Promoting Citizenship and Environmental Learning in the Marine Environment

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Thesis submitted for the degree

Doctor of Philosophy

Newcastle University

The School of Marine Science and Technology

October 2013

Dedication

This thesis is dedicated to the memory of Professor Stewart M. Evans. Stewart's research insights and belief in my abilities made so much possible. Thank you.

Acknowledgements.

There are many people who have supported me throughout the writing of this thesis. I would like to extend my sincere thanks to everyone, but in particular: my parents for buying me the red plastic boat that started my interest in the sea. My husband, Stephen, my (often neglected) children: Joseph, Harriet, Alasdair and Hester and my supervisor, Dr Jane Delany. Thank you to the staff and pupils of all the schools involved in the nine projects outlined in the thesis but in particular, Cullercoats Primary School and Epinay Business and Enterprise School. My thanks are also extended to former colleagues who worked alongside of me, Jo Stockhill, Cliff Garside and Dr Tom Catchpole. And finally to all the cheerful staff at The Dove Marine Laboratory, Annie Russell, Dr Heather Sugden, Dr Jenny Carney, Dr Sara Dixon and Prof. Matt Bentley for their motivation, advice and cake.

Abstract.

This thesis addresses the need to involve all members of society in marine environmental education, policy-making and stakeholder processes. Several strategies are considered. Firstly, marine environmental citizenship and the concept of joint responsibility as a way of enabling people to contribute meaningfully to marine environmental management processes. This incorporates the implementation of programmes that enable adults to participate in local environmental projects and the importance of using skilled volunteers in wildlife recording programmes. Chapter two outlines 'A Citizens' Day' between school pupils and environmentalists that enables participants to take part in debates and environmental planning in real life situations. The thesis examines the effects of links between universities, industries and schools were pupils surveyed a coastal area and made 15 recommendations for its sustainable management which were implemented by industry employees. Intergenerational learning as a means of encouraging transfer of knowledge between generations was tested in depth during one study. The methods proved effective, the majority of the adults in the project claimed that their knowledge of their areas maritime heritage had increased significantly. 'The Tale of the Herring' project looked at the concept of sense of place education as a tool for promoting environmental citizenship and connecting young people to their marine environment. The results of the study concluded that this approach did encourage a feeling of belonging and a sense of responsibly for one's local environs. Global marine citizenship was assessed through International Schools Partnership in Ghana and the UK. Schools carried out independent surveys of local coastal habitats and made recommendations to managers. Despite many differences in their lives, pupils' recommendations had many similarities. Innovative methods of giving children who have Special Education Needs a voice in marine environmental citizenry were also investigated. The focus had special emphasis on fieldwork, enquiry-based and cross-curricula approaches to learning. Pupils' believed that their work motivated their interest in science and gave them a sense of pride in their work. Finally the thesis explored the potential use of the creative arts as an effective means of communicating marine environmental messages.

Table of Contents

Chapter 1. **General Introduction. The need to promote marine citizenship and environmental learning in the marine environment.**

Chapter 3. **The 'Citizens' Day' as a means of empowering young people to contribute to coastal management processes.**

Chapter 6. The Tale of the Herring: Promoting community cohesion through sense of place education

Chapter 7. **Global Marine Environmental Citizenship**

Chapter 9. **Schoolchildren's use of poetry and paintings in conveying environmental messages.**

Chapter 10. **General Discussion**

Index of figures

Index of boxes.

Chapter 1 General Introduction. The need to promote citizenship and environmental learning in the marine environment.

1.1 The need for public engagement with science and understanding of environmental processes.

Today we face an unprecedented time of threats to natural environments. These threats come from climate change (Oreskes 2004), loss of habitats from development, and extinctions (Schlegal & Rupf 2010), pollution (Owens & Driffil 2008) and industrialisation. Collectively they pose a challenge to humankind, never before has there been such an urgent need for environmental awareness (Kaiser *et al* 2007) or environmental citizenship (Hawthorne & Alabaster 1999). Environmental Citizenship is an idea that each of us is an integral part of a larger ecosystem and that our future depends on each one of us embracing the challenge and acting responsibly and positively toward our environment. Marine environments have been disproportionately affected by some of the above threats, global warming in particular. The ocean has absorbed 84% of the heat added to the climate system over the last 40 years (Hanson 2004), it has locked away carbon dioxide into the deep ocean buffering the effects upon the earth (Kum 2011), and many animals are facing stresses due to ocean acidification (Schiermeier 2007). We also get many resources from the ocean yet are impacting them through over fishing, pollution and habitat destruction (Selkoe *et al* 2008). The ocean provides a vast array of resources; protein for human consumption, income from tourism, trade through shipping and the potential for new discoveries in the fields of algal biofuels, drug discovery and mineral mining in the deep sea. Regardless of where a person lives in the world their actions and behaviour affect the oceans health. Nevertheless, due to its inaccessibility and relative remoteness members of the public have less understanding of marine habitats than of terrestrial environments (Natural England 2008, The Northeast Biodiversity Forum 2007).

1.1.1 Advantages of public participation.

There have been many calls from scientists (Evans & Birchenough 2001, Clark *et al*, 1998) and official UK government bodies (House of Common Select Committee 2001) Department of Environment, Food and Rural Affairs (DEFRA 2002) for greater involvement of the general public in the debate of science policy related issues and environmental planning and management processes. There are several benefits to this approach. The more the public are involved in policy making, the higher their levels of trust in the scientific process (Mackinson & Nottestad 1998). The implementation of scientific policies is easier if those policies recognise, respect and weigh public opinion and support (House of Lords'

Select Committee on Science and Technology 2000) there is recognition also that society possesses a wealth of non-scientific knowledge, wisdom, skills and perceptions. This lay expertise can be utilised to inform decision-making processes, strengthen policies and allow the public to contribute effectively to the environmental issues of the day. DEFRA recognises the need to encourage "local partnerships to deliver local solutions" and develop opportunities within the government's framework for national policies. Christie & White (1997) have argued, "local knowledge, coupled with the specialist knowledge of the scientist is more potent than either kind of knowledge on its own".

1.1.2 The public's knowledge of the environment

The public must be well-informed about the environment before it can make meaningful contributions to the planning and decision-making processes affecting it (Dreyfus 1995). Whilst there is recognition of the existence of undoubted specialist understanding amongst different stake-holder groups and pockets of society, the reality is that the majority of societies are poorly informed about their natural surroundings (Lucas 1987, Arcury 1990, Dixon *et al.* 2005, Bebbington 2005, Kaplowitz & Levine 2005). Lay people have lost their affinity with the environment. It has been suggested that they see stewardship of it as a distant responsibility of politicians, scientists, industrialists, planners and 'green activists' (Barratt & Barratt-Hacking 2004). Evidence has come from a wide range of studies that sections of society have inadequate understanding to contribute to meaningful debate on societal issues that are underpinned by science (Jenkins & Pell 2008, Haldder *et al* 2010, Goldman *et al 2006).* Pruneu *et al.* (1999) found, at the beginning of a ten month study, that teenage students demonstrated very weak knowledge of living organisms in their region of Canada. They could not name, or describe or draw plants from different ecosystems. More worryingly perhaps, amongst those very university students whose professions will have a strong influence on the educational foundation of future generations, levels of understanding have been found in certain cases to be inadequate. Ekborg (2002) identified that student schoolteachers preparing to teach the 7 to 13 age ranges were poorly equipped to apply conceptual understanding of science in discussions of socially relevant questions. Similarly, Ozden (2008) established that students in a UK university did not have sufficient awareness and sensitivity about environmental issues. An understanding and appreciation of science and a familiarity with the workings of the environment is important to everyone." Science and the environment play an important

part in everyone's daily lives, even if we are not aware of the routes in which is does. It is important for our economy, our food security, and our modern way of life. Public understanding, of not just the benefits and potential for science, but also of the limitations of science is crucial. Realising this helps us as a society have realistic expectations" (Sir Paul Nurse, Richard Dimbleby lecture 2013). It has been suggested that science has played a role in detaching the public from the natural world as individual scientists have a tendency to cut themselves off from other disciplines, focus on specialist areas, not take a holistic approach or engage with other sectors. The public also have a role to play in the disengagement when they fail to see the importance that science plays in everybody's daily lives from the food that we eat to the weather around us (Sir Paul Nurse, Richard Dimbleby lecture, 2013).

1.2. Empowering people: Environmental Citizenship

The challenge therefore is how to address this increasing detachment from natural environments and at the same time to promote realistic expectations of what science and environmental management can achieve. One effective way of doing so is to give communities the opportunities to participate in environmental projects that operate at local levels, for example in a Citizens' Day as outlined in chapter 3 (Evans *et al.* 2008e). The benefits of engaging members of the public in this way have been demonstrated through a number of initiatives over the last decade. McKinley & Fletcher (2012) looked at the concept of marine citizenship and the advantages of using it to promote marine pro-environmental behavioural choices.   Whiteley (2004) investigated the concept of citizenship today and the consequences of a lack of civic engagement in modern democracy. Byron & Curtis (2002) studied using volunteers to promote habitat restoration in local watershed initiatives. Participants in such projects acquire a deeper understanding of environmental processes while developing a profound attachment to and sense of ownership for, their local habitat or resources (Clark *et al.* 1998, Meeras *et al* 2010). Such stewardship has long term benefits in that it changes attitudes and behaviours and promotes a sense of wider responsibility beyond the immediate species or habitat of the project focus (Brody 2003). The idea of "joint responsibility" to empower community members of all ages to participate and contribute to environmental planning processes is developed in the present thesis. Chapter 3 explores this concept in relation to facilitating ownership by local communities of a sand dune system and the influence that has on their

subsequent behaviours, whilst chapter 5 explores a shared partnership between three different stakeholder groups and the advantages accrued to each. It is a theme underlying several other chapters looking at the relationship of school-pupil engagement with the marine environment and their developing sense of responsibility towards it.

