003) considers the importance of depth of experience in place, combined with critical awareness in developing place-responsiveness. He also highlights the significance of engaging indigenous knowledge and coming into a relationship with the "fact of prior Aboriginal inhabitation and intimate knowledge of every part of the country" (Cameron, 2003, p. 106). Cameron (2008, p. 303) argues that "by implication, education, environmental sustainability and intercultural dialogue should not just take place into account, but they should be deeply grounded in place". The importance of being deeply grounded in place should also apply to the field of environmental education. A critical awareness of place allows students to investigate the influence of social, political and economical decisions on

natural places, incorporating Stevenson's (2007, p. 139) "socially critical and political action goals of environmental education".

Similarly, a 'critical pedagogy of place' is the amalgamation of place-conscious education and critical pedagogy (Gruenewald, 2003a). Where place-conscious education emphasises educating within a local and ecological context, critical pedagogy emphasises identifying and challenging oppressions of race, class, and gender (to this, proponents of eco-justice and socio-ecological justice would also add oppressions occurring in nature; see also Bowers, 1995; Furman & Gruenewald, 2004; Gruenewald, 2003a; Jucker, 2004). Merging place-conscious education and socially-critical education, a critical pedagogy of place "focuses attention on analysing how economic and political decisions impact particular places" (Gruenewald, 2003a, p. 3). In a critical pedagogy of place, David Gruenewald (2003a) contends that students need to be educated to the *decolonisation* and *reinhabitation* of places. 'Decolonisation' involves an understanding of the patterns of domination and discrimination that have benefited some while exploiting others. It looks at how places, both human-centred and more-than human, have been "diminished or thwarted" by such domination and discrimination (Gruenewald & Smith, 2008, p. 346). 'Reinhabitation', on the other hand, involves the "restoration of relationships to other people and the land characterised by affiliation and responsibility" (Gruenewald & Smith, 2008, p. 347; see also Gruenewald, 2003a).

Whilst place-conscious education is becoming a growing educational movement, Gruenewald (2003b, p. 621) warns that within the current educational discourse, "where place-conscious traditions continue, they will be under constant pressure to prove their worth by conventional measures in national, state, and local systems of education that remain disengaged from and unaccountable to the connections between people, education, and places". Smith (2007, p. 190) suggests that place-based education, "although rooted in environmental education", differs from conventional environmental education "by the attention its practitioners direct toward both social and natural environments" by grounding "at least part of student learning in the local".

A focus on place in environmental education, particularly pedagogies that engage in critical as well as ecological and social inquiry about the environment, is one such way to address the criticisms of environmental education noted above. Place pedagogy which merges experience with the critical awareness of a place and its history, is an important way of engaging learners with non-western discourses through a focus on indigenous place knowledge and alternative ways of knowing and being in place (Cameron, 2003; Gruenewald, 2003b; Hay, 2002; Payne, 2006).

The use of school grounds for place-making provides valuable opportunities for schools and teachers to situate environmental learning in place, making use of resources readily available and easily accessible. However, in a criticism of some uses of environmental learning spaces in school grounds, Malone and Tranter (2003) point out that all too often these spaces are heavily regulated, with student interaction within them only allowed during structured classroom activities, being designated out-of-bounds at all other times. The importance of unstructured environmental play in fostering care and concern for places is well documented (see, for example, Louv, 2008; Malone & Tranter, 2003; Sobel, 1996)

Far from being a push for curriculum reform in education and environmental education, place-conscious education is a means in which to develop and address issues of “human responsiveness and adaptability to the local and global dilemmas that now demand our attention, intelligence and energy” (Gruenewald & Smith, 2008, p. 345). Much in the field of environmental education allows for the possibility and potential of education that is grounded in place. A focus on local places can work as an integrating context for environmental education to become imbedded across the school curriculum. Community and environmental focuses in school curriculum can provide scope for teachers to engage with local places on a deeper level, allowing for critical discussion of the interrelatedness of places, humans and the more-than human world. Similarly, a place-conscious curriculum enables values education, cultural diversity, intercultural dialogue and community participation to be integrated throughout the curriculum. As Cameron (2008, p. 303) argues “by implication, education, environmental sustainability and intercultural dialogue should not just take place into account, but they should be deeply grounded in place”. Likewise, as well as providing an opportunity for environmental education to become more participative as a result, an ethical place education encourages intercultural dialogue and community action, some of the key goals of environmental education (see UNESCO-UNEP, 1978).

The following section outlines two examples of environmental education grounded in place, in particular the use of school grounds as an integrating context for environmental education, community and regeneration.

School grounds as an integrating context for environmental education grounded in place

Originally a degraded and disused stock reserve next to the local schoolⁱⁱ, ‘Gindaany Springs Public School’ⁱⁱⁱ, ‘Willaroo’^{iv} is now a part-time Environmental Education Centre (EEC) and public reserve in South-East Australia. Through the co-creating of place by the school and community, Willaroo EEC and nature reserve is an example of a “revitalizing of the commons” (Bowers, 2005). With a population of around 150, Gindaany Springs has become a place of biodiversity, regeneration and environmental education, fostering both ecological and rural-regional sustainability (see Green & Reid, 2004).

The experiences of students in Willaroo EEC has been used by the school to “tear down the school walls [fences]” (Powers, 2004, p. 17), giving students contextualised opportunities for environmental learning. In turn, this place is also used as a centre for environmental learning for visiting schools, with up to 3000 students visiting the centre each year. With an emphasis on ‘getting their hands dirty’, the curriculum and pedagogy at Gindaany Springs Public School emphasise the priority of place-based environmental education. As Daniel, the Principal at Gindaany Springs Public School, states:

we’ve got this unwritten rule here that the kids have got another subject they do that’s not really in the [Board of Studies] curriculum... I feel [environmental education] has just got to be a part of their everyday life that they’re doing.

The students at Gindaany Springs Public School, whilst also being taught set outcomes from the NSW Board of Studies syllabus’, partake in weekly gardening classes (image

1), and use Willaroo as a classroom resource for integrated learning experiences in Math, English, HSIE, Science, Creative Arts, and Personal Development, Health and Physical Education learning areas. Additionally, within the schoolgrounds, students have unstructured and informal access to outdoors areas, such as the bird garden, orchard and vegetable garden, and an extensive treed area where they spend much recess and lunch time, in the cooler months, building cubbies.

The community and the school have worked together to (co)create Willaroo. The students have been given valuable access to the expertise of community members, and in turn have taken part in the planning, propagating, planting, digging and maintenance of Willaroo. School principal, Daniel, has been an integral part in accessing funding and recognition for the centre. In turn, Willaroo has become an educational resource base, providing community environment groups with a place for members to showcase the vegetation that should be planted locally to increase biodiversity as well as space for a seed-bank of indigenous plant species fast disappearing from surrounding bush remnants. Furthermore, the educative potential of Willaroo as a place for environmental learning is seen through its use by community and regional groups for functions, professional development days, and as a training centre.

Image 1: Gardening Class at Gindaany PS



Image 2: Mountain-Top PS bin receptacle



In another example, Mountain-Top Primary School, located in North Eastern Victoria, has used its school grounds as an integrating context for environmental education. The school community has utilised a number of environmental education programs such as *Learnsapes*, *Waste Wise* and *Special Forever*, with a strong emphasis on visual arts in the school grounds. Through these programs, each class takes care of a place within the school grounds. These places include herb gardens, a mandala vegetable garden, an indigenous sculpture garden, and a chook yard, with classes working in their place in the school grounds at least once, often twice, a week. Using the school grounds in this way works to create a sense of place in students, encouraging them to take ownership and care, and to generate respect for their part of the grounds.

Similarly, the use of student artworks in the school grounds builds on the aesthetic dimension of place, creating bright colourful places in otherwise dark and unsightly places, such as the bin receptacle (image 2) and the bus shelter. Furthermore, these artworks feature native Australian birds, such as Cockatoos, Kookaburras, Swan's, Galahs, Willy-Wagtails and even a Wedge Tailed Eagle (complete with half-eaten prey), and so also work as an educative tool for the wider school and community

through providing images of, and pride in, the native birds commonly occurring in and around the Mountain-Top area.

