

Children's Observations of Place-Based Environmental Education: Projects Worlds apart Highlight Education for Sustainability Inherent in Many Programs

John Rafferty

Charles Sturt University

Shelby Gull Laird

Charles Sturt University

Abstract: This paper explores the observations and perceptions of school children as they engage with nature through place based environmental experiences. The paper reports on two projects, one based in the USA and the other in Australia, designed to promote understanding of sustainability through outdoor interventions. While the interventions share common educational goals the children came from very different places, on many levels. From New York City to regional Australia the children's collective experiences highlight the capacity of outdoor-based interventions to promote understandings of nature. Originating and enacted in different hemispheres, both interventions demonstrate the value of passive outdoor education in developing eco-centric thinking and values.

Keywords: place-based; environmental education; experiential learning; education for sustainability

Dr John Rafferty Lecturer in Science Education based at the School of Education, Charles Sturt University, Albury Wodonga (AW) campus. His teaching is directed toward Science and Technology education (SciTech) and Education for Sustainability Development (EfSD). A substantial body of his research is directed toward institutional reform and increasingly concerning education responses to issues around climate change and sustainability.

Dr. Shelby Gull Laird is currently a Lecturer in Outdoor Recreation and Environmental Education at Charles Sturt University in Albury, NSW, Australia. Prior to this she taught secondary science in North Carolina and worked for many years as an environmental educator helping teachers learn effective methods of teaching outdoors. Dr. Laird's research focuses on the nature-human interface and community environmental education.

Background

This paper reports on a recent research project that followed a group of primary school students for several months as they interacted with *Bugwise for Schools* and also reports on the pilot program of the *What's Good In My Hood?* curriculum resource in order to illustrate the similarity of experience between two very different student groups when experiencing science-based, outdoor education rooted in a sense of place.

Bugwise for Schools participating students were interviewed during and after their participation in the program. *What's Good In My Hood?* participating students development was analysed through their workbooks and letters collected through the pilot program development as well as from pilot summary teacher surveys and letters received from students after the program. Data gathered from the interviews and pilot program analysis provides insights into the impact of science-based interventions to environmental education and raises awareness of science-based, outdoor environmental education as a key tool in promoting pro-environmental behaviour and in understanding and addressing sustainability. Because of the greater curriculum development at the national level for EfS in Australia, the programs will be analysed in the Australian EfS context. Thus, the purpose of this proposed project is to evaluate the EfS effects of science-based, outdoor education intervention programs beyond the stated objectives of the intervention as an outdoor environmental education program and into EfS principles.

Setting the Scene

In line with a generalized cultural/social shift, educational institutions have become increasingly more environmentally aware over the last three decades (Clugston & Calder 1999; Benn, Dunphy & Griffiths, 2006) and international and national policies are urging these institutions to go beyond environmental awareness. Increasingly, the socio-cultural and economic-political dimensions of sustainability are expressed through Education for Sustainability (EfS). EfS is concerned with integrating knowledge, critical thinking, values analysis, skills development and active citizenship (Huckle & Sterling, 1996) as a catalyst for social change. In keeping with the assertions of these publications and paralleling changes within the government and corporate sectors, primary schools, secondary schools and universities have sought to adapt their curricula, policies and processes in accordance with the mores of Education for Sustainability (EfS) as outlined in Australia's National Action Plan for EfS, *Living Sustainably* (DEWHA, 2009).

Within Australia, schools are supported with a wide range of curricula to meet established EfS goals through the *Australian Sustainable Schools Initiative* (DEWHA, 2011). Reflecting the national focus on EfS, each state and territory has an extensive set of policies and activities for schools to engage in. In the United States (US), emphasis remains on connecting environmental knowledge with science curriculum, largely through STEM initiatives. In a speech given by Education Secretary Arne Duncan (2010), he reflects on the past and future role of the US Department of Education in EfS efforts:

Historically, the Department of Education hasn't been doing enough in the sustainability movement. Today, I promise you that we will be a committed partner in the national effort to build a more environmentally literate and responsible society.