1.2.1 The Role of Universities.

Ducrotoy (2003) suggests that Higher Education Institutes are in a strong position to engage local communities in environmental issues through their outreach programmes. It is only relatively recently that there has been a formalised drive to promote engagement by universities with the communities in their region and nationally. The research findings and resources they hold are publically funded and there is therefore a logical inference that there is a responsibility to make these more publically accessible. Co-enquiry is an emerging concept that research directions can be informed by debate and contributions from lay-members, and that in doing so the research itself is more societally relevant. Newcastle University is one of six national university based collaborative centres for promoting university public engagement referred to as the 'Beacons Initiative'. The six beacons were university-based collaborative centres that were set up in 2008 to support, recognise, reward and build capacity for public engagement, with a lifespan of four years. The beacons were at the forefront of efforts to change the culture in universities, assisting staff and students to engage with the public. Their partners included further education colleges, museums, galleries, businesses, charities, TV and press, and public bodies. As such the initiative has been at the forefront of exploring ways in which members of society cannot only become more aware of the findings of publically funded university research but involved in its actual compilation (www.publicengagement.ac.uk). Involvement in the 'Beacon Project' very much reflects Newcastle University's mission statement to be a 'civic university' and to play a leading role in the economic, social and cultural development of the NE of England. Facilitating communities in the region to engage with their natural heritage and empowering them to have a role in its management is very much underpinned by this concept.

1.3 Environmental Education in the Formative Years.

Environmental education aims to foster public awareness of and concern about environmental issues, problems and solutions by providing people with opportunities to

acquire the knowledge, values, attitudes, commitment and skills needed to investigate issues, solve problems and protect and improve the environment (UNESCO 1979). Accordingly, it seeks to develop an active and informed citizenry committed to the values and practices of ecological and social sustainability. Environmental Education in the formal school context can play an important role in this process. Young people are a key audience for environmental messages as they are tomorrow's leaders and stewards of the Earth (Ballantyne *et al.* 1998a). Environmental education currently exists in the National Curriculum in the form of the Every Child Matters Agenda (2003) in biology, chemistry, general studies and citizenship syllabuses and in critical thinking at 'A' level. Nonetheless, Barraza & Cuaron (2004) argue that environmental education in schools requires a reorientation. Emphasis should be given to teaching 'in' rather than teaching 'for' the environment. Awareness of environmental issues is frequently dependent on the wording used (Holden 1994). Hearing environmental terms does not necessarily mean understanding them (Fortner 2001). Even though children might have heard and talked about environmental terms at school, they may not have fully understand the concept. They do not associate these words with their everyday life and the words imply a high level of abstraction. Children tend to remember, understand and explain what a word means in relation to direct experience of it (Barraza & Cuaron, 2004).

1.3.1 The Decline of Fieldwork

Experience of studying science in the field is likely to be a key element in making contact between the environment and the world of laboratory, textbook, video and computer simulation. It is to make the connection between abstraction and reality. The nature of scientific enquiry is to start from observations of the real world. In view of this, it is regrettable that field experience in UK schools appears to be in decline (Barker *et al* 2001, Rickinson *et al* 2004). The modern curricula, financial and health and safety issues make the organisation of fieldwork difficult, there is an obvious need for initiatives that permit young people to spend more time in the field, especially those that enable them to 'use' their knowledge, for example, in contributing to national surveys. The initiatives, through better use of the outdoor classroom, seek to address concerns that young people have become distanced from nature, are to be welcomed. However, while school environmental education programmes have seemingly succeeded in raising students' concerns about the

environment; they have not effectively enabled such concern to be expressed in the form of action supporting sustainable practices (Ballantyne *et al.* 2006e).

1.3.2 The Changing Role of Schools

There is a need for the education system to move away from didactic and traditional teaching methods and find new exciting methods of engaging young pupils in science and environmental citizenship. There are three main styles of teaching: didactic, facilitative and Socratic. Didactic learning is essentially teacher centred with limited student participation, examples include note taking, lectures and learning by rote. The approach can produce feelings of boredom and limited student refection (Entwhislte 1997). Facilitative learning is self-directed, the teacher uses problem solving techniques and vicarious learning strategies to encourage students to articulate and theorise what they already know (Preece & Griffin 2002). The Socratic Method also emphasises student centeredness and strongly opposes didacticism. Teachers provide the initial theoretical positions and introduce associated inconsistencies and attributes in an attempt to raise awareness in the students, initiate reflection and ponder key concepts (Brownhill 2000). Slingsby & Barker (2003) suggest that the role of educators is not to teach "right answers" but to equip citizens to be able to take part in debates throughout their lives. Participation in debates, role playing, visualisation and other approaches have all been demonstrated as having positive benefits and have promoted feelings of empowerment and citizenship (Devictor 2010). An important aspect to this new found sense of responsibility is the powerful emotion that the child has real capability for effecting change and 'a voice' that can be heard. One route by which this can be promoted is through child to adult intergenerational learning which encourages children to share their knowledge with adults, thereby influencing their behaviours and attitudes (Uzzell 1994). Children have a huge ability to influence the values, attitude and decisions of adults through 'pester power' (Ballantyne *et al.* 2001b), environmental awareness (Vaughan *et al.* 2003), and information technology (Hampshire 2000). Concepts relating to the idea that children engage with their learning on a deeper level when they recognise the worth of their opinion and knowledge are explored in chapter 4 (Citizens' Day in school), chapter 5 (partnership working) and chapter 6 (intergenerational learning).

Different sectors of society have been identified as having specific roles to play in promoting effective environmental citizenship. There are many benefits to school pupils being involved in projects working alongside professional environmental practitioners, scientists, engineers and industrialists (Didier & Huet 2008). The case studies and issues to-hand are more closely reflective of real world and societal issues. They enable pupils to experience problem solving, team skills and are exposed to career exemplars from their 'fellow participants'. Increasingly industry is playing a part through its Corporate Social Responsibility programmes in a range of community and environmental projects, which has benefits for the staff involved but also for the children who have the opportunity to work alongside the staff (Carolle 1997, DTI 2004, Murillo 2006).

1.3.4 Sense of Place

For many people personal intimacy with their local environment has been replaced with misunderstanding and indifference (Sobel 1996). To have little or no understanding of one's own local area is to be oblivious to its aesthetic value, cultural and political significance and possibly accede to its environmental or social degradation. The challenge in this era of climate change and environmental change is to ensure that that not only do community members have the skills to contribute effectively to debates and to shape policy, but just as important is the desire to want to do so. Fettes & Judson (2011) suggest that "sense of place" education is a valuable resource for promoting people's relationships with their surroundings and environmental sustainability. Chapter 6 looks at the benefits of sense of place education in promoting marine environmental citizenship in 5 eastern coastal schools. A key element of this 'sense of place' in a child's development is the realisation of how his or her own home-base relates to the wider community, national and international contexts. This is important to how a child or indeed an adult is motivated to act on wider societal and global concerns.

1.3.4 Global Citizenship

It can be argued that disaffection towards global environment predicaments is due to an ability to identify that one's own actions have repercussions on a wider scale (Barr and Prilwitz, 2011). It may also be due to the complexity of global problems and an inability to comprehend or influence them. Environmental education can be promoted through exploration of different habitats, and how the environmental conditions influence different

societies and cultures. Juxapositioning these experiences in an education setting, highlights the differences and similarities between each and serves to reinforce the key messages of habitat structure, ecology, impact of pollution and the interconnectivity of all environments. Global citizenship has a high educational priority in schools around the world and teachers have the responsibility of bringing it into the classroom. Yet, means by which we can encourage young people to understand the links between their own lives and those of people in other countries and act in ways that will promote environmental sustainability is a challenge that may require re-examination of teaching priorities or even major reforms of the curriculum (Bourn 2005, Haigh 2005). Such approaches are supported and underpinned by the ethos set out in many of the targets of The United Nations Millennium Development Goals (2000) under environmental sustainability and global partnership (www.un.org/millenniumgoals).

1.3.5 Special Educational Needs

In considering approaches to science learning in the classroom, there are challenges for the teacher to understand the individual and group needs of their pupils and to tailor their teaching approaches accordingly. Teachers are faced with the challenge of providing effective science teaching for children of all abilities, both gifted and able, and those thought of as having Special Educational Needs (SEN). This is in addition to being mindful that children from each group could prove to be our future scientists and that all members of society should have a voice. Chapter 8 focuses on methods which makes science learning relevant for SEN pupils in a way that has particular emphasis on fieldwork, enquiry-based learning and cross curricular approaches to leaning. The project addressed the idea that SEN science curriculum should not just be a "watered down" version of main stream themes but should be inclusive, appropriate and targeted to the audience

1.3.6 The Arts and Science

The arts and sciences are not traditional bedfellows; conventionally there have been institutions that have been the preserve of either scientists or artists. In the past five years some organisations, most notably the Wellcome Collection in London and Science Gallery in Dublin, have been established with the core purpose of bridging these disciplines. The "Science for All" consultation paper, (Science for All Expert Group 2010) has recommended that the recent collaborations between science and the arts should be

extended. This is to be achieved by "building mechanisms to share more extensively the outcomes, best practice and evaluations of science and arts collaborations". These initiatives are to be welcomed as where science meets art and the two work together, the result can be extraordinarily productive, as horizons are broadened and gaps in our understanding of both are filled. Science and the arts both rely on observation and synthesis: taking what is seen and creating something new from it. Society could hardly exist without either, but when they come together cultures are enriched, sometimes in unexpected ways. The arts are not a traditional means to communicate environmental or scientific messages; research is often presented in a rather dry and unimaginative way, frequently in a language that is difficult, even for scientists from different disciplines to understand. The interaction between science (both natural and social) and the arts can be a powerful way of disseminating environmental messages enabling people to discover new perspectives and insights into everyday problems.