Both of these examples show how school grounds and local areas can act, not only as a resource for learning, but as an integrating context for environmental education to become embedded in the curriculum. As Power's (2004) definition of place-based education shows, these schools have become both a resource for the local community, as well as use the local community as a resource. With an emphasis on environmental education as a priority curriculum area in these schools, the teachers and students are engaging with local places and developing a sense of care and concern for these places. Furthermore, as well as the formal learning experiences occurring in their places, these schools encourage free and imaginary outside play amongst their students, with students from both schools keenly spending lunch and recess time building cubbies and creating elaborate fantasy worlds and games.

Conclusion: grounding environmental education in place

Place matters in environmental education. Grounding educational experiences in places not only provides a context for student's environmental learning, it offers opportunities for students to investigate the influence of social, political and economical decisions on natural places and also incorporate the socially-critical and political action goals of environmental education. Education that is conscious of place allows for engagement with an alternative/indigenous ecological gaze. Similarly, conceiving of place using an ecological gaze encourages a social and ecological justice perspective. The study and care of one's own place, while also considering the interrelatedness between one's place and another, fosters care and concern for other places. Furthermore a focus on place allows students to develop a care and concern for the place(s) they interact with, including positive actions they can take in regenerating that place. By providing opportunities for environmental education to become more participative, and to encourage intercultural dialogue and community action, education that is explicitly grounded in places encourages students to look critically at their places, both natural and constructed, and to consider the interconnections that occur within and through these places. The place of 'place', with its opportunity for cross-curricular integration, active participation and community interaction, should, therefore, be integral to effective environmental education.

References

- Arenas, A. (1999). If we all go global, what happens to the local? In defense of a pedagogy of place. Paper presented at the Annual Meeting of the Comparative and International Education Society. Retrieved [3 May, 2006] from <http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=ED434796&site=ehost-live>
- Bowers, C. A. (1995). *Education for an Ecologically Sustainable Culture: rethinking moral education, creativity, intelligence and other modern orthodoxies*. New York: State University of New York Press.
- Bowers, C. A. (2006). *Revitalizing the Commons: Cultural and Educational Sites of Resistance and Affirmation*. Oxford, UK: Rowman & Littlefield Publishers, Inc.
- Cameron, J. I. (2003). Educating for Place Responsiveness: An Australian Perspective on Ethical Practice. *Ethics, Place and Environment*, 6(2), 99-115.

- Cameron, J. I. (2008). Learning country: a case study of Australian Place-Responsive Education. In D. A. Gruenewald & G. A. Smith (Eds.), *Place-based education in the global age: local diversity* (pp. 283-308). New York: Lawrence Erlbaum Associates.
- Chawla, L. (1998). Significant life experiences revisited: A review of research. *Journal of Environmental Education*, 29(3), 11-22.
- Fien, J. (1993). *Education for the environment: critical curriculum theorising and environmental education*. Geelong, Vic: Deakin University: distributed by Deakin University Press.
- Furman, G. C., & Gruenewald, D. A. (2004). Expanding the Landscape of Social Justice: A Critical Ecological Analysis. *Educational Administration Quarterly*, 40(1), 49-78.
- Gough, A. (1997). *Education and the environment: policy, trends and the problems of marginalisation*. Melbourne: Australian Council for Educational Research.
- Green, B., & Reid, J.-A. (2004). Teacher education for rural-regional sustainability: changing agendas, challenging futures, chasing chimeras? *Asia-Pacific Journal of Teacher Education*, 32(3), 254-273.
- Greenall Gough, A. (1993a). *Founders in environmental education*. Geelong, Vic: Deakin University.
- Greenall Gough, A. (1993b). Universalized discourses: in whose interests in teacher education? Paper presented at the Annual Conference of the Australian Association for Research in Education.
- Gruenewald, D. (2003a). The Best of Both Worlds: A Critical Pedagogy of Place. *Educational Researcher*, 32(4), 3-12.
- Gruenewald, D. (2003b). Foundations of Place: A Multidisciplinary framework for Place-Conscious Education. *American Education research journal*, 40(3), 619-654.
- Gruenewald, D. (2004). A Foucauldian Analysis of Environmental Education: Toward the Socioecological Challenge of the Earth Charter. *Curriculum Inquiry*, 34(1), 71-107.
- Gruenewald, D. (2005). Accountability and Collaboration: Institutional Barriers and Strategic Pathways for Place-based Education. *Ethics, Place & Environment*, 8(3), 261-283.
- Gruenewald, D. (2006, April 7-11). Why Place Matters: The everyday context everywhere of experience, culture, and education. Paper presented at the Annual conference of the Association of Educational Research in America San Francisco.
- Gruenewald, D. (2008). Place-based education: grounding culturally responsive teaching in geographical diversity. In D. Gruenewald & G. A. Smith (Eds.), *Place-based education in the global age: local diversity* (pp. 137-154). New York: Lawrence Erlbaum Associates.
- Gruenewald, D. & Smith, G. A. (2008). *Place-based education in the global age: local diversity*. New York: Lawrence Erlbaum Associates.
- Hay, P. R. (2002). *Main Currents in Western Environmental Thought*. Sydney: UNSW Press.
- Huby, M., & Bradshaw, J. (2006). *A review of the environmental dimension of children and young people's well being: Report prepared for the Sustainable Development Commission*. York: University of York
- Jucker, R. (2004). Have the Cake and Eat It: Ecojustice Versus Development? Is it Possible to Reconcile Social and Economic Equity, Ecological Sustainability, and Human Development? Some Implications for Ecojustice Education. *Educational Studies*, 36(1), 10-26.

- Louv, R. (2008). *Last Child in the Woods: Saving Our Children from Nature-Deficit Disorder*. Chapel Hill, NC: Algonquin.
- Malone, Karen and Paul Tranter. "Children's Environmental Learning and the Use, Design and Management of Schoolgrounds." *Children, Youth and Environments* 13(2), 2003. Retrieved [22 July, 2006] from <http://colorado.edu/journals/cye>
- Martusewicz, R., & Edmundson, J. (2005). Social Foundations as Pedagogies of Responsibility and Eco-Ethical Commitment. In H. B. Dan (Ed.), *Teaching social foundations of Education: context, theories and issues* (pp. 71-91). Mahwah, New Jersey: Lawrence Erlbaum Associates.
- Payne, P. (2006). Environmental Education and Curriculum Theory. *Journal of Environmental Education*, 37(2), 25-35.
- Plumwood, V. (1999). Inequality, Ecojustice and Ecological Rationality. *Ecotheology: Journal of Religion, Nature & the Environment*, 5(5/6), 185.
- Powers, A. L. (2004). An Evaluation of Four Place-Based Education Programs. *Journal of Environmental Education*, 35(4), 17-32.
- Rural School and Community Trust. (2003). Place-based Education Learning Portfolio. Retrieved 28 September, 2007, from <http://www.ruraledu.org/rtpportfolio/index.htm>
- Smith, G. A. (2007). Place-based education: breaking through the constraining regularities of public school. *Environmental Education Research*, 13(2), 189-207.
- Sobel, D. (1996). *Beyond Ecophobia: Reclaiming the heart in Nature Education*. Great Barrington, MA: The Orion Society.
- Stevenson, R. B. (1987). Schooling and environmental education: contradictions in purpose and practice. In I. Robottom (Ed.), *Environmental Education: Practice and Possibility*. Geelong, Victoria: Deakin University Press.
- Stevenson, R. B. (2007). Schooling and environmental education: contradictions in purpose and practice. *Environmental Education Research*, 13(2), 139-153.
- UNESCO-UNEP. (1976). The Belgrade Charter. *Connect*, 1(1), 1-9.
- UNESCO-UNEP. (1978). The Tbilisi Declaration. *Connect*, 3(1), 1-8.

Acknowledgement: I would like to acknowledge the feedback from reviewers on a previous draft of this paper. Additionally, I would like to thank my supervisor, Professor Bill Green, for his feedback and editing on a previous draft of this paper.

ⁱAn overview and links to key environmental education documents can be found at http://portal.unesco.org/education/en/ev.php-URL_ID=16706&URL_DO=DO_TOPIC&URL_SECTION=201 Further information about these conferences, reports and documents can be found online.