Though environmental educators, teachers and non-profit organizations throughout the US, have done much work EfS remains largely absent from national level curriculums and initiatives. A notable exception is the Green Ribbon Schools effort of the US Department of Education, which recognizes schools that meet certain criteria, which includes schools “providing effective environmental and sustainability education, which incorporates STEM, civic skills and green career pathways (USDOE, 2011). Curriculum initiatives are typically made at the local level or through programs developed for specific cities, states or regions, but the emphasis of the importance of education to address environmental issues continues to be pressed at the global level, even with a lack of clear policy action. During the recent US Inauguration, President Obama noted “We will respond to the threat of climate change, knowing that the failure to do so would betray our children and future generations. Some may still deny the overwhelming judgment of science, but none can avoid the devastating impact of raging fires, and crippling drought, and more powerful storms.” (Obama, 2013). Though not explicit, surely we cannot address issues such as climate change without a focus on EfS and a shift towards a more environmentally literate world citizenry.

The draft *Shape of the Australian Curriculum: Science* (ACARA, 2010) includes sustainability as a key cross-curriculum priority or “unifying idea” (p9). Allowing “young people to develop an appreciation of the need for more sustainable patterns of living, to build capacities for thinking, valuing and acting necessary to create a more sustainable future” is a priority (ACARA, 2010, p 10). Similarly, the National Action Plan for EfS, *Living Sustainably* (DEWHA, 2009), outlines seven principles of EfS. These principles relate to the development of an environmental consciousness or awareness and the impact of this on life choices and life opportunities. In relation to the primary school students participating in these projects, this environmental awareness may be thought of as *ecosensitivity*; the students developing, at conscious and subconscious levels, a deep awareness of the living complexity of the biosphere and their own place within it. At its highest level, this should enable the students to develop an understanding of complexity that is ultimately transferable to other systems and other settings. Ecosensitivity should be differentiated from *ecoliteracy*, which relies upon learning and the acquisition of knowledge (Pilgrim, Smith & Pretty, 2007; Kahn, 2010), which may be deep or superficial and which may or may not impact substantially upon actions or behaviour. This paper contests that experiential education or place-based education has a significant role in developing ecosensitivity and should be considered as a critical component of effective EfS programs. Programs such as *Waterwatch* (DSEWPC) and *Bugwise for Schools* (Australian Museum) that schools can use to engage students in science-based, outdoor education activities that promote EfS; however, EfS is not the stated objective of these programs. Similarly, environmental education programs exist in the US, often included only if the teacher has been trained or educated in the program or have a special interest in environmental education or EfS. Sometimes a non-profit organization develops resources for local schools to use, including the example included here of *What's Good in My Hood?* (Price, 2011).

Briefly, EfS is designed to equip all citizens with the knowledge, skills and understanding needed to make decisions with full consideration of environmental, social and economic impacts. Four defined conceptual groupings that would indicate the effectiveness of EfS in the program: 1) Place-Based Education; 2) Ecosensitivity; 3) Balancing the Outdoor Education model; and 4) Futurity.

The term “place-based education” carries broad and complex meanings (Gruenewald, 2003; Knapp, 2008; Gruenewald & Smith, 2008; Nespor, 2008). Resor has observed that “the term is overused and misunderstood” and claimed that these misuses stem primarily from an insufficient attention to the concept of place (Resor, 2010, p185). Drawing upon Gruenewald’s description of place-based education as comprised of ‘natural history’, ‘cultural journalism’ and ‘action research’ (Gruenewald, 2003a), Harrison (2010) identifies three consistent elements in place-based education. These (slightly abbreviated) elements are:

- A series of visits to one locality
- A diverse and increasingly participant-directed experiential approach to understanding the place
- An action research approach where students direct and shape their own learning (Harrison, 2010, p7)