An additional challenge is to find ways in which science-art projects can be implemented at a grass-roots level. Watts (2001) has argued that it is necessary to move beyond the customary curricular constraints within schools. He suggests that school science can be both a scientific and literary experience and highlights the power of poetry in stimulating observation, imagination and emotion in school science. Several studies have found that young people have the talent and motivation to use art forms, to assist their science learning, (Osborn 2006, Francis 2007, Kempton 2004). The final chapter of this thesis looks at how this approach was used successfully during a project based in Ghana.

1.4 Ethics
Since the millennium interest in ethical issues regarding organisational research has grown. As a result of these concerns, ethical codes have been implemented as a means to prevent and offer protection mechanisms regarding ethical violation in most fields of research (Rogelberg 2008) and across the majority of the developed world's academic institutions (Shamoo 2000). There are several reasons why it is important to adhere to ethical norms in research. First, norms promote the aims of research, such as knowledge, truth, and avoidance of error. Secondly they promote values that are essential to collaborative work, such as trust, accountability, mutual respect, and fairness. Third, many of the ethical norms help to ensure that researchers can be held accountable to the public. For instance, policies on research misconduct, conflicts of interest, human protection, and

animal care and use are necessary in order to make sure that researchers who are funded by public money can be held accountable to the public. Fourth, ethical norms in research also help to build public support for research. People are more likely to fund research project if they can trust the quality and integrity of research. Finally, many of the norms of research promote a variety of other important moral and social values, such as social responsibility (Resnik 2005).

Newcastle University has a Research Ethics Committee defined as a multidisciplinary, independent body charged with reviewing research involving human participants to ensure that their dignity, rights and welfare are protected. The committee aims to ensure that all projects undergo appropriate ethical review before commencement. This covers both internally and externally funded projects, and includes undergraduate and postgraduate projects. In addition to the institutional requirement, main research funders (e.g. Research Councils) now require assurances that projects have been through an appropriate ethical review and that the research will be conducted within a research governance framework embedded within the institution. When researchers seek to recruit children or young adults they must first demonstrate that they have the appropriate qualifications and experience to do so. The research protocol must set out a clear justification as to why it is necessary to work with these groups, identify and explain the risks and benefits of participating in research and describe the specific safety measures in place to safeguard the interests of participants. Researchers are expected to show that they have an appropriate supervisory or advisory team in place and that they are aware of and able to act upon the relevant guidance and legislation regarding the inclusion of children and young adults in research.

The majority of the projects that are outlined within this thesis were undertaken before the REC was formed and therefore they were not subjected to the protocols outlined above. Only one, 'The Tale of the Herring' (chapter 6) had full ethics approval by the committee. The author now ensures that all studies have been fully approved and comply with the appropriate regulations.

1.5 Aims and Objectives.

Overall aim. This thesis aims to identify the advantages and limitations of a number of community and formal education based approaches to promoting greater understanding of marine environmental issues and a deeper sense of marine citizenship.

1.5.1 Objectives. The number in the bullet point corresponds to the chapter in which the objective below forms the main aim.

1 to investigate if lay people can work alongside scientists to produce effective management plans for a coastal area (chapter 2).

2. to investigate if primary school children can work alongside scientists and environmental managers to effectively promote awareness of specific, local, maritime issues to the wider public (chapter 3).

3. to assess if high school pupils under the guidance of university scientists could devise effective, practical management recommendations for two coastal habitats that could be implemented by employees of a pharmaceutical company (chapter 4).

4. to examine the effectiveness of intergenerational knowledge transfer from children to adults in promoting increased awareness of local maritime heritage (chapter 5).

5. to show that tailored cultural, environmental workshops, lessons and exhibitions can raise coastal school children's awareness of their locality and promote sense of place (chapter 6).

6. to explore the benefits of an International School Partnership in raising awareness of coastal environmental issues and lifestyle differences in pupils in Ghana and the UK (chapter 7).

7. to evaluate the effectiveness of an enquiry-based science programme taught to a group of Key Stage 3 children, primarily with moderate learning difficulties, on their interest, attitude and motivation towards science and marine habitats (chapter 8).

8. to investigate if young Ghanaian students can effectively disseminate their learning about the effects of climate change on the marine environment to their peers, parents and wider community using poems and paintings (chapter 9).

Chapter 2 'Joint responsibility': participation in ecological projects as a means of empowering communities to contribute to coastal management processes.

A modified form of this chapter has been published as: Evans, S.M., Gebbels, S. and. Stockill, J.M. (2008). 'Our shared responsibility': participation in ecological projects as a means of empowering communities to contribute to coastal management processes. *Marine Pollution Bulletin* 57, 3-7

The section detailing the Bird of Blyth study was published as: Gebbels, S. (2006) The Birds of Blyth, a community survey. Birds in Northumbria 2004 249-251. *Published by The Northumberland and Tyneside Bird Club.*

2.1 Introduction

There is a need from both the publics and environmental managers' perspective to involve citizens in decision-making processes that relate to all issues involving the management of the natural environment. There are, nevertheless, difficulties on both sides to achieving this ideal. The environmental manager is faced with presenting issues to the public that can be academically complicated and value-laden, often to numerous user groups that have several contradictory and diverse interests which can lead to an atmosphere of disagreement and mistrust (Fischer 2000a, Jasanoff 2005). Finding solutions to environmental problems often requires changes in individual behaviour, policymakers find themselves targeting and involving the public as they would corporations and other affected organizations in a way in which they are not used to doing (National Research Council 2008). In addition, Gigliotti (1990) commented that we seem to have produced a citizenry that is emotionally charged but woefully lacking in basic ecological knowledge. Addressing this challenging collection of circumstances requires decision-making that is both flexible and transparent and ideally embraces local knowledge and a variety of values (Reed 2008).

Conventionally, "public participation" has been characterised as a legally required, one-way conversation between the public and officials (e.g. voting, forming interest groups, demonstrating, lobbying) in which agencies notify the public after determining a course of action (Beierle 1998, Innes & Booher 2004). While this approach may provide a way for decision-makers to convey pre-determined facts and figures to the public, it misses the

chance for communities to directly inform and have an impact on, environmental policy developments, products, and outcomes.

To increase the value, legitimacy, and aptitude of environmental decisions, public participation has begun to include more direct routes for participation and discourse such as formal comment and public hearings (National Research Council 2008). In the past 10 years, the public has also helped to inform a varied series of planning and policymaking processes by participating in stakeholder or citizen science groups (Beatley *et a*l. 1994, Patterson 1999, McCool & Guthrie 2001). While opponents raise concerns about a more involved public (Innes & Booher 2004, Bora & Hausendorf 2006, Abels 2007, Reed 2008) the advantages of two-way interactions between the public and decision-makers have been broadly advocated as a way to increase the legitimacy and worth of management decisions (Rowe & Frewer 2000, Abelson *et al.* 2003, Daley 2007, Fox *et al.* 2013). This includes decision-making within the field of environmental management (Fischer 2000, Beierle 2002, Reed *et al.* 2009) and more precisely, marine planning (Pomeroy & Douvere 2008).

Ducrotoy (2003) suggests that Higher Education Institutes are in a strong position to engage local communities in environmental issues through their outreach programmes. One effective way of doing so is to give communities the opportunity to participate in scientific projects. There are multiple benefits of this type of involvement including: enhancement of people's feelings of 'ownership' of their environment, creating valuable long term and/or large scale data sets (Barratt *et al* 2003), increasing general awareness of environmental problems (Reed 2008), intensifying relationships between stakeholders (Valadez 2001, Abelson *et al.* 2003) and increased understanding between the needs and concerns of participants and communities (Salm *et al* 2008). Joint participation facilitates multi-dimensional discussions so that strategies, interests, and policies co-evolve (Innes & Booher 2004). Outreach teams can also act as a liaison point between the public and environmentalists. A consistent outreach team member can provide the public access to a person who can listen to concerns, respond to questions and provide information (Sayce *et al* 2012).

The Dove Marine Laboratory (Newcastle University's marine teaching and research satellite station) has had a comprehensive outreach and public engagement programme running for the past 15 years. It is underpinned by the concept of 'joint responsibility'; that is, the environment belongs to all of us and it follows that we share the responsibility of managing it at sustainable levels for the benefit of future generations (Evans 2002). Community groups have been involved in a range of different projects, resulting in several publications in scientific journals (Evans *et al.* 2000, Evans *et al.* 2001, Evans *et al.* 2002, Foster-Smith & Evans 2003, Evans *et al.* 2008a, Evans *et al.* 2008b, Evans *et al.* 2008c, Gebbels *et al.* 2010, Gebbels *et al.* 2011, Gebbels *et al.* 2012).

Certain projects in The Dove Marine Laboratory's programme have been set up in collaboration with environmental managers so that volunteer participants can develop management recommendations for the study area and feed them directly into environmental planning processes. This chapter describes one such project as an example of the way in which lay people can make significant contributions to environmental management processes. The environmental managers in this instance were Blyth Valley Borough Council (BVBC), Northumberland Wildlife Trust and *Posford Duvivier* (now known as Royal Haskoning**)**, It describes studies by members of the community of Blyth in Northumberland, United Kingdom on a sand dune system, known locally as Blyth and Hartley Links. These dunes stretch for a distance of about 3km. from the town of Blyth to the village of Seaton Sluice, The project lasted from 2003 until 2005.

2.2 Aims and Objectives.

The aim of the study was to investigate if lay people can work alongside scientists to produce effective management plans for an area. The objectives were to provide skills by:

1. gathering information about the social and cultural aspects of the Blyth/Hartley links to enable participants to see the dunes in a holistic context.
2. providing training in identification skills and survey techniques in a sand dune habitats.
3. providing background knowledge of key environmental processes in a sand dune habitat.
4. providing a platform through which lay people can devise management processes and present them to environmental managers.

5. evaluating the effectiveness of the management plans.