ⁱⁱ All names of people and places have been changed for confidentiality. However, all efforts have been made to retain the name-identity of the place, within the confines of confidentiality, through its pseudonym.

ⁱⁱⁱ Gindaany means "Sugar glider" in the Wiradjuri language, the language group of the traditional Indigenous Australian owners of the land. Sugar gliders are small gliding possums that were previously common in the area. The community at 'Gindaany Springs' have been involved in an effort to conserve habitats for Sugar Gliders at the Willaroo EEC.

^{iv} Willaroo means "Bush-Stone Curlew" in the local Wiradjuri Language, a ground-dwelling native bird that was previously common to the area but is now endangered.

Action competence in New Zealand schools: Improving the capacity for understanding student learning in EFS

Faye Wilson-Hill, Barry Law, Chris Eames

This paper will present the development of an analytical framework for understanding and identifying action competence as a key component of education for sustainability (EFS) in New Zealand schools. A framework has been developed and trialled as part of a two year project currently underway. This project has created partnerships between experienced researchers and practitioners in EFS in New Zealand involving members of the national EFS team, teachers and students in five NZ schools. The framework for analysing action competence, and some of the interim findings about its validity and how schools might utilise it will be shared. The timing of this research has also taken the opportunity to consider aspects of action competence in relation to the recently introduced new curriculum in New Zealand Schools. The development of the framework has been critiqued by the architects of action competence (Jensen and Schnack, 1997) and we look forward to further feedback on it.

Background

This research responds to a previous project that investigated teachers' pedagogical approaches to developing student's action competence (Eames, C., Law, B., Barker, M. et. al, 2006)ⁱ. This project combines a number of recommendations from that research to investigate whole school approaches to Education for Sustainability (EFS) and the relationship to student learning. Student learning in EFS for this project has been linked to the concept of action competence (Jensen 2004, Jensen and Schnack 1997) and it is this component of the research question that this paper deals with. A second part of the research is the development of a whole school framework which has been discussed in a previous paper by Dr Chris Eames from the University of Waikato, the project director.

The format of this research has been a cooperative venture with four New Zealand Universities who employ school advisors in Education for Sustainability and teachers from five schoolsⁱⁱ. The partnerships for this research are between the lead University (Waikato) coordinating the research project, three research mentors, four advisors and five teachers and their schools. Each of the schools is committed to a whole school approach to sustainability through the Enviroschools programmeⁱⁱⁱ.

The research is funded through the Teaching and Learning Research Initiative (TLRI) which is administered by the New Zealand Council for Educational Research^{iv}. A joint research programme of this nature across New Zealand while logistically challenging at times, has provided benefits in establishing an EFS research culture that has a national perspective. Each school has identified a teacher researcher who is working with an EFS school advisor as the main researcher with the aim of producing a case study based on two sets of data, one from mid 2007 the other mid 2008. The project is due to conclude at the end of 2008, with a cross-school analysis of the five individual school case studies. The research mentors support the in-school research teams, advise on framework design and jointly write the cross-school case study for the final report.

Research design

The research question for the project is to examine the relationship between whole school approaches to education for sustainability and student learning. The research aims are to:

- build on previous work in action competence by designing a valid and reliable framework for investigating the development of action competence in students, teachers and their schools.
- understand the practice of whole school approaches to EfS in NZ schools and the impact on the school community.
- understand the relationship between a whole school approach to EfS and student learning.

The project has been informed by a literature review into whole school approaches for sustainability, student learning in EFS and action competence. As the project has developed the literature has been re-consulted and reviewed in light of our findings and research process. As the research team consists of members from across the country there are whole team meetings on a less regular basis and smaller networking clusters in the south and north island as required. Whole team meetings have been used to plan the research process and begin thinking on the two frameworks. More recently the findings from the first data gathering were brought together, analysed and discussed then the next steps for the project were formulated. Regional teams carry out the basis of the work on either the action competence or whole school framework, using the whole team meetings for consultation and feedback to inform next steps.

Data was gathered in the schools using interviews (individual and focus group from a range of students, staff members and community members), observation (in and around the school) and document analysis. This data was analysed by the teacher researcher and school advisor, completing a standard template across the five schools ready for cross-school analysis. At a whole team meeting this information was analysed and discussed, and the findings used to reform the focus of the second data gathering later this year. A final meeting will bring together the findings from each school, before a final report is written at the end of 2008.

EFS within the New Zealand curriculum

Education for sustainability is a non-mandatory component of the New Zealand Curriculum (NZC). At the time of writing the research proposal the NZC was being re-written with a stated aim of responding to the changing nature of society and the “challenges of our time (Ministry of Education 2007, p.4)”. The final document while in its intent can be framed to perfectly fit the pedagogy and approaches advocated for in successful EFS, there is no requirement for schools to engage with the issues of sustainability as they present to us as *challenges of our time*. However, the shifting focus for learning as a process rather than just a product is best recognised in what is commonly becoming known as the ‘front end’ of the NZC where the vision, principles, values and key competencies for learning in New Zealand schools are outlined.

The introduction of key competencies within the revised NZC was a bold move away from a curriculum solely focused on student achievement of prescribed knowledge, to a more holistic view of the learner where an accumulation of a range of processes including knowledge, attitudes, skills and values combine to develop “capabilities for living and life-long learning (Ministry of Education 2007, p.12)”. In an earlier consultation paper these competencies were defined as:

... the ability to successfully meet complex demands in a particular context through the mobilisation of knowledge, cognitive skills but also practical skills, as well as social and behaviour components such as attitudes, emotions, and values and motivations (Rychen 2003, p.3 in Rutherford 2004)

It was this emphasis of a process of learning in the new curriculum that interested the research team with its focus on better understanding the dynamics of a competency also, albeit one that had not made it to the NZC^v. Therefore, as part of our process we endeavoured to connect the student learning process in action competence to the key competencies described in the revised NZC.

These competencies include: thinking, using language, symbols and texts, managing self, relating to others and participating and contributing. Within the descriptors in the curriculum document, phrases were being used that resonated incredibly well for us in our thinking and what we were exploring with action competence. For example within the competence of *thinking* the curriculum encourages teachers to use process that “can be applied to...developing understanding, making decisions, shaping actions, or constructing knowledge (Ministry of Education 2007, p.12)”. Such statements converge well with the literature on action competence where knowledge is formed from a range of perspectives, to inform choices and decisions for taking action (Jensen 2004, Jensen and Schnack 1997, Breiting and Mogensen 1999 and Uzzell 1999). In our minds the two types of competencies were inextricably linked. Part of our challenge within the research would be to make the EFS aspects clear but not present them as additional or completely new as we suspected this would switch off many teachers. Therefore, within the development of the action competence framework there needed to be an obvious and easily recognisable link to the NZC through the key competencies.

The action competence framework version one

The previous study into teachers pedagogical choices for the development of student action competence provided some initial thinking as to what aspects of action competence could be recognised in a learner. These components included knowledge and understanding, planning and taking action, participation, emotional response, critical thinking and reflection. The project team for this research project discussed and debated these components, using the practical experience of the teachers, advisors and the available literature further reframing how action competence might be described within the NZ setting. The resulting framework used to create the initial research instruments included: vision for the future, knowledge (about the environment), experience (what you do, feel and how you react), reflection, connectedness, actions (direct and indirect), managing self, participating and contributing, thinking; using languages, symbols and texts; and relating to others.

A further dynamic in our understanding of action competence was also emphasised in the new framework showing a balance between action and cognition. Highlighted, was the consideration that too much emphasis on developing cognitive aspects could result in *in-action*, as the learner can become overwhelmed at the enormity of the issues and their global implications. Dr Miles Barker, one of the research mentors was able to sum this up with the phrase *swell-headed inertia*. At the other extreme, action that is implemented without first understanding and making links to the causes of the issue may be akin to *un-informed action* or *empty-headed freneticism* (Barker, 2007).

A ‘balance scale’ model was developed to bring together action competence within a New Zealand setting and link it to the NZC. The cognitive and action aspects were visually represented on the arms of the scale while the central post or leverage point was formed by the component of connectedness. In order for genuine action to occur, connections between the two arms of action and cognition and the processes outlined on the stem of the scale needs to occur. Therefore, students can only develop the action and cognitive aspects through multi-disciplinary learning across the areas of the NZC, the key competencies and the components of action competence in EFS namely, visions, knowledge, experience and so on, as shown in *Figure 1*.