The concept of place is already loaded with connotation but in the context of place-based education it usually refers to the natural environment as: “a bounded area setting independent of human activity” (Nespor, 2008, p478). Stevenson (2011) notes that the construction of meaning emerges as central to the definition of place in most disciplines and cites Relph (1993) to observe that... “a place is above all a territory of meanings... created both by what one receives from and by what one gives to a particular environmental context” (Ellis, 2005, p58: cited in Stevenson, 2011, p47). In settler societies like Australia, the idea of place is also richly layered with indigenous understandings of belonging and potentially fraught with concerns about neocolonial appropriation. This is rendered more problematic by the way that Australian formal education policy still conceives of the environment from “within colonial framings, with Aboriginal and Torres Strait Islander readings of country relegated to an extra-mural postcoloniality” (Whitehouse, 2011, p 57). Furthermore, as Whitehouse argues, the interests and ideologies of formal education are inextricably enmeshed with Eurocentric colonialism and expansionism (Whitehouse, 2011).

In Australia, the concept of “outdoor education” in various guises has always had an “unusually wide acceptance in schools as a distinct curriculum offering” (Brookes, 2002, p 405). Throughout the twentieth century this was predominantly expressed through sport although some privileged schools (usually elite private schools) have always offered extensive outward bound type programs. These too, tended to be constructed around aspirational ideals of physical fitness and sporting achievement (rowing, skiing, horse-riding and sailing). The growth in environmental awareness over the last three decades (Benn, Dunphy & Griffiths, 2006) has had limited impact on the outdoor education curriculum, partly because it has been paralleled by growing concerns about fitness and obesity in children and political pressure on schools to provide options for exercise. The rise in health concerns has also led to the domestication of outdoor education, exemplified in such laudable schemes as the school *Kitchen Garden Program*

(see Stephanie Alexander Kitchen Garden Foundation, 2011). While the environmental aspect of outdoor education has been hijacked by anxieties about diet and fitness, concern has also been voiced about the need to deliver all modes of environmental education in socially just and equitable ways to all learners (Corcoran, 1999; Gough, 2002). While fitness, nutrition and sustainable food production all have a valuable part to play in a holistic education, there is a justifiable concern that an opportunity to respond freely to the natural environment and potentially receive EfS outcomes should not be subsumed in the mix.

Higgins (2010) has noted that although the beneficial tripartite relationship between physical activity, greenspace and health and well-being is well understood, there is now a growing body of evidence establishing a strong correlation between greenspace and health and well-being independent of physical activity (Bird, 2007; Bell et al, 2008; Munoz, 2009; Higgins, 2010). This 'holistic' approach reflects the belief that "effective environmental education for sustainability is not just a curriculum issue; it requires the involvement of the whole school" (Gough & Sharpley, 2005 p.7).

Gough has described our current era as an unsettling time for youth who are increasingly informed about "the death of nature as we know it and the loss of places and forces beyond human influence" (Gough, 2002, p20). In the Australian context there is continued public reference to the dry and fragile natural environment and the immediate social and economic impacts of water restrictions, river system degradation, coastal erosion and salinity. A number of studies have indicated concern about the degree to which environmental knowledge leads children to a negative state of learned hopelessness – a belief that the future is doomed (futuraity) and that nothing they do can change things. However, Smith has argued strongly that students who are provided with opportunities to engage with the environment tend to acquire a sense of their own agency and to believe in their individual and collective capacity to effect change (Smith-Sebasto, 2007). He draws attention to the link between place-based education and empowerment and asserts there are benefits to "making the boundaries between schools and their environs more permeable", giving students a greater sense of their place in their environment (Smith-Sebasto, 2007, p.108). This coheres with other research, which indicates that the current curricular arrangements in schools leave an "action/knowledge gap", suggesting that "the kind of agency encouraged by school and through conventional school learning may be different to the agency required outside school" (Vongas-Macrow, 2007, p20).