2.2.3 Community surveys of the dunes.

A community focus group, the Links Conservation Group, was formed specifically for the project. It consisted of about 20 volunteers who lived locally, 12-15 of whom were regular participants. The recommended number of people per focus group is usually six to ten (MacIntosh 1993), but some researchers have used up to fifteen people (Goss & Leinbach 1996) or as few as four (Kitzinger 1995). Prior to the start of the project a cycle pathway had been laid through the dunes. This track had divided local opinion; some local people thought that it was an asset allowing easy access for child buggies, wheelchairs and bicycles, whilst other residents said that one of the last "wildspaces" in the area had been spoilt. It was as a result of this unrest that BVBC allocated the funds to assist with the formation of a conservation group who could act as a voice for local people to have a say in the management of the dunes. Group members were both male and female, there were three sets of married couples and in addition, two family groups (two parents and a child and one parent and two children). The remainder were individuals. The age range of the group was from early-teens through to people of retirement age. Group members were all white and worked or went to school the local area. Nobody had been involved in a project of this kind before. Members of the Links Conservation Group were recruited through advertisements in public places around Blyth and Seaton Sluice; there was no limit to the size of the group. The members did not have to give any informed consent to take part in the study. The group elected a chairperson, a treasurer and secretary early on in its formation by a democratic voting process.

2.2.4 Role of the researcher.

The group's activities were coordinated by the researcher and the Coastal Warden, (Blyth Valley Borough Council). The author was responsible for organising the survey work, planning the workshops (and delivering them alongside the members from the conservation groups), gathering the data from the surveys, sending the results to the relevant national organisations, liaising with the Links Conservation Group and the environmental managers. She also designed the nature trail and information panels and worked with a graphic design team to produce the end products.

2.3 Methods.

The initial phase in the project was to gather information about the dunes. This was done by members of the Links Conservation Group referring to earlier published work (Fothergill 1934, Skinner 1934, Loring 1982, Radley & Woolven 1988, Arthur *et al.* 1993, Wilson *et al.* 2001, Holliday 2000) and by carrying out surveys in collaboration with scientists or other local specialists or specialist groups. These included surveys of wildlife, social and industrial history, accretion and erosion of sand on the adjacent shore and opinions of local residents on issues relating to the dunes (Table 2.1). The length of time spent on the survey work varied from survey to survey. The bird, butterfly and social history surveys were carried out over a one year period, the plants and mammals over 18 months and moths during an intensive 3 night survey. The surveys concerning the snails and local opinion lasted 6 months. Data regarding the sand accretion by a Newcastle University student took place over a 6 month period, the Links Conservation Group carried out their sand accretion work over 1 year. The group took a series of photographs showing changes in sand accumulation/erosion each month from a series of 18 fixed points along the dunes. The points were chosen as they were the sites of greatest change.

The dates and times for the mammal workshops, butterfly, moth, bird and plant surveys were advertised prior to their commencement in the coastal warden's education centre, BVBC's website and notice boards. All members of the public were invited to come along to the events and take part. In addition to members of the Links Conservation Group and lay experts from the conservation groups, typically between 2 and 8 people from the local community attended.

Table 2.1 Surveys carried out and groups involved in them.

Subject of survey	Group or individuals responsible for the survey
Small mammals	Northumbrian Mammal Group.
Birds	Birds of Blyth Volunteer Group, and Tyneside and Northumbria Bird Club assisted by 8th Blyth Girl Guides
Plants	Mid-week Botany Group.
Butterflies	Butterfly Conservation
Moths	Butterfly Conservation
Snails	Adam Worsley (Newcastle University honours student).
Local opinion	Wendy Pawsey (M.Sc. student).
Social and industrial history	Seaton Sluice Historical Society and Blyth Historical Society.
Sand accretion and erosion in the dunes and adjacent shore	Ruth Lawless (Newcastle University honours student) and Rebecca Teasdale (Nuffield Foundation Science Bursary Student), in collaboration with environmental consultants *Posford Duvivier*. Links Conservation Group.

The subjects for the surveys were decided prior to the start of the project by the researcher, the coastal warden and the environmental managers. The topics were chosen because either there were past reports that could be used for historical comparison, (birds, plants, sand accretion, social and industrial history) or because the area had been recognised as an important site for a particular species (moths and butterflies). The range of the surveys undertaken was increased by the addition of work carried out by BSc and MSc and Nuffield Foundation students from Newcastle University (snails, local option, sand accretion). These students worked on the study site during their final year dissertations; they were supervised by the researcher and a member of the Dove Marine Laboratories team (Prof. Stewart Evans). Their surveys have been included to show the level of investigation that the area received during the two year study period. The other surveys were carried out voluntarily by members of the organisations with the exception of

the sand accretion and erosion study undertaken in conjunction with Royal Haskoning. This was part of the areas Shoreline Management Plan 2 that was commissioned by Northumbrian Coastal Authorities Group which comprises of two Local Authorities; Northumberland County Council and North Tyneside Council, The Environment Agency, Natural England, The Northumberland Coast Area of Outstanding Natural Beauty and The National Trust. The authors funding to carry out the 2 year study came from The Esme Fairburn Foundation.

2.3.1 Analysis tools.

At the end of the two year study period the members of the Links Conservation Group were asked to fill in a questionnaire during one of their meetings at the Coastal Warden's offices. This method was chosen as an analysis tool because the responses could be gathered in a standardised way which makes the technique more objective than interviews. A Likert scale was used as a means to measure attitudes by asking the group to respond to a series of statements about their perceived benefits in participating in the project in terms of the extent to which they agree with them. Likert-type or frequency scales use fixed choice response formats and are designed to measure attitudes or opinions (Bowling 1997). These ordinal scales measure levels of agreement/disagreement. Likert Scales have the advantage that they do not expect a simple yes / no answer from the respondent, but allow for degrees of opinion, and even no opinion at all. Therefore quantitative data is obtained, which means that the data can be analyzed with relative ease (Likert 1932). However, the validity of Likert Scale attitude measurement can be compromised due to social desirability. This means that individuals may lie to put themselves in a positive light or to please the researcher.

SWOT Analysis was used to identify objectively which management recommendations from the Links Conservation Group could be implemented and which could not. This method is beneficial for evaluating the internal potential and limitations (strength and weaknesses) and the probable/likely opportunities and threats from the external environment. However, although it can be a powerful tool it can present a simplistic view of a situation. SWOT analyses are becoming increasing popular as an evaluation tool in natural science for example McKinley & Fletcher (2012) used this method to give an overview of the concept of marine citizenship.

2.4 Results.

An MSc student conducted the study of local opinion by making a questionnaire available to people living in the area through community groups, such as local churches, the Women's Institute and historical societies, and through local libraries. The author was not responsible for the design or analysis of the questionnaire but as it was supervised by the projects PI the results are shown here as they offer a valuable insight into the value placed on the dune system by local residents. A total of 70 residents returned questionnaires. The responses showed that people valued the dunes as a habitat. Most of them (74%) visited the dunes at least once a month, and some claimed to do so more than five times (28%) a month. Overall, they ranked the dunes as the most important local habitat when they were asked to rank six local habitats in order of importance (Table 2.2).

Table 2.2. Ranking local habitats in order of importance. The mean rank refers to the average response.

Overall Rank	Habitat	Mean rank	Mean score ± standard error
1	Blyth-Hartley links	2.0	±0.33
2	Holywell Dene (saltmarsh)	3.1	±0.45
3	St Mary's Island Nature Reserve	3.3	±0.63
4=	Colywell Bay (sandy shore)	3.6	±0.72
4=	Plessey Woods	3.6	±0.77
6	River Blyth	3.7	±0.62

Opinions were divided on the extent to which the quality of the dunes had improved or deteriorated within personal experience; 23% thought that their quality had improved and 46% thought that their quality had deteriorated. The major problems confronting the habitat were identified as loss of sand leading to decreased height of the dunes (71%), increased numbers of blowouts (53%), damage caused though use of car parking areas (50%), plastic litter pollution (47%), trampling (30%) and fly-tipping (19%).

2.4.1 History and Environment

The dunes have had a turbulent history, being used as military bases during the Napoleonic, First and Second World wars. Parts of them have been used a sites for depositing building and household rubbish and, until the middle part of the last century, as centres of commercial sand extraction, an activity which was probably responsible for the reported loss in dune height (Loring 1982). Despite its appearance as a natural part of the dunes, a mound at the extreme southern end of the system is a sand-covered 'hill' formed in the nineteenth century from ship's ballast. This was deposited by ships that came to Seaton Sluice harbour to be loaded with coal (Fothergill 1934). A stream, Meggie's Burn, carries water from adjacent agricultural land, through an outflow pipe, constructed in the 1930s, flowing beneath the Blyth to Seaton Sluice road and then under the dunes. It ends at the base of the dunes, where there has been severe erosion of sand. The stream meanders across the shore, often changing course after storms. It sometimes undercuts one of the wooden groynes, probably reducing its ability to trap sand.

2.4.2 Leisure

The dunes have been, and still are, an important leisure resource for the local community, with a promenade towards the northern end, now in poor condition, and a disused bandstand. They currently suffer from excessive and largely uncontrolled trampling from walkers, including dog-walkers, horse riders and people gaining access from car parking places to the shore. They are consequently characterized by a network of interconnecting paths. In many places, trampling has destroyed vegetation, leading to areas of bare sand. In the worst of these, gales have caused 'blowouts', with severe loss of sand. As in many areas there is the difficulty of balancing the public's use of the site whilst managing the impacts that they may cause. The balancing act centres around maintaining the naturalness of the site (keeping it wild), preserving the natural heritage, (the geology, habitats and landforms) maintaining biodiversity and local distinctiveness whilst still providing spaces for recreation, social interaction, relaxation and experiencing nature (Scottish Natural Heritage 2005). There are also the issues of access (car parking) and economic regeneration: cafes, gift shops and mobile catering outlets can provide valuable services and jobs but also litter and potentially detract from a sites naturalness (Natural England 2013).