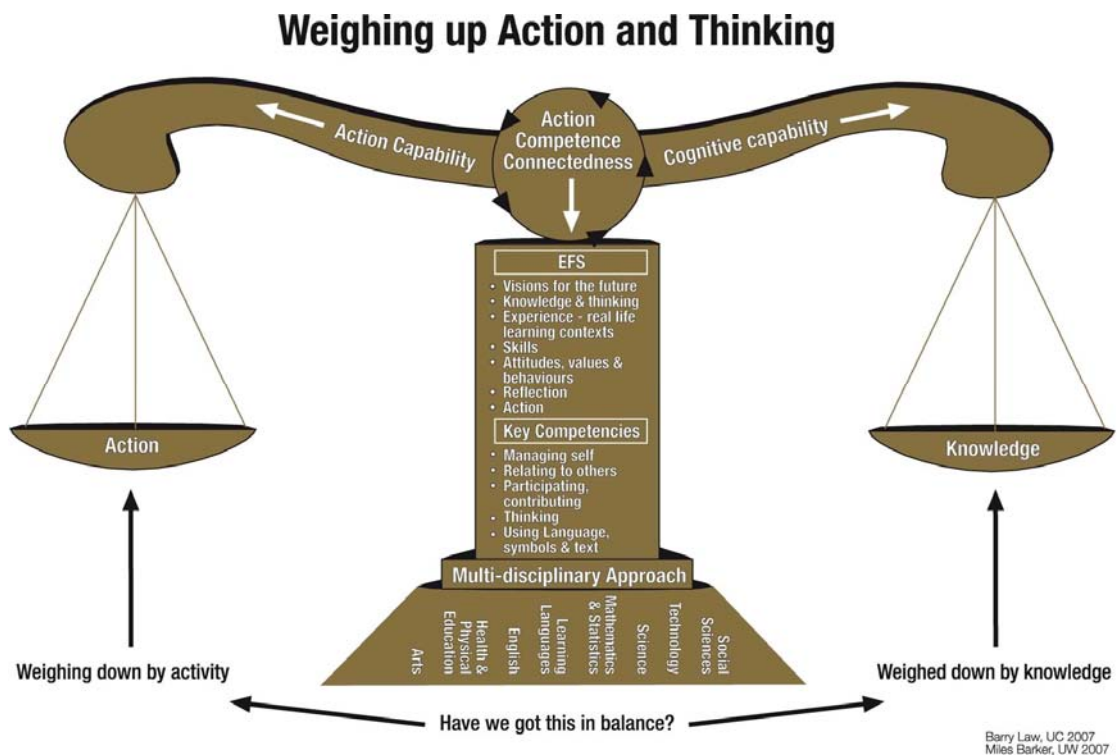


Figure 1 Weighing up action and thinking

This model and framework for action competence is currently under review as a result of the analysis and findings of the first set of data.

Findings

The findings here refer to possible links to student learning via the action competence framework. Each school and their researcher advisor collated their data under the action competence components and these were then submitted to a whole team meeting where cross-school analysis took place.

The resulting findings were varied and wide ranging from school to school giving rise to the conclusion that the framework required further refinement. There was little definitive and conclusive data that could be linked specifically to student learning in EFS and the research teams found that constant revision and reframing of research questions was required in order to elicit information during the data gathering. Often the teacher and or the advisor were aware of certain information and practices through the school which were not being raised through the use of the framework. Another key issue was the lack of student voice around some of the data.

The one setting within the data gathering that resulted in better information was student focus group interviews around a project that they had implemented. The students talked with greater conviction, excitement and clarity about what they had done. However, even within these settings the questions from the framework did not elucidate ideas about students learning processes and understandings to the degree expected. This has led to further refinements of the data gathering process and framework described below.

A further issue revealed in the data was the varied interpretation research teams had taken for each of the components on the framework. This led to some inconsistencies making analysis difficult. It was clear that this aspect of the research required some further refinement.

The action competence framework version two

A key requirement of the revised framework was the inclusion of a description that reflected a shared understanding of each component and within each component the role of the student and teacher to develop action competence was articulated. Possible sources of evidence were also included to prompt researchers if required. For example if asking how students might have developed a vision for the future around their project, a further prompt might be to ask “Can you show me any plans or drawings that you did?”. Therefore, the reworked framework is a matrix as shown in *Figure 2*.

	AC component	Learner	Teacher	Possible evidence	
How we think feel and act Connectedness and coherence	<ul style="list-style-type: none"> • vision for the future, • knowledge (about the environment • experience (what you do, feel and how you react) 	A learner who has...	A teacher who supports students to ...		Developing competencies within the NZC and EFS (action competence)

	<ul style="list-style-type: none"> • reflection • connectedness • actions (direct and indirect) 			
--	--	--	--	--

Figure 2 The Action Competence Framework within a New Zealand setting

The other major re-working of this framework was the integrating strand of think, feel and act, connectedness and coherence. This seemed to better resolve a constant debate over the component of connectedness within the framework. For some this component was about a sense of belonging and connectedness to the environment (an emotional response), for others it was the connections that need to be made across learning areas, and or between the components in the framework, including the relationship between action and cognition, while for others it was more akin to the notion of the key competencies as an “accumulation of a range of processes (Ministry of Education 2007, p.12).” The integrating strand therefore, was to include the idea of connecting or linking learning and processes across the already determined aspects of action and cognition, but also the recognition of emotional engagement as part of this process. The more personal and perhaps spiritual notion of connectedness to the environment was to be encapsulated in the separate component within the framework as connectedness.

Finally, there was much discussion about the key competencies from the New Zealand Curriculum. While the components of visions, knowledge, experience, connectedness, action, and reflection could be described specifically with aspects pertaining to EFS, the descriptors for the key competencies were very generic and largely expectations of any teaching process. Therefore, our discussion focused on the place and purpose of the key competencies within the framework. From this discussion it was recognised that our assumption that action competence would be developed through the components on the framework could apply also to the development of the key competencies from the NZC. It seems incongruous that students would not be learning to *relate to others* as they sort differing opinions and points of view about an issue, or *using language, symbols and texts* to read ideas, interpret information, that if they were making decisions about action and implementing it, then they must be *participating and contributing* and above all they had to be part of *thinking* process for action competence to be realised. Therefore, it was concluded that both action competence and the key competencies were being developed throughout the process.

This framework also has a visual representation that is a work in progress. It utilises a more circular approach where all the components work towards the centre which is the development of action competence and the key competencies. But it also captures some of the wider notions of action competence such as decision-making, democracy, commitment and engagement that are not specifically highlighted in the components of our framework but are none the less important elements to be considered as part of developing action competence (see Jensen 2004, Jensen and Schnack 1997, Breiting and Mogensen 1999, Uzzell 1999). This visual aims to portray the moving and interacting nature between all the parts of the process, whereas the ‘balance scale’ seemed to segregate these parts.

Final data gathering

The matrix is the key tool at this stage that will be used to form the research instruments for the second set of data gathering. It is envisaged that the visual model might be further informed by the research findings into a tool that can be used in schools to support teachers growth and understanding of the action competence dynamic in their classes. At present we are focused on forming a research process that will further our understanding of how action competence develops with students and the kinds of learning that takes place through EFS.

Acknowledgements

Funding for this work was provided by the Teaching and Learning Initiative of New Zealand through the National Council for Educational Research, for which we are very grateful.