At the same time, researchers have begun to explore the presence of a place-based connection to the cultural or biophysical environment or landscape in education and education research (Trigger, 2008; Stevenson, 2011). Researchers have found that outdoor, place-based education is more important for lasting knowledge, attitude and behaviour change than class-based activities (Ballantyne & Packer, 2008) and that repeated visits to an outdoor education site leads to a sense of place and better learning outcomes. Thus, science-based, outdoor education activities have the potential to meet a unique responsibility when it comes to "forging a sustainable way of living in the twenty-first century – of developing principles which might become "the guiding principles of a truly sustainable global civilization" (Flannery, 2008, p63). Ballantyne and Packer (2008) even go as far as to develop what they refer to as an Experience-based Learning pedagogy which includes the principles necessary for growth of environmental attitudes and behaviours beyond that of the classroom experience. Suggested principles in the report by Ballantyne and

Packer include: learning by doing, being in the environment, real life learning, sensory engagement and local context. It is clear that programs based on these principles are increasingly attractive and offer useful resources for schools to engage students in both Science and EfS via outdoor environmental education. However, little is known about the effectiveness of such science-based interventions beyond their immediate popularity with staff and students. As subsequent sections of this paper will explain, the projects reported on here had access to easy and extensive "outdoor environments" (extensive wetlands and a restored park). However, the term "outdoor environments" requires definition. This paper accepts that not all schools will have locality to nature, waterways or even public parks. Further, it is acknowledged that teachers can be discouraged from even considering outdoor education when faced with the seemingly endless layers administration involved with "going of campus". Nevertheless, this paper holds that all schools have the capacity to explore their own outdoor environment even if that environment is restricted to within the schoolyard. The point been made here is that all schools can provide students with a natural experience. Opportunities for natural experiences can be identified by schools looking at their locality with an 'environmental' gaze. The urbanisation of birds and other animals to urban environments in densely populated and congested cities is perhaps a possibly starting point for some schools.

Methods

The Sites

The *Bugwise for Schools* program was geographically located on Charles Sturt University's (CSU) Albury-Wodonga (AW) Campus. The AW campus, purchased in 1993 and purpose built to meet the needs of the university, has been comprehensively designed and built with regard to environmentally sensitive principles including the use of windmills and solar collectors. Buildings have been constructed from rammed earth and recycled materials, creeks have been rehabilitated and wetlands developed. There is on-site management of water and waste (including composting toilets) and attention to minimal energy use. These initiatives directly impact upon the sustainable functioning of the university and its identity. They impact most particularly in terms of their use and the university's capacity to directly engage students and members of the external community in formal and informal EfS. The wetlands and re-forested areas are quite extensive as shown in Figure 1.



Figure 1: CSU's Albury Wodonga Campus

The *What's Good In My Hood?* program was originally developed by Akiima Price as a part of a New York Restoration Project (NYRP) education initiative. The curriculum used the local neighbourhood of the students as a beginning to nature exploration in urban areas, with most children visiting either a local park or the Swindler Cove at Sherman Creek Park owned by NYRP as a part of the exploration (Figure 2). The park is located in the Inwood area of Manhattan on the Harlem River. Swindler Cove is a restored site previously home to an illegal dumping site which has been cleaned and restored to native habitat types (NYRP, 2013).

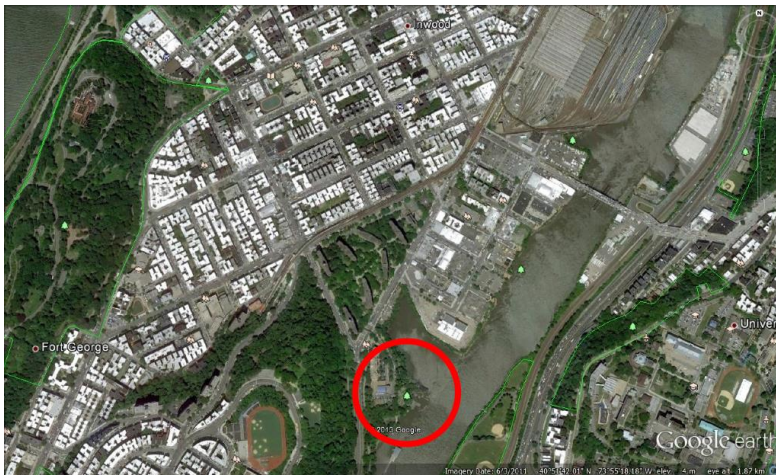


Figure 2: Swindler Cove at Sherman's Creek Park in upper Manhattan.