2.4.3 Wildlife

Natural coastal processes are also a cause of sand movement in the study area. Comparisons of profiles of the shore and dunes made by members of the Links Conservation Group with similar profiles commissioned by Blyth Valley Borough Council at various times since the 1950s showed that sand is eroding in the central part of the Bay, and accreting at the northern and southern ends.

The dunes still support a rich diversity of plants and animals, including several species of conservation importance. Bird life includes two species, the skylark (*Alauda alvensis)* and song thrush (*Turdus philomelos)*, whose decline in numbers has been the cause of national concern (Birdlife International 2013). Sea bindweed (*Calystegia soldanella)*, sand lucerne (*Medicago sativa)* and bur chervil (*Anthriscus caucalis)* are among rare plants that occur in these dunes, as well as the Duke of Argyll's tea plant (*Lycium barbarum)* which is a non-native invasive species that was almost certainly introduced with the ballast that was deposited at the southern end of the dunes. The plant however is a valued part of the biodiversity on the dunes and a conservation point. As are the garden escapees (gladioli, *Gladioulus spp* and snowdrops, *Galanthus nivalis*) which flourish in the spots were they have been dumped. Jacobson (2011) argues that not all non-natives are bad as they can contribute to conservation objectives by providing food sources and habitats and in many cases they are benign and in time will be seen as desirable. A direct example of a species being introduced into a sand dune habitat can been found in the common rabbit, (*Oryctolagus cuniculus)* which was introduced by the Romans as a source of food (JNCC 2004). Rare insect life includes the Lyme grass moth (*Photodes elymi*) and the dingy skipper butterfly (*Erynnis tages).*

The results of three wildlife surveys have been submitted to national recording schemes: Mammals – results contributed to the Wildlife Trusts' national mammal monitoring scheme (2005). Plants - results contributed to the Plant Life's "Common Plant Survey" (2005). Butterflies – results contributed to the Butterfly Conservation's Butterfly Monitoring Scheme (2005). All the records from the bird survey were submitted to the Northumberland county recorder.

2.5 Management recommendations.

Members of the Links Conservation Group held fortnightly meetings and workshops in the coastal warden's education centre at the north end of the dunes to discuss the progress of the surveys and identify forthcoming work-packages. The meetings were chaired by the Links Group's chairperson, the sectary took minutes, the researcher and coastal warden provided information and advice as necessary. Towards the end of the two year study period the focus of the meetings became a consideration of the data gathered and specific concerns relating to the dunes. The group's management recommendations related to four specific issues:

- The need to raise awareness of the value and importance of the dunes in the local community. This should be done by developing educational materials and finding ways of disseminating information to the general public.
- The need to improve the aesthetic value of the dunes by reducing plastic litter and other picnic/household materials.
- The need to address problems relating to the erosion associated with Meggie's Burn. A possible solution was to extend the outfall pipe so that it ended below low water. In addition, it was suggested that the area of dunes adjacent to the stream should be replenished with sand and that marram grass *Ammophila arenaria* should be planted in the bare areas in order to stabilize the sand.
- The need to address the issue of erosion that was occurring along paths that were used for access to the shore. One way of reducing the impact of trampling would be to provide fencing at strategic places as a means of channelling people along certain routes, and thereby limiting the number of access points. Another would be to construct boardwalks across the dunes. Sand replenishment and re-planting programmes were needed in the most severely affected areas.

2.5.1 Management actions.

The management recommendations developed by the Links Conservation Group have been considered at three levels (national, regional and local), and in several cases they have been acted upon:

2.5.2 National plans.

The Group accepted an invitation from the Northumbrian Coastal Authorities Group to submit its proposals to the UK Government's (DEFRA) Shoreline Management Plan 2. Some of the group's recommendations were incorporated into the document, for example the need to replace the sand lost in the blowout areas to stop breaches in the dunes during extreme high tides.

2.5.3 Regional plans.

Several of the Group's recommendations have been incorporated into planning processes by Blyth Valley Borough Council. The following actions have been funded by the Council:

- Members of staff from the Dove Marine Laboratory, working in collaboration with the Links Conservation Group and other Blyth residents, designed a nature trail, drawing attention to features of wildlife and historical interest in the dunes. It has been published, and made widely available, by Blyth Valley Borough Council.

- Four display boards, giving information about the wartime history of the dunes, the fragility of the ecosystem, dune conservation and wildlife, have been placed at intervals along the nature trail.

- Sand has been moved from the southern end of the Bay, where it is accreting, to the damaged area adjacent to Meggie's Burn and the two most severe blowouts.

2.5.4 Local Actions

Recommendations also included further involvement for members of the Links Conservation Group themselves. These have included:

- Planting marram grass in the newly-deposited sand at Meggies' Burn and in the blowout areas.

- Organizing annual litter clean-up events.

- Starting a programme to monitor the health of the dunes through measurements of shore/dune profiles.

- Continuing biodiversity monitoring programmes with conservation groups.

- Involving students from two of Blyth's schools, (South Beach Primary School and New Hartley Primary School) in educational programmes relating to the dunes, including field surveys of birds.

- Collaborating with students from Cramlington High School in their own independent studies of the dunes.

- Disseminating information about the dunes in a range of different ways:

(i) Articles have appeared in the local and regional press and magazines, including *The Newcastle Journal*, *Newspost Leader* and *The Chronicle*, *The Northumbrian* magazine and *Northumberland and North Tyneside Bird Club's Annual Review* (e.g. Stockill & Evans 2004; Gebbels 2005, 2006).

(ii) There has been regional radio and BBC1 "*Look North*" television coverage.

(iii) The Group has published a monthly newsletter *Grassroots* for circulation among its members.

(iv) Three presentations describing the project were given to open meetings of the Blyth Valley Community Assembly.

(v) A public lecture describing the project was given at Newcastle University as part of National Science Week in March, 2004.

(vi) A full-day seminar *'Celebrating Our Cultural Heritage'* was held at Blyth Community College in September 2005, opened by the Mayor of Blyth Valley.

2.6 Benefits to members of the Links Conservation Group in participating in the project.

Twelve members of the Group, who were all regular contributors to the programme, were asked to complete a short questionnaire relating to their own experiences in the project. They were asked to respond to 9 questions and to grade answers on a scale of 0 to 10, where 0 = not at all and 10 = as much as could be expected.

Overall, responses were highly positive; mean scores for the questions ranged from 5.9 to 9.0 (Table 2.3).

Table 2.3. Responses of members of the Links Conservation Group to questions relating to their own benefits from participating in the project. Members were asked to grade their responses on a score of 0 to 10, where 0 = not at all, and 10 = as much as could be expected. N=12

Question number	Question	Mean score ± standard error
1	To what extent has your involvement in the project raised your awareness of local environmental issues?	8.1±0.51
2	To what extent has your involvement in the project raised your awareness of wider environmental issues	7.9±0.77
3	To what extent has your involvement in the project increased your feelings of responsibility towards the local environment?	8.4±0.62
4	To what extent has your involvement in the project increased your feelings of ownership towards the Blyth-Hartley Links Nature Reserve?	7.5±0.78
5	To what extent has your involvement in the project increased your knowledge of local wildlife, including plants and animals?	7.3±0.58
6	To what extent has your involvement in the project, increased your motivation to become involved in other environmental projects?	5.9±0.88
7	To what extent do you feel that the project has generated information that should be valuable to the environmental managers?	8.2±0.36
8	How strongly do you feel that lay people have a role to play in management of the local environment?	9.0±0.33
9	To what extent do you feel that your views have been considered by environmental managers?	6.6±0.80

Participants clearly felt that the project had:

- Increased their awareness of environmental issues (Q1 and 2);
- increased their feelings of responsibility and 'ownership' towards the environment (Q3 and Q4);
- increased their knowledge of wildlife (Q5);
- and increased their motivation to become involved in further projects (Q6).

In addition, members of the Group believed strongly that what they were doing was important (Q7 and 8) and, to a lesser extent, that their views were being listened to by the environmental managers (Q9).

2.7 The Birds of Blyth: A Community Bird Survey

This survey is outlined in detail as it can be viewed as a stand-alone study although it was an integral part of the Bylth/Hartley sand dune project.

Introduction

The area surrounding the Blyth/Hartley Links supports a wide diversity of bird species (Holiday 2000). It also contains several habitats, which range from the muddy estuary of the River Blyth, to woods, farmland and the sand dunes that form The Links. The birds which can be seen vary widely with the seasons. Some are only present during the summer breeding season; others spend only wintertime in the area whilst another species just use the valley as a staging post in their journeys to other parts of the world. Each one of these factors helps to give Blyth a rich and varied birdlife. The Blyth Estuary is of special ornithological interest. It is the second most important estuary as a feeding area and roost site for wintering species in the county; especially for waders, purple sand pipers (*Calidris maritime*), cormorants (*Phalacrocorax carbo*) and shelducks (*Tadorna tadorna*) (Day & Hodgson, 2003). Moderate to high densities of ten seabird species were detected in Northumberland, highlighting that Northumberland waters support important concentrations of wintering seabirds (Brereton *et al.* 2010). Inspection of sightings data from local survey effort (Northumbria Bird Club Reports 2007 and 2008) indicates that individual sites and/or Northumberland as a whole are nationally important for a number of coastal seabird species of conservation concern. Northumberland is accredited with

various statuses including Site of Special Scientific Interest (SSSI), Special Protected Area (SPA), Site of National Conservation Interest (SNCI) and Ramsar.

Stable bird population trends are regarded as good indicators of overall environmental quality (Gregory & Stein 2010).   Birds are sensitive to a variety of potential changes affecting their habitats and the health of populations is therefore of considerable relevance to sustainability (World Energy Council 2005). Not surprisingly, three important organizations, the Royal Society for the Protection of Birds, Birdlife International (www.birdlife.org) and the European Bird Census Council, have developed a biodiversity indicator, The Common Bird Indicator, based on the population trends of representative species of "common" birds (Birdlife International 2010). Therefore it is important that bird life in Blyth is surveyed as one of the ways of assessing and monitoring the quality of the own environment. One of the surveys in the Blyth /Hartley project looked especially at the birdlife in the area.