References

- Barker, M (2007) personal communication, Wellington, New Zealand.
- Breiting, S., & Mogensen, F. (1999). Action competence and environmental education. *Cambridge Journal of Education*, 29(3), 349-353.
- Eames, C., Law, B., Barker, M., Iles, H., McKenzie, J., Williams, P., et al. (2006). *Investigating teachers' pedagogical approaches in environmental education that promote students' action competence*. New Zealand. (Wellington): New Zealand Council of Educational Research.
- Jensen, B.B., (2004). Environmental and health education viewed from an action-oriented perspective: a case from Denmark. *Journal of Curriculum Studies* 34(4), 405-425.
- Jensen, B. B., & Schnack, K. (1997). The action competence approach in environmental education. *Environmental Education Research*, 3(2), 163-179.
- Ministry of Education. (2007). *The New Zealand Curriculum*. New Zealand (Wellington): Learning Media.
- Rychen, S. (2003) in Rutherford, J. 2004 “Key Competencies in the New Zealand Curriculum: A snapshot for consultation”. www.cmponline.tki.org.nz accessed March 2005
- Uzzell, D. (1999) Education for environmental action in the community: new roles and relationships, *Cambridge Journal of Education*, 29(3), 397-413

ⁱ For more information about this research see www.tlri.org.nz

ⁱⁱ This includes three primary schools, students from age 5 to 13, and two secondary schools, students from age 13 to 17 or 18.

ⁱⁱⁱ For more information about the Enviroschools programme see www.enviroschools.org.nz

^{iv} See www.nzcer.org.nz

^v Not without due comment and submissions from a range of interested parties from across the EfS community in NZ. See <http://nzcurriculum.tki.org.nz/> for responses to the curriculum which was part of the consultation process.

Indigenous environmental principles and resource management systems in Sub-Saharan Africa

Santosh C. Saha

Sub-Saharan landscapes -- tropical forests, savannah grasslands, and desert -- are experiencing a wide range of human-induced ecological bio-degradation. The legitimate backlash against the failure of modern environmental policies that mostly rely on government and NGO backed top-down commandist initiative and people's disaffection with westernization in ecological management and the perceived loss of national sovereignty generated a debate, currently less scrutinized, about the indigenous resource management. Assuming a non-romantic view of the Sub-Saharan indigenous rural people's principles and practices in conservation, I argue that various traditional practices, though not essentially environmentally friendly, are inspired by controversial moral economy that contributes to the efficient resource-management.

KEY WORDS: Sub-Saharan, environment, indigenous, rural, postmodern, resource management.

Introduction

Sub-Saharan (66 percent of the people south of the Sahara live in rural areas) indigenous people, including the pastoralists and forest dwellers, are those whose attachment to particular lifestyles and sociopolitical standing in relation to other dominant groups have resulted in their substantial socio-economic marginalization. Lifestyles of the pastoralists, rural masses, and hunter-gatherers, who are mostly illiterate and poor, fall outside the dominant paradigm of production, and as such, are largely ignored by states' environmental policies. Although there is hardly any uniform indigenous ecological practices, but an in-depth study reveals some coherent principles and ethics in resource management. This paper questions the full relevance of Francis Bacon's ideology of science with its distinct utilitarianism rooted in the Hermetic conception of man as a manipulator commanding the power of environment.

Existing literature

First, much of the Western perception of African agricultural and environmental management is based on accounts of "developers" and government administrators, agencies that stand for globalization of scientific techniques, ignoring that agricultural development is as much about social "meanings as about materials" (Arnold, 1996; Guha 1989). The existing literature aims at the unified destiny of man in the model of Western civilization which claims that there exists a unique legitimate centre.

Second, the current literature is virtually unmindful of the advantages of some indigenous means. For instance, in central Tanzania, government agricultural and other land use planners and policy makers in the HADO (Dodoma Region Soil Conservation Project) project in Condo Orange Hills area have assumed that the area has been socially homogenous and thus, they have ignored the existing conditions in

“problem” definitions, rival perceptions and above all, plurality of interests in land use and cultivation. The result has been political agitation, “irresponsible” burning of regenerating vegetation, and “illegal” grazing in the enclosed areas. The planners usually have blamed the cattle owners and their “propensities” to overstock because a reductionist (non-dialectical forms of natural and social sciences) theory generally educated the policy makers but failed to provide them with an understanding of the multiple causalities that were characteristic of the soil erosion problem.

Third, the Western environmental ideology ignores that humans can value the non-human world intrinsically, quite apart from its usefulness to humans. In most cases in Kenya, local subsistence hunting came to be erroneously termed as “poaching”, thereby setting in motion social and political processes of gradual removal of indigenous decision-making institutions through westernized state wildlife conservation policies and programs (Callicott, 1996; Callicott, 2001; Akama, 1998; Palmer, 2003).

Last, deforestation leads to both a loss and a change in the ecosystem. In contrast to the existing view that wooded Savannas, including the Ivory Coast, are becoming deserts, some ecologists validly claim that the landscape is becoming more wooded (Leach & Means, 1996; Bassett & Zueli, 2000; Anderson & Grove, 1987). South Africa, as a whole, is almost certainly more treed now than it has been for centuries, because of the widespread planting of exotic species in many different locales (Beinart, 2003; Beinart, 2003). Farmers increasingly cultivate fodder crops such as Lucerne and clover to find a crop capable of withstanding drought (Lance, 2003).

Over a period of the last sixty years, the agro-pastoralists Akamba people in Machakos District in Kenya prevented land degradation to improve sustainability of their livelihood system. Their attempts were consistent with the indigenous management that adapted to modern technical change. A high-density population in dry land can be sustained through a combination of exogenous practices and local initiatives. Thus, inspired by their own needs, the energetic and innovative Akamba people in East Africa adopted a range of land conservation practices on farmland in which field terracing was the most prominent (Mortimore, 1998; Tiffen & Mortimore & Gichuki, 1994). A study demonstrates that in two generations a five-fold increase in population has been accompanied by better management of the land and a substantial reduction in degradation (Arnold, 1996; Guha, 1989).

A specific case in deforestation is illustrative. At independence in 1961, forests covered 60 percent of Sierra Leone; at present this area has been reduced to 6 percent and the export of log for both state and private revenues continues. Deforestation has resulted in widespread erosion of former farmland, and consequently, deforested land has become swampy breeding grounds for deadly mosquitoes. The effect has been massive migration to urban centres, mostly to new slums where water supply and sewers are not separable (Cobb, 2003).

Africa's environmental ethics and principles

Naturalist John Kirk wrote in a paper in 1865, based on “native information”, claiming that the Makalu people in East Africa possessed a thorough knowledge of the pastures. Reporting on the tsetse cattle disease in Tanganyika, Bishop Spreader wrote in 1908, “The *Wakens* often know more about these things (like pastures and herbs) than we highly educated Europeans” (Larson, 1978). The 1888 edition of *Encyclopaedia Britannica* testified that the “civilized” world’s knowledge of the tsetse flies was very limited at that time but the “African contribution to the knowledge” was good. John Ford, an agronomist, reported that a massive bush-clearing and wildlife preservation were schemed in 1861 by Mila, a chief of Northern Mozambique. Apparently, on his advice, the resettlement scheme in northern Mozambique was organized by colonial authorities there (*Encyclopaedia Britannia* 1998: 55).

Referring to rural Africans’ helpful knowledge about certain plants and trees, another investigating report tells us that the Chagga of Tanzania, a mixture of ethnic groups settled in the area of Kilimanjaro mountain are “experts in combining many types of plants” requiring different amounts of light and having roots of varying depths. *Iambi*, a special form of land use, incorporate patches of forests where useful species remain standing; other parts of the forests are replaced by cultivated species. The Chagga, who have earlier incorporated the shade-tolerant coffee bush into their farms, are now successfully growing coffee as a cash crop. Interestingly, they cultivate sixty types of trees on an area, having the size of a football (Callicott, 1996; Callicott, 2001; Akama, 1998; Palmer, 2003). However, it does not imply that production is increasing. In Kenya, for instance, crop production (about 47% of people’s income), despite being the main source of income, is not reliable because of climatic variability and poor market conditions (Leach & Means, 1996; Bassett & Zueli, 2000; Anderson & Grove, 1987). Even in some specialized fields, such as soil erosion, Ethiopian northern subsistence peasants, being aware of erosion that takes away valuable top soil, use “some techniques” to cope with the issue. In the same fashion, peasants in Wollo province use bonding, terracing, contour ridging, hedging, strip cropping and mulching. In the south-western highland, farmers are aware of intensive and highly integrated horticulture, based on a complex mix of annual and perennial crops, including roots and tubers.