The Participants

Primary students from Trinity Anglican College in Albury participated in the Bugwise for Schools program at the CSU AW Campus. Trinity Anglican College is located near CSU's AW Campus' northern border. Trinity students need to walk less than 800 meters to the CSU wetlands and pathways to and around the wetlands facilitate easy access. Primary students from

two New York City public schools participated in the *What's Good In My Hood?* pilot program. The schools are within walking distance of Swindler Cove and much of the area is highly developed. Many of the students at each of these public schools are traditionally underserved and are from the immediate neighbourhood area. Swindler Cove has seven large housing project buildings across the street from the park.

The Trinity primary teachers attended three professional development (PD) workshops concerning *Bugwise for Schools* at CSU. The *Bugwise for Schools* PD workshops had three functions: 1) Explain the *Bugwise for Schools* program and explore links to appropriate syllabus and teachers' current planning; 2) Explore and engage with all *Bugwise for Schools* resources (including resources purchased for the project); and 3) Increase teachers' knowledge of and familiarity with the CSU AW campus wetlands. Following the *Bugwise for Schools* PD, the primary teachers were given an open invitation to engage with the *Bugwise for Schools* program and use the CSU AW campus wetlands as an extension of their own classrooms. All of Trinity's primary classes made at least one visit to the campus to engage with *Bugwise for Schools*. Of most interest to this project were four classes that made multiple visits to the campus (in keeping with research findings noted, above) and integrated aspects of *Bugwise for Schools* into their classroom program. From these four class groups, 11 students were interviewed as part of the research project. All 11 interviewed students participated in at least 4 *Bugwise for Schools* activities.

The NYC primary teachers had all cooperated previously on programs with the NYRP and were familiar with the Swindler Cove facilities. Students from five different class groups at each of the two schools participated in the pilot program. Each of the teachers involved participated in a workshop before the program with students began. Teachers used the *What's Good In My Hood?* workbooks to in conjunction with visits from the NYRP staff to the school that included walks around the neighbourhood and a visit to the park. NYRP staff worked with students on at least 5 separate occasions, and each time students began indoors but then travelled for out-of-the-classroom (OOTC) experiences.

Methodology

The *Bugwise for Schools* interviews were semi-structured conversations between the participants and the researcher. Questions including "What did you learn from your trips to the wetlands?", "How did what you do in the classroom match up with what you did in the wetlands?", "How important is Science?", "How important is the environment?" and "What does sustainability mean?" were used to initiate discussion between the research and the participants. The students were interviewed individually and in groups during and at the end of their involvement with *Bugwise*. The interviews were recorded digitally and then transcribed. Data analysis of the interviews followed the phases of reduction, display and conclusion drawing/verification (Huberman & Miles, 1998).

Students from the *What's Good In My Hood?* program were not interviewed individually. Their answers on the worksheets, homework sheets and other workbook items were used to assess the success of the pilot program as a regular part of piloting a new curriculum program. Along with these artefacts, letters from the students and teacher feedback via survey were used to analyse the

success of the program as well as to clarify and create the updated edition of the workbook. Both data sets were used as a part of this study to determine whether two programs a world apart designed with a similar focus outdoor education and place-based experiential learning could result in unintended EfS outcomes. Regardless of the different data gathering techniques engaged at each site the data provides useful insights into students' experience within these programs. Data were reduced by coding, clustering and data summaries, which were then transformed into themes. Conclusions were drawn by noting patterns within themes and seeing plausibility, making contrasts, comparisons and metaphors, and clustering by conceptual grouping (Huberman & Miles, 1998). The themes included *Enjoyment, Learning, Legacy* and *Agency* and provided a useful mechanism in over coming the different data gathering techniques used by each study. Effective EfS was determined by considering if student comments align with the seven principles of EfS as outlined in the National Action Plan for EfS, *Living Sustainably* (DEWHA, 2009, p9) - transformation and change, education for all and lifelong learning, systems thinking, envisioning a better future, critical thinking and reflection, participation, and partnerships for change.