2.7.1 Aims
The birds of Blyth survey aimed:

- to promote an interest in birds among the general public, especially people with little or no ornithological experience.
- To allow opportunities for participants to propose management measures to improve the habitats for birds and other wildlife.

2.8 Methods. The Birds of Blyth
The year-long study started in December 2004.   Volunteers were recruited by word of mouth and via press articles. The group of 40+ represented a wide range of age groups, backgrounds and neighbourhoods from throughout the region. Examples of participants include, 15 girl guides (10-14 years) from Blyth, members of the Northumberland and Tyneside bird club, members of the Links Conservation Group, children and parents from the local schools and interested individuals from the community. Participants were asked to survey birds in recording sessions for one hour a month.   Overall six different habitats were surveyed: the Blyth/Hartley Links, Blyth Harbour, a wood in New Hartley, the River Blyth estuary, the foreshore between Blyth and Seaton Sluice and selected farmland opposite the Blyth/Hartley dunes. The introductory event was a workshop run by the

author with assistance from the Conservation Officer of Northumberland and Tyneside bird club. It aimed to familiarize people with the birds that might be seen and the recording methods that were to be used.

2.9 Results. The Birds of Blyth

Over 40 different people retained their interest throughout the year, 71 different species of birds were recorded throughout the study – 15,414 individual birds. The most popular site to watch birds was the farmland followed by the Blyth/Hartley Links. The least popular was the woodland. The individual sightings of the most frequently recorded species are detailed in Figure 2.1
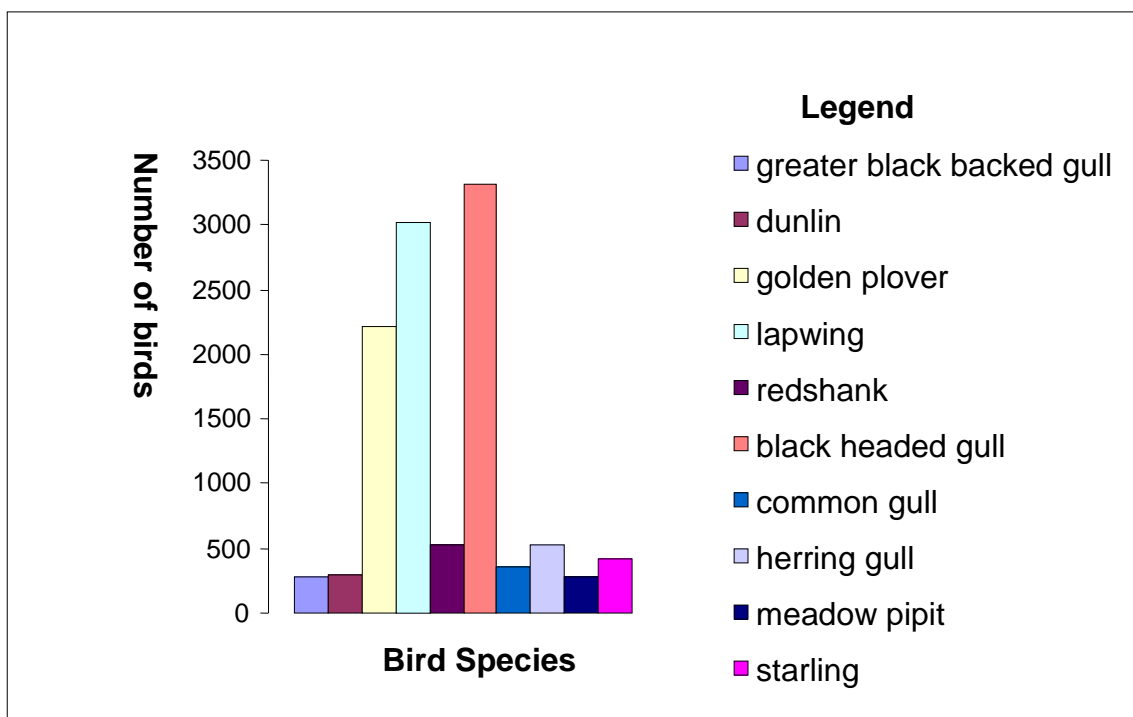
Figure 2.1. The ten most common birds seen throughout the survey over one year.

Some of the less common bird the participants observed included Bar-Tailed Godwits (*Limosa lapponica)*, Corn Buntings (*Miliaria calandra*) and an Icterine Warbler (*Hippolais icterina*). The Corn Bunting was an interesting find as it has a red status rating on the U.K.'s list of conservation importance. Two were seen in the hedgerow near the cemetery at the northern end of the dunes. It is an uncommon and declining breeding resident (British Trust for Ornithology 2013). Icterine Warblers are also rare visitors;

Northumberland is one of the best counties in the UK to see this species (Birdguides 2013). The bird in this survey was seen in the farmland opposite the Blyth/Hartley Links. The Blyth/Hartley Links support a large population of Skylarks (*Alauda arvensis).* The national population has been declining over the years (BTO 2013), mainly due to habitat loss and changes in agricultural policy. However, there were 30 records of Skylarks during the study, of which 22 were seen on the Links. Another finding was the record of 68 individual Stonechats (*Saxicola torquata).* Most of them were observed either within the Links or in the surrounding farmland. This reflects the continuing expansion of this species in Northumberland from a low of five breeding pairs (The Atlas of Breeding Birds in Northumbria, Day *et al.* 1995).

The success of the project can be measured in the number of returned sightings forms and the public's raised awareness for and appreciation of the birds of Blyth. The volunteers' enthusiasm was both infectious and continuous, so much so that some people continued to survey independently even though the study had ended. A local group of Girl Guides had used the experience as part of their "community" badge and it has inspired others to join local and national ornithological organizations. Through taking part in a bird project people have also realized the diversity of their local habitats in relation to other organisms. At the end of the year's study the group met at the Dove Marine Laboratory to hear the results of the surveys from the researcher and propose their management ideas. These included: specialized planting schemes to provide food and shelter for the birds, dog free areas on the beaches, and areas set aside for bird watching such as hides and other suitable viewing places. These suggestions were put forward by a group of volunteers to the local authority along with the other management recommendations in the Blyth/Hartley project. One of them only, specialised planting, was implemented.

Table 2.4. SWOT analysis of the Links Conservation Groups and birds of Blyth participant management recommendations.

The Blyth /Hartley sand dunes could be **Strengthened** by implementing the following community management recommendations:	The Blyth /Hartley sand dunes could be **Weakened** by implementing the following community management recommendations
Specialised planting schemes for shelter and food for birds	Moving sand from one part of the bay to the blowout areas
Designing a series of info panels	Building a bird hide.
Raising the profile of the LCG	
Designing a nature trail	
Dog free areas on the beach	
Build broadwalks as pathways	
Re-planting marram grass.	
The use of fencing to trap sand	
Start a series of monthly measurements of shore heights/dune profiles.	
The Blyth /Hartley sand dunes could have **Opportunities** for improvement by implementing the following community management recommendations	The Blyth /Hartley sand dunes could be **Threatened** by implementing the following community management recommendations
Organising annual litter picks with wider community involvement.	Lay people suggesting management recommendations.
Continuing monitoring with conservation groups	
Involving local schools in a range of conservation activities	

2.10 Analysis of SWOT table.

Strengths. All the recommendations in the strengths list were implemented with the exception of dog free areas on the beach and the building of boardwalks as pathways. There was one in existence at the time of the study; it led from the main car park through the dunes to the beach. Whilst it was initially successful in directing users along a designated route, over time it became covered with sand and its effectiveness became greatly reduced. The idea for dog free areas on the beach came from the birds of Blyth focus group. During their surveys they noticed that birds were often disturbed by dogs. The group felt that this idea would allow birds more feeding time at the water's edge. Whilst it was said to be a good idea by some members of project, it was not accepted as a recommendation as there were concerns as to how the designated area would be enforced. The other points were implemented as the environmental managers and Links Conservation Group both decided that they were achievable with the time and resources that were available.

Weaknesses. One recommendation which was carried out had the potential to be a weakness. There were several areas along the dunes that had lost large amounts of sand through sediment being blown away when the marram grass which bound it, died. This can be perceived as a natural process, dune systems are ever changing and dynamic. A large quantity of sand was dredged from the mouth of the nearby River Blyth and used to fill the blowout areas. This sand moves during the seasons from the south end of the bay to the northern end were it obstructs the channel, hampering the vessels that use the harbour, it is cleared annually and moved offshore (Shoreline Management Plan 2005). The result of this human intervention is that there is less sand in the system for the replenishment of the dunes which are noticeably lower than they were in the 1930's (Skinner 1934). In 2013 the areas that have been filled have not been colonised by marram grass and are still covered with hessian sacking (personal observation). The birds of Blyth focus group expressed a recommendation to construct a bird hide. Whist this was initially considered a viable option, concern was raised about acts of vandalism which could lead it to be fire hazard. As this was considered a real threat the hide was not built.

Opportunities. The project participants looked to the wider community to see what opportunities could be found there to help improve the sand dune habitat. Their

suggestions included community litter picks during the summer months, continuing monitoring programmes with the conservation groups as good links had been established. It was also agreed that the Coastal Warden should lead on the initiative to involve schools and increase the use of the education facility were his offices are based. The managers and Links Conservation Groups viewed these opportunities as positive ways which would increase public responsibility for behaviour towards the sand dune habitat and improve trust between stakeholders and managers by increasing the capacity for greater inclusion and transparency.

Threats. Ironically enabling greater public participation in marine planning and governance could be perceived as a threat. There was some resistance and lack of acceptance from certain traditional stakeholders who believed that governance was the preserve of local authorities and government agencies. Some took the view that the project was just a public relations exercise.