Ethiopian mountain women play a major role in planting and harvesting sorghum, coffee, teff, and sesame, because they “have a profound knowledge of the plants, animals and ecological processes” around the high land (Beinart, 2003; Beinart, 2003). Admittedly, complex resource managements are not exceptional in Sub-Saharan Africa. Responding to the choices of their social and physical environments, the Oromo, a traditionally pastoralist people in Southwest Ethiopia, who comprise about 30 percent of the country’s population, have developed complex systems of agriculture and intensive soil, water, vegetation and wildlife management that have survived the vagaries of the environment.

Nine years of ecosystem-level research in northern Kenya presents a view of pastoral ecosystems that are non-equilibrium but persistent, with system dynamics affected more by abiotic than biotic. By keeping a low pressure on land, resources, and high mobility and dispersion of his livestock, an African pastoralist is able to maintain equilibrium and interconnectedness (Niamir, 1995). Many argue that the Maasai are successful in managing land and wildlife, and so there is hardly any need of keeping the Amboselli and Mara Parks in Kenya as Reserves for wildlife. The effectiveness of the parks as a protective measure without the consent of the Maasai is questioned (Howell, 1987).

Agronomist Wilmsen powerfully demonstrates that no strict separation of pastoralists and forgers can be seen, arguing that the idea of “otherness” may not well be applied to the pastoralists (Wilmsen, 1989). Planners may do well in exploring the appropriateness of different development interventions for different ecosystems and design interventions to fit the dynamics of specific target systems (Babikar, 2006; Ellis & Swift, 1988). Local indigenous knowledge is increasingly seen as a reservoir of ideas and perhaps solutions for development work by major donors and NGOs, such as OXFAM, CARE, etc. A group of geographers demonstrated that in the Machakos District (Kenya), healthy relationship and cooperation between local people and modern management for two generations led to five-fold increase in population and “a substantial reduction in degradation”(Lance, 2003). But as yet, there are few examples where Sub-Saharan conservation knowledge has been directly incorporated into development projects (Mortimore, 1998; Tiffen & Mortimore & Gichuki, 1994).

Traditional Africans believe that the entire universe is steadily deteriorating and there exists an existential anxiety that forms part of cosmology. Imbued by this mode, most Farmers in Burkina Faso, the Ivory Coast, and Ethiopia have adopted tree-planting as one of their replenishment means and investment strategies. In Burkina Faso, the area under tree planting has been under steady expansion for decades and as a result there has been no loss in green land cover.

In famine-prone Ethiopia, where the government promotes the notion of farmer-driven deforestation, research shows that individual farmers are planting trees and bushes to meet their own needs, but the market-driven demands create a shortage of fuel and building materials (Songorwa, 1999). Farmers in Burkina Faso, Niger, and Mali improved traditional planting pits, although at a slow rate, to rehabilitate only 0.2ha of land per year. In subsequent years, farmer innovators, development projects, and NGOs in those West African countries made these innovations more widely known. All these build better linkages between various actors and received attention from “mass communication media” (Percival & Homer-Dixon, 1995).

Interestingly, competing values are weighed. In South Africa, trees are seen as a threat to crops if they compete for space, water, labour, or harbour pests (Percival & Homer-Dixon, 1995). However, cropping patterns of trees reveal that households engage in a food-first production strategy, which limits the scope for new tree-plantings. Farmers acutely feel that the land is becoming “narrow” because of the growth of population

which reduces the amount of land available to each farming family. Consequently, hunger remains real, but growing land scarcity has not triggered a downward spiral of tree-cutting, deforestation, soil erosion, and yield losses (Gupta & Ferguson).

Sub-Saharan Belief System and Conservation

In Sub-Saharan Africa, worshiping the land of a village is equivalent to worshiping one's ancestors, a reflection of the postmodernist possibility of indigenous myth and rituals transforming into reality (Cheney, 1990). Thus, in Burkina Faso, the Namwaya people regard livestock as playing a central role in the life of man because they see that positive attitudes toward animals can be a source of "divine blessing", and more strongly so, if the animals are not domesticated. They, therefore, try to create conditions on their farm that allow wild animals to survive and reproduce. During the dry season, they care for wild birds by hanging "calabashes" with water in the trees. As a result, their trees abound with birds during the dry season and they are convinced that they contribute to the natural regeneration of the vegetation by spreading the seeds of various trees and bushes (Taonda, 2001).

Even the bush fires, which are by no means unorganized, have some ecological implications. Despite official prohibition, bush fires in Malawi are common because they serve direct purpose of clearing land for gardening. Obtaining the ashes as fertilizers satisfies the villager's religious needs. As in puberty celebrations, bush fires are regarded as a transition from non-productivity to productivity (Schoffeleers, 1971). Lewis showed that the Australian natives had technical knowledge of fire and used it effectively to improve feeding spaces for animals and to assist in the hunt itself (Cobb, 2003).

The ecological rites of the Ashanti in Ghana are based on the presumption that the trees and animals, as human beings, are endowed with souls surviving after death, and as such people have the religious rites to propitiate the spirits and souls of trees, certain animals, and plants which should be kept safe from the hunters or herbalists. The tree-planting ceremony in Chief Nhema's area in the Zaka District in Zimbabwe always invokes the spirit of the ancestors. Among the Shona, public confessions of guilt about destruction of trees are made by the ritual by the officers on behalf of all the participants. In a sense, the ancestor is the ecological conscience of the living descendants. Likewise, *chimurenga* tree-planting ceremonies in Zimbabwe may be reinterpreted in the context of the green revolution in which cultural, religious, and nationalistic-patriotic motivational forces converge for environmental reform (Daneel, 2001).

These ceremonies are based on the premise that states have the sovereign right to exploit their own resources pursuant to their westernized principles, but state policies need to be qualified by traditional belief system for ecological balance. However, as Sinha and others legitimately argue, "the worship of specific trees" may not imply a general reverence for forests;" more importantly, it should not lead to even broader concept of "reverence for nature" (Sinha, 1997)

Faith in the hidden power of the oracles helps to check imbalances in the environment. A local organizational unit consisting of an acknowledged officialdom controls the oracular activities at several adjacent places. For instance, shrine cults, especially territorial cults in Zambia, have a strong ecological dimension relating to the cultivation, cattle-keeping, fishing, and gathering of food and vegetables. In Zambia and other Central African countries, the ritual focus is on man-made ecological shrines having extensive parts of the landscape including a garden plot and a hunting area. Here the ritual needs are more defined than plotting a hunting area. The basic philosophy underlying the rituals about the ecological hut-like shrine is to detect an area adversely affected by evil spirit and then performs ritual operations, and eventually extends the operations in the wider landscape so that good fortune would return (Schoffeleers, 1999).

Various important deities such as *Ogun* and *Osun* within Yoruba religion are invoked to bring misfortune upon the person unwilling to comply with orders from those in spiritual authority, thereby influencing the behaviour of wrong-doers (Warren & Pinkston). Author Daneel finds that among the Karanga Shona, virtually all large trees (*miti mikurul*) are protected as they belong to the *samarombo*-ancestors who are believed to dwell in tress branches (Daneel, 2001). Here rural peasants' religious dimension is not adequately expressed by the universalistic language of ecological concern, which has secular developmental appeal that obscures a number of variables.

Their beliefs are results of "deliberate instructions" to modify the ecological behaviour of a community's spiritual value systems (Warren, 1995). This patronizingly faithful call – "respect for nature" – is internalized in customary religious beliefs and taboos (MaCay & Acheson, 1987). The Ga of Ghana do not allow fishing on Tuesdays (Parrinder, 1962). Non-Western indigenous people's exhibits of spiritual dependence with respect to nature is symptomatic of their pre-scientific backward-looking concepts, conclude some scholars (Guha, 1998). More relevantly, there is no direct evidence to suggest that indigenous faith has direct stipulation for conservation. Sacredness is the last resort of varied human anxieties. Thus, Nisbert Taringa argues that African religion is more based on fear or respect of ancestral spirits than on respect for nature itself (Taring, 2006).