Results

Both project outcomes were considered in the context of the following four defined conceptual groupings that would indicate the effectiveness of EfS in the program: 1) Place-Based Education; 2) Ecosensitivity; 3) Balancing the Outdoor Education model; and 4) Futurity. Each of these groupings will be discussed, below, with extracts from the student interviews or workbooks and letters to support claims of what students learned. The extracts are cross-referenced with the four themes mentioned earlier (*Enjoyment, Learning, Legacy* and *Agency*).

Place-Based Education

While respectfully acknowledging the political and historical ramifications of the idea of place in postcolonial communities, both programs sought to connect students to a particular place, to enable their embodied investment in the surrounding natural environment. The students were free to map their own relationships with the space and their learning was mobile and tactile – bark, leaves, buildings, earth, grass, sky, sidewalks, insects, birds, reptiles –while they looked and thought, walked and worked, touched and talked. The comments recorded in interviews and in their assignments are indicative of their deep engagement and active response. The reciprocal relationship that developed between the student participants and the environment is mapped through the observations in Table 1.

It is clear that the students understand that the local landscape is beneficial in developing pro environmental behaviours and attitudes. There is a willingness to engage with a “place” that offers comfort. Furthermore, the multiple visits to the site clearly creates a sense of place with participants directing their own learning and even taking their family to the site to share and extend their learning, which is an important principle of EfS. Less evidence of this connection to place exists from the *WGIMH?* Program, perhaps due to the urban environment or lower number of visits to natural areas in the neighbourhood, but the students were excited to share the natural areas they discovered with their families.

Table 1: Student exemplar quotes and teacher survey quotes from students regarding Place-based Education, Ecosensitivity, Balancing the Outdoor Education Model and Futurity principles illustrating EfS

Focus Area	Bugwise for Schools	WGIMH?
Theme: Enjoyment.		
Place-Based Education	<p>"I like it over there. It is fun,"</p> <p>"The more we went the more we saw. It is great."</p> <p>"I was looking for the bugs and didn't see the monitor. I went looking for the monitors and I did see the birds..."</p> <p>"My dad said he used to run around in the bush all the time when he was kid,"</p> <p>"I like it there, I know my way around now, I see something different each time,"</p> <p>"I told my dad about how I like it and he told me about places he liked when he was my age,"</p> <p>"On the weekend we (my family) walked through the same places we (the class) went. Mum said that it is a special place,"</p> <p>"I really like it when the teacher says we are going to CSU (the wetlands),"</p> <p>"Dad takes me into the bush all the time and we go looking for lots of things,"</p> <p>"I explained to my family what grey water is and how the wetlands work,"</p> <p>"It's hard to get it on a hot day but the shade there is good,"</p> <p>"I was hoping to see a snake but never did,"</p>	<p><u>From Teacher Surveys:</u></p> <p>"The park was a surprise for them. They didn't expect to see that beautiful space! They were interested in using some of the leaves of some plant to cure their mosquito bites."</p> <p>"The field trip was a blast. The students loved it and kept talking about it. They wanted to take their parents to the park."</p> <p>"They were able to recognize details about their neighbourhood they weren't aware of."</p> <p><u>Students:</u></p> <p>"I want to come and show grandma the plants and insects."</p> <p>"This was just the best trip just by walking a few blocks."</p>
Theme: Learning.		
Ecosensitivity	<p>"It is not about the bugs. It's about understanding the connections between things".</p> <p>"I understand how the bugs live and how the trees live. I know which bugs do what. I know how the birds need the bugs. The trees are important."</p> <p>"All that water is really drain water, but it makes a home now."</p> <p>"Everything ends up somewhere."</p> <p>"I know how things are all connected now."</p> <p>"The monitor was really big because he ate lots of birds. The birds ate bugs and the trees are home for the bugs and the monitor lives in the tree."</p>	<p><u>From Teacher Surveys:</u></p> <p>Program benefits include "talking about what they DO know and then tying it back to the environment"</p> <p><u>Students:</u></p> <p>"I learn that wood peckers find bugs to eat in a tree."</p> <p>"Tree, helps humans breathe, makes air"</p> <p>"Do not litter"</p> <p>"Grow more trees"</p>
Theme: Legacy.		
Balancing the Outdoor Education Model	<p>"We do the same things in the classroom. This (Bugwise) is always different."</p> <p>"I can be far from the teacher and that is okay."</p> <p>"I like being outside and sitting in the shade is nice."</p> <p>"My friend tells me lot about bugs."</p> <p>"It feels like play time... we can run around."</p> <p>"Will pulled some bark off a tree and saw lots of marks that bugs have made."</p>	<p><u>From Teacher Surveys:</u></p> <p>Program benefits include "hands on experience with nature"</p> <p><u>Students:</u></p> <p>"My favourite part was running down and up the hill"</p> <p>"My second favourite part of the trip was when we went up the hill. It was difficult but I felt like I was</p>