2.11 Discussion

The data and information collected by the Links Conservation Group presents a positive view of the Blyth and Hartley links. It demonstrates that the Links are an important part of the environmental and cultural heritage of Blyth Valley. Although the management recommendations that have been produced for them have arisen from a small group of people, the Links Conservation Group, inputs from several different individuals and organizations have been incorporated into them. Responsibility has therefore been shared between a wide range of people. The importance placed on the recommendations by the environmental managers, industry and the media are illustrated by outputs such as the publication of a nature trail, signage and wide dissemination of the results of the project. The success of the project can also be measured in the longer term outcomes mentioned in the next section.

Benefits of incorporating public opinion into the decision-making processes are of at least five kinds:

1.) The quality of the decision-making process can be improved by the incorporation of the public. This is because society possesses a wealth of non-scientific knowledge, wisdom, skills and perceptions, including cultural and social ones, and these may be highly

beneficial in determining wise policy on environmental issues. As Christie & White (1997) have argued local knowledge coupled with the specialist knowledge of the scientist is more potent than either kind of knowledge on its own. While there have been several studies that have shown that environmental knowledge of the general public is generally poor (see general introduction for references), it became evident in the present study that there are some individuals in the local community who have exceptional knowledge of the local environment. This includes people who have researched the local history to a high level and 'non-specialists' with above average abilities to identify wildlife groups, such as plants, birds, mammals and insects. Examples of how the decision making processes were enabled by public participation in this project can be found in three instances. Firstly, members of the Links Conservation Group had an intimate knowledge of the erosion processes taking place along the dune fronts; this information was shared with the authorities responsible for updating the Shoreline Management Plan 2 and was incorporated into that document. Secondly, the members of the plant and bird groups worked together to recommend a list of plants that could be planted to provide food and shelter for birds. The list was submitted to environmental managers who amended their dunes planting policy, acted on the suggestions and planted the shrubs. Thirdly, the Coastal Warden's planting policy was influenced by the plant conservation group who advised him that when he was replanting areas of marram grass he should use plants from the dunes rather than buy in new stock. This small change in policy resulted in an increase in the successful growth of new plants.

2.) Lay involvement will help the implementation of policies since policies that recognize, respect and weigh the public's attitudes are likely to win public support (House of Lords 2000). As mentioned in the introduction BVBC built a cycle path through the dunes without any public consultation. Many people were upset about this as they felt that one of the last areas of local wildspace had been lost. Some of the people who held these views were members of the Links Conservation Group. During the course of the two year project their views moderated and many decided that although they preferred the area without the pathway, they conceded that there were many advantages to it. They communicated these views to other local residences which helped with its acceptance within the community.

3.) Public participation will improve trust in the scientific process (Mackintosh & Nottestad 1998), which is often under-valued and misunderstood to the general detriment of scientific advancement (House of Lords 2000). At the beginning of the study there was resistance from the local residences towards the scientists and local managers. However, through close partnership working, strong bonds were forged which allowed mutually beneficial advantages to all groups. The Links Conservation Group gained support for the work that they did in the area, the environmental managers were able to implement policy change that had public support and input, and the conservation groups had valuable data about the biodiversity present in the habitat.

4.) The public becomes a potentially huge work force that can support ecological studies. There are ever-increasing numbers of completed projects that would have been too ambitious, costly and time-consuming to be undertaken without volunteer assistance. This includes, for example, biodiversity surveys and the production of species atlases (e.g. Foster-Smith & Evans 2003, Barratt *et al.* 2003) as well as studies that are more experimental in nature: volunteers investigating biodiversity in Coral reef ecosystems (Mumby *et al.* 1995), TBT contamination in the North Sea, (Evans *et al.* 2000) assessing the performance of volunteers in wildlife conservation (Newman *et al.* 2003). Members of the Links Conservation Group collected valuable information about the dunes, some of which has contributed to national recording schemes, published regular newsletters, were involved in re-habilitating parts of the dunes and also in designing and participating in a longer-term monitoring programme.

5.) Public involvement in projects of this kind has huge benefits for the participants and, probably because of them, knock-on benefits to the whole of society. Members of the Links Conservation Group felt that they had increased awareness of environmental issues; increased feelings of ownership and responsibility towards the environment, increased knowledge of wildlife and increased motivation to contribute to further environmental projects.

A criticism of the study is that it arguably attracted people who were already interested in taking part in ecological projects and who have portrayed the project in a positive light. Further work should look at strategies for reaching under-representative groups in the region who are not typically involved in decision making processes.

2.12 Project update.

There have been several outcomes since the project ended in 2005. The Links Conservation Group continues to meet once a fortnight, six of the original team are still involved and they have recruited another five members. The Blyth/Hartley links are now a Local Nature Reserve with a special remit to improve access to recreational green space. The Links Conservation Group plays an active role in its management. The designation arguably increases the status of the dunes in the eyes of the public, (Natural England 2013) and increases the chance of obtaining grants to carryout projects. The Coastal Warden informed the author that demand for the education centre on the dunes is increasing as more school groups use it as a base for ecology studies. Open days in the education centre run by the wardens and the LCG inform people of the value of habitat and provide opportunities for users to "have a go" at various activities. Two group members, retired males, are now volunteer wardens who assist the Coastal Warden with his duties. These "key communicators" (Sayce *et al* 2012) provide valuable links between the group and the environmental managers enabling ideas and information to flow between the two. Additionally, all the users can see the challenges that each party faces. The partnership allows members to feel a sense of confidence in their abilities as their skills increase and a continuing feeling of empowerment that their views are taken into consideration whilst building mutual respect. The additional presence of two extra wardens may act as a deterrent to vandals. The nature trail leaflet is still being produced and the walk has been incorporated into the wildspace network that publishes long and short walks in the Borough. The cycle path is part of the National Cycle Network (route no. 1) (Natural England 2013). The mammal, and plant conservation groups revisit the site at regular intervals to update their records and the bird group continue to survey at three of the original sites (Blyth and Seaton Sluice harbour and the foreshore).

Table 2.5 Benefits of the project to Links Conservation Group, the wider public and the Environmental Managers.

Group	Links Conservation Group Benefits	Wider Public Benefits	Environmental Managers. Benefits	Conservation Groups Benefits
	Local nature reserve status for dunes.	Local nature reserve status for dunes.	Local nature reserve status for dunes.	Local nature reserve status for dunes
	Better understanding of the views of environmental mangers	Nature trail incorporated into wider network of walks	Better understanding of the public's views	Continuation of biodiversity data
	Increase in practical and management skills	Linkage to National Cycle Routes	Public acting as extra workforce	Public acting as extra workforce
	Increased use of education facilities	Increased use of education facilities	Increased use of education facilities	
	Increased status of the area in public's eyes	Increased status of the area in public's eyes.	Increased status of the area in public's eyes.	Increased status of the area in public's eyes.
	Sense of empowerment.	Series of open days and taster events		

2.13 Conclusions

The project has demonstrated that lay people can work effectively alongside scientists, environmental managers and specialist conservation groups. The subsequent valuable data and management recommendations were a valuable tool to inform local and regional policies, produce community resources and build long term relationships. Projects of this kind can aid multi-directional dialogues, increase sense of ownership and have continuing long term effects. Future projects should place more emphasis on working with hard to reach groups.

Chapter 3 The 'Citizens' Day' as a means of empowering young people to contribute to coastal management processes.

A modified form of this chapter has been published as**:** Evans, S.M., Gebbels, S., Green, M. and Stockill, J.M. (2008).   The 'Citizens' Day' as a means of empowering young people to contribute to coastal management processes. Oceanis 24 (1/2), 255-265.

3.1 Introduction

Education must provide the key to the long-term solution of the world's environmental problems. It is through it that humankind can generate a new ethic in which it is prepared to live in harmony with nature (World Conservation Strategy 1980).   Teaching innovations, such as the introduction of *Citizenship* in the National Curriculum in England and Wales (Crick 2001) and the U.K. Department for Education and Skills' (2003) initiative *Sustainable Development Action Plan for Education and Skills* are therefore welcome and exciting opportunities for environmental citizenship development. They are mirrored in many different parts of the world. They do, nevertheless, present formidable challenges for the teachers at tertiary, secondary and primary levels of education (Toakley & Aroni 1998, Chatzifoiou 2002, Summers *et al.* 2003), and may require re-examination of priorities in teaching environmental education or even major reforms of the curriculum (Rauch 2002, Dillon *et al.* 2005, Haigh 2005, Varnham 2005, Faulk 2006).

Citizenship is taught in the national curriculum and underscored by the requirement to teach 'moral development', through helping pupils develop a critical appreciation of issues of right and wrong, justice, fairness, rights and obligations in society' (DEE & QCA 1999). In the past environmental citizenship had a low priority in English schools (Heater 2001) and was based on abstract knowledge which although led to increased concern it also resulted in a feeling of powerlessness and action paralysis' (Uzzell 1994, Macnaghten & Jacobs 1997). Several teaching initiatives have been designed to bring environmental-related citizenship issues into the classroom, through, for example, informed debate on controversial topics (Campbell 2002, Smith 2005), the development of emotional literacy (Matthews *et al.* 2002) and highlighting concerns in bioethics (Macer 2004) outdoor learning, (Barker *et al* 2002) and waste management (Sperling & Bencze 2010). There have also been calls for more participatory approaches to learning, addressing real issues with which young people can identify (Slingsby & Barker 2003). Huckle (1986) argues that

environmental citizenship can only be learnt by practicing it and suggests that students should become involved in issues that are affecting their communities, and Hungerford & Volk (1990) believe that there are needs for new approaches to environmental education that will take instruction beyond environmental awareness, giving students the opportunity to develop senses of environmental ownership and empowerment. Environmental awareness has been defined by the UN (1999) as "The growth and development of awareness, understanding and consciousness toward the biophysical environment and its problems, including human interactions and effects." Bourne (2005) argues that strategies for promoting education for sustainable development and citizenship should be linked to people's active engagement in society, and Barton *et al.* (2005) suggest that science experiences in the classroom should bridge the gap between the practices of science in the real world with students' own interests and experiences. Dobson (2006) argues that the entire citizenship curriculum could be taught through environmental citizenship because every theme in the curriculum is present in it. He gives the example of how environmental issues in any given school's community would provide the opportunity for pupils to 'share ideas, formulate policies and take part in responsible action in communities'. The Citizens' Days are examples of this approach in action. It supports Dobson's view that the best way to learn is to do.