In Africa, spiritual values contribute to development of social and environmental ethics. At the individual level, a person can seek supernatural means to punish someone else who refuses to comply with orders regarding land utilization from the chiefs. In the Yoruba religious worldview, the land is a divine phenomenon with celestial status and agriculture is a divine occupation originated by a woman known as *Orisa-oko*. It is forbidden to cut certain trees such as *iroko* (African tree), or *ope* (oil palm). In cases of urgent need to cut these trees, appropriate rituals of propitiation must be observed thereby providing a check. During that period, certain sacred forests and trees could not be utilized by the inhabitants. However, it is admitted that the natural resource-use patterns focus on subsistence-level production of food crops only (Warren & Pinkston).

The HSM's soldiers in Uganda regarded the "trees and animals" as partners in political fight, thereby assuming that man and nature work as partners. In other words, in the worldview of the Acholi people, the moral order and the natural world are not separate implying that care of nature is a moral responsibility (Larson, 1978). The sacredness of *neem* tree in Ghana is expressed through community attitudes toward its protection from harm. The Asante of Ghana believe that the Creator, being unsettled by human misdeeds, fled to Heaven leaving the spirits and ancestors in the forest to keep a close eye on the living. This explains the traditional Asante respect for the forest (Niamir, 1995). The land movement of the Mau Mau forest fighters in Kenya during the 1950s and the freedom fighters in Zimbabwe in the late 1970s invoked "nature gods" (trees and plants) for both political liberation and preservation of land. Likewise, Zimbabwe's "African Independent Churches" (AIC) considered the habit of indiscriminately cutting trees as "ecological sin" and punished the deviants by debarring them from participation in the Eucharist, proving an ethic which stipulated that enemy was both inside and outside. Critics, however, are legitimately aware that the African Independent (Christian) Churches expressed a high "ethical code" for their "control system" because an identification of the "wrong-doers" enhanced the chief's political power.

Sub-Saharan Women for Conservation

During the 1990s, a socially powerful section of Tanzanian women invoked the instrument of "curse" to call on "men" to respect some "sacred lands and trees" which must not be brought to cultivation. This "threat of nature's curse" prevented the Barabaig people, 76,000 strong, from wasting water, especially urging that water sources must not be diverted or contaminated (Howell, 1987). The discourse is not about reflections on the implications of the "myth" of female solidarity and economic autonomy, but meaningful engagement with both preservation and conservation. When women's promotional literature declared that in the Gambia, women could "be deemed our most precious and vital resources," the donor agencies merely appreciated the women's work in agro-forestry (Wilmsen, 1989). On the other hand, when women in West Africa are precluded from planting tree crops for themselves that is by the terms on which they are asked to participate in the rural economy as a whole.

In reality, the degree of individual control over tree crops remains across the humid zone in West Africa subject to redefinition by kin, courts and local administrative bodies, because there is frequent conflict over rights in tree crops. Thus, the reflections on the division of work in ecological preservation boil down to the question: How women come to be represented and by whom (Babikar, 2006; Ellis & Swift, 1988)? There are examples of individual quality efforts by rural women in tree-planting in the drought-stricken northern Natal in South Africa. For over five years, a woman farmer called Tsepho Khumbnae planted trees in thirty-one scattered villages, although most trees did not survive due to water shortage - an isolated example testifying to women's conservation work without giving the idea of autonomy.

As Cornwell legitimately argues, a postmodernist emphasis on contextualization and narratives about the means of locating oneself offers an alternative mode of understanding bioregionalism as well as environmentalism. In this case, the notion of context and narrative can be extended not only to general principles but also to the women community in particular. Likewise, Ethiopian mountain women play a major role in planting and harvesting sorghum, coffee, teff, and sesame, because they “have a profound knowledge of the plants, animals and ecological processes around” the high land. As Mohanty and Ong conclude, the analysts’ concern is with the “production” of the developing world’s women “as a singular monolithic subject in Western feminist texts,” wherein an impression is generated to suggest that Western women “are truly” liberated from “patriarchal shackles” (Songorwa, 1999).

Varieties in women’s ecological knowledge need to be recognized. The traditional city state of Ara has a community of forty towns and villages that are located on the Expressway of Ibadan-Osogbo in Nigeria. There men traditionally farmed their land whereas women assisted in planting, weeding and harvesting, but their major role was in the processing of agricultural products and women were known to have good knowledge in processing (Percival & Homer-Dixon, 1995). Similarly, research in Chivi Communal Area in Zimbabwe found that women knew more than men about some crop varieties, and men knew more about local soil classification (Percival & Homer-Dixon, 1995). But the politics of articulating African women’s ecological knowledge and muteness are not well recognized by Sub-Saharan ecofeminists (Gupta & Ferguson, 2001).

Women’s special skill in certain areas in agriculture-related work does not imply that Sub-Saharan women have some mystical knowledge about nature and crops. What is clear is that although women are usually kept out of the decision-making process, their work in farming is being utilized for general conservation practices. Women were not naïve or bystanders in specialized ecological knowledge. In 1985, Meandeolo Ya Wana, Kenya’s largest women’s developmental/environmental network initiated a campaign to construct improved wood-saving cook stoves and some new ones were devised by women. What is clear is that women’s specialized knowledge and work often give them an achieved status. Wangari Mathia’s “The Green Belt Movement” in Kenya, concerned with effects of deforestation and desertification of rural areas, empowered women to plant 10 million trees of various kinds in one thousand “greenbelts,” recognizing women’s “power” in tree planting, a grand project offering a gender relation perspective on environmental relations in policy literature.

The eventual impression was that women’s tree-planting in Kenya linked their conservation work to the concerns of the modernized economic development practitioners. Unlike the Western counterparts, Ethiopian make informal experiments in small low-cost changes in local farming practices by digging infiltration pits in the backyard garden and finding cheaper alternatives, such as using a donkey instead of an ox for cultivation. Although social norms prevent African women from being as forthcoming as men in announcing why and how they make experiment, they obviously assume new power because of their skill in resource utilization.

Noteworthy Areas in Conservation

First, traditional African religious networks (rather than primarily Christian or Muslim ones) play a meaningful role in the management of natural resources. They have a conviction that relationship between the lands they cultivate or farm and people are governed by identifiable spirits whose favour they must seek for the good of the earth that is inhabited by plants and people. The major tree-planting movements in East Africa are political, social, and ecological movements that generate adequate popular consciousness.

Second, indigenous women are involved not only in the labour of forestry activities but also in decision-making and the control of natural resources.

Third, there are myths and traditions attributing quasi-human qualities to the forces of nature that are upheld by many indigenous peoples as a means of achieving sustainable use of environmental resources. Among the Akan people of Ghana there is a belief that the living can only temporarily retain the right to use the fruits of inherited Earth.

Fourth, even bush fire is regulated by the indigenous Africans who resort to bush fire for religious and pragmatic reasons.

Last, ecology in Africa implies a family of living organisms, each dwelling in close proximity to each other, sharing the same physical space with animals as in the Bantu kraal (enclosure).

Conclusion

An examination of the Sub-Saharan ecological knowledge and practices demonstrates: Firstly that the Africans contention does not pit modern against pre-industrial, or provincial against universal; Secondly that over-reliance on Western socio-environmental conservation values has led to increasing alienation of natural resources from Africa's rural peasants and consequently created, to use the words of the subalternists, a "fractured" historical dialogue; Thirdly that the "choice", the Indian social critic Ashis Nandy notes, is not between a traditional technique and a modern technique in development, but between different traditions of technology (Nandy, 1983); Fourthly that the metropolitan intellectuals need to make "non-modern" practices allies, as has already successfully been done in area studies of culture, and Lastly that technical interventions may raise the productivity as well as regulate the interaction between animals and plants, but confining pastoralists, for instance, to grazing blocks or ranches reduce the spatial scale of exploitation and result in disaster during serious droughts.

The fundamental issue is how to incorporate in a significant way Africa's environmental practices. In sum, it is not certain whether indigenous equitable ecological concepts are ideological tools to form political community solidarity.

Which is the motivating force -- moral obligations with members of the community or conservation principles (Nash, 1982; Nash, 1989; Attfield, 1991)? However, it is reassuring that interest in African traditional resource management systems is growing for better utilization of natural resources (Geertz, 1983).