	<p>“It was fun making rubbings of the tree.”</p> <p>“Our class laughs a lot when we are over there when someone finds something good they yell out and we run over.”</p> <p>“My teacher asks us what we learned when we get back.”</p>	<p>getting stronger by the minute.”</p>
<p>Theme: Agency.</p>		
<p>Futurity</p>	<p>“Why? There are plenty of other places.”</p> <p>“That would not be good, what about the animals?”</p> <p>“I would get our class and complain.”</p> <p>“Where would the animals go?”</p> <p>“I would be sad about that, it is a great place.”</p> <p>“It is a really important place and when it s gone its gone.”</p> <p>“What will my brother have when he is in year 5?”</p> <p>“I think we could stop that happening.”</p>	<p><u>From Teacher Surveys:</u></p> <p>“One of the classes [at our school], students suggested beautifying their school / community w/ plants. This led to the students planting on their school property, which gave power to their voices”</p> <p>“This unit was a great platform for youth to speak out about issues that were important to them. They wrote brief essays, draw pictures, and utilized the data sheet to express themselves.”</p>

Ecosensitivity

The comments recorded in interviews with the students suggest they are indeed developing a deep awareness and understanding of ecosystem complexity as indicated by the responses shown in Table 1. It can be assumed that the student’s level of ecoliteracy continually improves with engagement in environmental education programs. However, it is clear that the student’s level of ecosensitivity is already strong and that the *Bugwise for Schools* project at CSU delivered effective EfS using the systems thinking principle. The *WGIMH?* unit on water introduced the students to systems thinking using the hydrologic cycle, and students began to understand the interconnections between nature, the build environment and humans.

Balancing the Outdoor Education Model

The comments expressed by participants in the programs show in Table 1 reflect the sense of balance that students are receiving in their education; that it is a holistic approach. The comments also suggest that the *Bugwise for Schools* is being fully integrated into the students’ education and involving the whole school. Their sense of well-being without organized physical activity is also evident in their comments suggesting that the programs are providing balance and contributing to a holistic approach to education. Furthermore, having an opportunity to reflect on their learning when they return to class offers a unique opportunity to think critically about the environment they have just visited, which is an important EfS principle. This principle may have been missing from the *WGIMH?* teachers, as they had less training before the program began.

Futurity:

Student participants in the *Bugwise for Schools* program were asked about the hypothetical possibility of the wetlands being removed, with responses shown in Table 1. Responses by participants from *WGIMH?* come from teacher observations on the survey about the final unit of

the curriculum which illustrates the methods through which students can achieve a change in their own neighbourhood through purposeful action. Teachers were highly satisfied with the call to action their students felt upon completion with the *WGIMH?* curriculum. Clearly, and in support of Smith-Sebasto (2007) the *Bugwise for Schools* program and *What's Good In My Hood?* have contributed to students having a strong sense of empowerment, which goes beyond the stated objectives of the program. Furthermore, the students have used their opportunity to reflect on their place-based education to enhance their sense of agency.