Bibliography

- Akama, J.S. (1998). The evolution of wildlife conservation policies in Kenya. *Journal of Third World Studies* (15), (2), 103.
- Ardener, E. (2001). Belief and the problem of women. In S. Ardener (Ed.), *Perceiving Women*. London: Malaby, 1-18.
- Arnold, D. (1989). *The problem of nature: Environment, culture and European expansion* (London, 1996), 148-153; 182-185.
- Attfield, R (1991). *The Ethics of Environmental Concern*. Athens, OH.
- Babikar, M. (2006). African pastoralism through anthropological eyes: whose crisis? In M. Ntarangwi, D. Mills, & M. Babiker (Eds.), *African Anthropologies: History, Critique and Practice*. London, 184-85.
- Barabaig, C. L.(1990). Natural resource management: sustainable land use under the threat of destruction. Discussion Paper Number 12, (UNRISD: United Nations Research Institute for Social Development).
- Bassett, T.J. & Zueli, K.B. (2000). Environmental discourses and the Ivorian Savanna. *Annals of the Association of American Geography* (90) (1), 69. In D. Anderson, & R. Grove (Eds.), *Conservation in Africa: People, Parks, Priorities* (Cambridge, 1987).
- Beinart, W. (2003). Soil erosion, conservationism and ideas about development: a southern African exploration. *Journal of Southern African Studies* (11), (82), 221.
- Beinart (2003). South African environmental history in the African context. In S. Dovers, R. Edgecombe, & B. Guest (Eds.), *South Africa's environmental history: Cases & compassions*, 221.
- Berkes, F. (1990). *Sacred ecology: Traditional ecological knowledge and resource management* Philadelphia, PA: Taylor and Francis, 158.
- Berry, S. (1989). Social institutions and access to resources. *Africa* (59), (1), 2-10..
- Brookfield, H. & Padoch, C. (1994). Appreciating agrodiversity. *Environment*, 36(5), 11.
- Callicott, Baird (1996). *Earth's Insights*. Berkeley: University of California Press.
- Callicott, Baird (2001). Multicultural environmental ethics. In M. Tucker & J. Grim (Eds.), *Daedalus* 130, 77-78.
- Cheney, J. (1990). Nature and the theorizing of difference. *Contemporary Philosophy* 13(1), 1-14.
- Cobb, Jr. J. B. (2003). Toward a just and sustainable economic order. In A. Light & H. Rolston (Eds.), *Environmental Ethics: An Anthology*. London, 364-69.

- Daneel, M.L. (2001). *African earthkeepers: Wholistic interfaith mission*. New York: Orbis Books, 67-83.
- Dankelman I. & Davidson, J. (1989). *Women and environment in the Third World: Alliance for the future*. London: Earthscan Publications.
- Dei, G.J.S. (1993). Indigenous African knowledge system: local traditions of sustainable forestry. *Singapore Journal of Tropical Geography*, 14(1), 30.
- Ellis, J.E. & Swift, D.M. (1988). Stability of African pastoral ecosystems: alternative paradigms and implications for development. *Journal of Range Management* 41(6) 450, 458.
- Geertz, C. (1983). *Agricultural Revolution: The Process of Ecological Change in Indonesia* (Berkeley: University of California Press, 1963).
- Geoffrey, P. (1962). *Africa: Traditional Religion*. New York.
- Guha, R. (1996). Radical American environmentalism and wilderness preservation: a third world perspective. *Environmental Ethics* (11), 71-83.
- Guha, R. (1998). Radical American environmentalism and wilderness preservation: a third world critique. In B. Callicott et al (Eds.), *The Great New Wilderness Debate*. London, 237.
- Gupta, A. & Ferguson, J. (2001). *Beyond difference*. *Cultural Anthropology*, (9).
- Howell, P. (1987). *Introduction*. In D. Anderson & R. Grove (Eds.), *Conservation in Africa: People, Policies and Practices*. Cambridge, 106-08.
- Jackson, C. (1993). Women/nature or gender/history? A critique of ecofeminist development. *The Journal of Peasant Studies*, 20 (3), 389-414.
- Lance, V.S. (2003). Our irrepressible fellow colonist. In S. Dovers, R. Edgecombe & B. Guest (Eds.), *South Africa's Environmental History: Cases & Compassions*, 156.
- Larson, L.E. (1978). Book Review. *African Affairs* 77(1), 129-130.
- Leach, M. & Means, R. (Eds.), (1996). *The Life of the Land: Challenging Received Wisdom on the African Environment*. Oxford: Oxford University Press, 14.
- Lewis, H.T. (1989). Ecological and technical knowledge of fire: Aborigines versus park managers in northern Australia. *American Anthropologist* (91), 940-62.
- MaCay, B. & Acheson, J. (1987). *The Question of the commons: The culture and ecology of human resources*. Tucson, AZ.
- Mohanty, C. (1991). Cartographies of struggle: third world women and the politics of feminism. In Mohanty et al., (Eds.), *Third World and the Politics of Feminism*. Bloomington, IN: Indiana University Press, 51.
- Mortimore, M. (1998). et al., *Roots in the African Dust: Sustaining the Sub-Saharan Dry Land*. Cambridge, 159-76.
- Mwaniki, N. (1996). Against many odds: the dilemmas of women's self-help groups in Mbere, Kenya. *Africa* 56(2), 212.
- Nandy, Ashis (1983). *The intimate enemy*. Delhi: Oxford University Press.
- Nash, R. (1982). *Wilderness and the American mind*. New Haven.

- Nash, R. (1989). *The Rights of nature: A history of environmental ethics*. (Madison: University of Wisconsin Press, 1989)
- Niamir, M. (1995). Indigenous systems of natural resource management among pastoralists of arid and semi-arid Africa. In M. Warren et al. (Eds.), *The Cultural Dimension of Development: Indigenous Knowledge Systems*. London, 247.
- Niamir-Fuller, M. (1996). The resilience of pastoral herding in Sahelian, Africa. In F. Berkes et al (Eds.), *Linking Social and Ecological Knowledge*, 161.
- Palmer, C. (2003). An overview of environmental ethics. In A. Light & H. Rolston, (Eds.), *Environmental Ethics: An Anthology*. (London), 17.
- Percival, V. & Homer-Dixon, T. (1995). Environmental scarcity and violent conflict: the case of South Africa. *American Association for the Advancement of Science*. Toronto, 11.
- Richards, Paul (1985). *Ecological change and politics of African land use*. *African Studies Review*, 1-39.
- Schoffeleers, J.M. ed. (1999). *Guardians of the land: Essays on Central Africa territorial cults*. Mambo Press, 55-62.
- Schoffeleers, J.M. (1971). The religious significance of bush fires in Malawi. *Cahiers des religions Africaines*, 271-87.
- Sinha, S. (1997). The new traditionalist: discourse of Indian environmentalism. *The Journal of Peasant Studies* 24 (3), 71.
- Songorwa, A.N. (1999). Community-based wildlife management (CWM) in Tanzania: are the communities interested? *World Development*, 27(12), 2061-2079.
- Taonda, J.B. (2001). Namwaya Sawadogo: the ecologist of Touroum, Burkina Faso. In C. Reij and A. Waters-Bayer (Eds.), *Farmer Innovation in Africa: A Source of Inspiration for Agricultural Development*. London, 142.
- Taringa, N. (2006). How environmental is African traditional religion. *Exchange*, 35(2), 191-214.
- Tiffen, M., Mortimore, M. & Gichuki F. (1994). *More People, Less Erosion: Environmental Recovery in Kenya*. Chichester, England.
- Waren, D.M. & Pinkston, J. (2001). Indigenous African resource management of a tropical rainforest ecosystem. In F. Berkes et al. (Eds.), *Linking Social and Ecological Systems*, 168.
- Warren, M. et al. (Eds.) (1995). *The cultural dimension of development: Indigenous knowledge systems*. London, 245.
- Warren, D.M. & Pinkston, J. (1998). Indigenous African resource management of a tropical rainforest ecosystem: a case study of the Yoruba of Ara, Nigeria. F. Berkes et al. (Eds.), *Linking social and ecological systems* (Cambridge: Cambridge University Press), 166-67.
- Wilmsen, E.N. (1989). *Land filled with flies: A political economy of the Kalahari*. Chicago: University of Chicago Press), 270.