When considering effective EfS, both projects were analysed by considering if student comments align with the seven principles of EfS as outlined in the National Action Plan for EfS, *Living Sustainably* (DEWHA, 2009, p9) - transformation and change, education for all and lifelong learning, systems thinking, envisioning a better future, critical thinking and reflection, participation, and partnerships for change (Table 2). Overall, both programs show some, but not complete intention to conduct EfS education through the program objectives.

Table 2: Seven principles of EfS as outlined in the National Action Plan for EfS, *Living Sustainably* (DEWHA, 2009, p9). Noted for each curriculum product is whether or not each Principle of EfS is an intended, assumed or absent goal of the curriculum product.

Principles of EfS	<i>Bugwise for Schools</i>	<i>WGIMH?</i>
Transformation and Change	Assumed	Absent
Education for All and Lifelong Education	Assumed	Assumed
Systems Thinking	Intended	Intended
Envisioning a Better Future	Intended	Intended
Critical Thinking and Reflection	Intended	Intended
Participation	Assumed	Assumed
Partnership for Change	Intended	Absent

Conclusion

The outcomes of the both projects met the stated objectives of engaging students outdoors. Importantly, they also included fostering environmental stewardship for the students, school and their community through authentic experiential learning. In practice they can be seen to have enabled a strong sense of place for the students, the development of “eco-centric thinking and values” (Tooth & Renshaw, 2009, p95) i.e. “ecosensitivity” among the participating students, demonstrated the value of passive outdoor education and generated a pattern of “reflective response within the natural environment” (Ballantyne & Packer, 2008, p12) with a sense of empowerment to effect change. These outcomes exemplify the degree to which programs such as *Bugwise for Schools* and *What's Good In My Hood?* may be effective EfS initiatives and can make it possible for schools (and their students and communities) to critically examine the environmental effects of their current patterns of behaviour, suggest alternatives, and make changes (Payne, 2005; Tilbury, 2007). Even with the very different audiences for each program and locations a world apart on many levels, both programs were developed to serve as environmental education curriculum and contributed to EfS.

Change generated at the school level has a particular significance for EfS: formal education has been identified as one of the vehicles capable of developing the global environmental consciousness (Nagel, 2005; Tilbury, Taplin, & Hebert, 2005). Environmental consciousness

may also be described as environmental awareness, a state “foundationally underpinned by the understanding that contemporary first world living standards are destroying the natural world as we know it and that significant changes are required to be made to the way that most of us measure our aspirations and conduct our lives” (Rafferty & O’Dwyer, 2010). As observed by Pascale: “we are more likely to act our way into new ways of thinking than thinking our way into new ways of acting” (Pascale, 2010). Schools have a unique capacity to impact upon scholarly and public discourse in the sustainability debate and to establish themselves as exemplars of environmentally sound practice and long term vision. These studies have demonstrated, however, that the capacity for quality outdoor education opportunities is significantly enhanced through partnership with outside agencies and the motivation they provide. The *Bugwise for Schools* and *What’s Good In My Hood?* programs clearly demonstrated the capacity of science-based, outdoor education programs to be valuable tools for achieving effective EfS and contributing to a sustainable future for all.

Key Findings:

1. Science-based, outdoor environmental education programs, when delivered using EfS principles may have a very important role to play in creating a sustainable future for all. The learning outcomes of the science-based, outdoor education objectives may go far beyond the program’s stated objectives.
2. Developing a sense of place through regular visits to a site is important for enhancing science learning outcomes and EfS. This translates into students having regular engagement with a particular environment. There is value in knowing a place well.
3. There is a sensory element to engaging with environmental issues that contribute to the important concept that we need to act our way into thinking.
4. Outdoor education is useful and outcomes are worthwhile even if the experience is passive.
5. Students have a sense of optimism concerning societal capacity to act sustainably following their participation in programs that focus on positive change. They see themselves and their family making changes and displaying a capacity to change. They make changes themselves.

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