The concept of the Citizens' Day, which is described in this third chapter, gives students the responsibility to participate in environmental planning and decision-making processes in real situations, concerned with the local environment. It was originally developed and tested with students of secondary school age, including sixth-formers (Evans *et al.* 2005, Evans *et al.* 2007), and followed successful projects with adult groups (Evans *et al.* 2008a). Students gather information from a range of different sources about a local habitat of conservation interest, such as a nature reserve, and then make their own recommendations for its future management. Projects are developed in collaboration with local environmental managers (e.g. local authorities) and industry so that management recommendations arising from them can be fed into real planning processes. Here, the possibility was investigated that the Citizens' Day can be developed successfully for children of primary school age. There were three reasons for considering this age group. First, the abilities of young children to make sensible and mature recommendations

relating to land management when left to their own devices are probably underestimated (Dixon *et al.* 2005). Second, most environmental management or conservation projects are well-suited to the multi-disciplinary approach and the greater flexibility in primary school education offers a better opportunity to do this than is possible in the more restrictive, single-subject, qualifications-orientated, secondary school curriculum. Third, young children have a natural curiosity with nature (Palmer & Suggate 2004), and harnessing it at an early stage may help to increase numbers of children taking "A" level sciences.

Two Citizens' Day models have been developed here and tested for primary children. One of them, the Environmental Citizens' Day, is based on the kittiwake and an artificial nesting site, located in a small local nature reserve on the banks of the River Tyne. This project worked with children and staff from Lindisfarne Primary School (Gateshead). The other, the Courtroom Citizens' Day, is concerned with threats to the health of the River Tyne, using the salmon as an indicator species. It is based on role play: the classroom becomes a court in which different members of society (industrialist, farmer, angler etc.) are put on trial because of the potential threats that they cause to the environment. Members of Bill Quay Primary School (Gateshead) were involved in this project.

40% of the project was funded by *Akzo Nobel* from their Community Fund, 40% from the Esme Fairbairn Foundation and the remaining 20% from Gateshead Borough Council. Within the budget there was an allocated amount for implementing any management recommendations that the children decided upon.

3.2 Aims and Objectives.
The aim of these programmes was: to investigate if primary school children can work alongside scientists and environmental managers to effectively promote awareness of specific, local, environmental issues to the wider public.

Objectives:
1) to offer learning opportunities which allow children to explore and develop their relationships with the natural world.

2) to provide opportunities for school children to debate current environmental issues with their peers, parents, environmentalists and scientists.

3) to provide opportunities for children to develop a sense of environmental citizenship

3.3 The Environmental Citizens' Day.
3.3.1 Methods.

Thirteen students of mixed ability from Year 4 (ages 7/8) at Lindisfarne Primary School (Gateshead) worked on this project. The school was chosen because the teacher was known to have an interest in ornithology and in project based learning. The school is small for an inner-city school, 63 pupils aged from 3-11. 2005 key stage 2 SATs results showed that the pupils achieved less than average scores in English, slightly above average scores in Maths and 10% higher than average scores in Science. 34.50% of the pupils throughout the school were on the Special Educational Needs register.

The pupils focussed their interests on the kittiwake (*Rissa tridactyla)*, a common seabird in northeast England. This species was chosen for several reasons: Seabirds are some of the more prominent members of the marine community of the North Sea, with changes in population size considered to be reasonably good indicators of important changes in seabird community structure and therefore useful indicators of the overall state of the ecosystem. The kittiwake is been identified in the EU marine strategy framework directive as a descriptor species for changes in trophic structure (Gubbay 2009). Kittiwakes construct nests precariously on narrow cliff ledges and there are several large breeding colonies, some consisting of many thousands of nesting pairs, on suitable cliffs along the NE coast and bordering near-shore islands. One unusual feature of kittiwakes on Tyneside is that some of them have taken to constructing their nests on window ledges of warehouses.   By doing this, they have moved much further inland than is normal, progressing as far up the River Tyne as the City of Newcastle itself. However, their presence on window ledges can become contentious and the birds were deprived of one particular breeding site, the Baltic Flour Mill in Gateshead, when it was converted to become a centre for contemporary arts in 2002. Netting screens were erected to prevent the birds from reaching the window ledges on which they had nested for decades. However, the kittiwakes were provided with an alternative, artificial breeding site, The

Kittiwake Tower. It consists of a series of narrow ledges on which the birds can build their nests. Initially, the tower was sited adjacent to the Flour Mill but it has since been moved down river, some 2-3km away, to Felling. Kittiwakes have adopted the tower, which provides nesting places for up to 200 pairs. The tower, and the area immediately adjacent to it, now has the status of a local nature reserve which is partially run by volunteers with help from Gateshead Borough Council's Wildspace officer, Peter Shield.

Prior to the start of the project the author worked with the class teacher, Mr John Innerdale, to devise a cross curricula scheme of work based around the kittiwake that would last for a 12 week term (spring 2006). The author researched the topic, then after consulting the schools planning, assessment and learning outcome documents developed 12 lesson plans. The teacher commented on their content and revised any aspect of the sessions that he felt could be improved upon to suit the pupils learning styles. Using this project based approach the children considered not only the bird's natural history but were engaged creatively with the kittiwake and its environment through music, debate, visual arts and storytelling as well as the more traditional school subjects. Advantages of a project based approach to learning include: increased attendance, growth in self-reliance and improved attitudes toward learning (Thomas 2000, Boaler 2007) It also provides opportunities to develop complex skills, such as higher-order thinking, problem-solving, collaborating, and communicating (SRI, 2000) as well as access to a broader range of learning opportunities in the classroom, (Railsback, 2002).

The author visited the class once a week for a two hour session for the duration of the project. She taught different aspects of the birds' biology: life cycle, mating patterns, reproductive strategies, food preferences and nesting site inclinations. The methods used to deliver this information were varied and included: films, photographs, books, and debate. Stuffed birds (juvenile and adult) were borrowed from the local natural history museum for the children to study along with blown kittiwake eggs. In addition to The Citizens' Day fieldtrip the children had two outdoor sessions. During the first they visited Newcastle quayside to see the birds nesting on the ledges of the Tyne Bridge and during the second they walked along the banks of the river on the Gateshead side and carried out a one hour bird survey.

The school funded an independent artist/creative practitioner, Malcolm Green to work with children during the project. His role was to help them create a 15 minute performance based around the kittiwake which was performed at The Sage Opera House in Gateshead during a schools festival. The author had minimal input into this aspect of the project; she gave some advice about the kittiwake's lifecycles and offered some feedback during rehearsals.

3.3.2 The Citizens' Day fieldtrip

The Citizens' Day fieldtrip was held towards the end of the project and was based around a two hour visit to the Kittiwake Tower Nature Reserve, which is a twenty minute walk from the school. The site is of urban designation and covers two acres of riverside green-space which was reopened to the public after the completion of a 1.5 million pound remediation scheme to deal with contamination left over from past industrial activity.
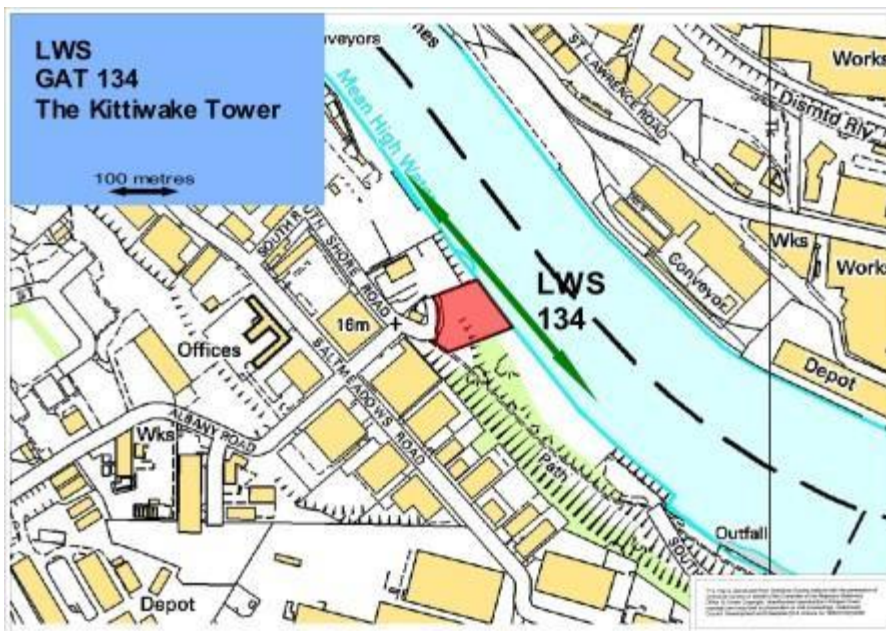
Figure 3.1 Location of The Kittiwake Tower Local Nature Reserve. Newcastle is 3km upstream on the right hand bank of the River Tyne. North Shields is 3km downstream on the right hand bank.

Figure 3.2 The Kittiwake Tower.

The field trip was structured around four questions:

- What is here that you can see?

- What is here that you cannot see?

- What is here that should not be here?

- What would you like to see here?

The children met the wildspace officer at the site and learnt about its history, the species that could be found there and the construction of The Kittiwake Tower. After this briefing the children were divided into 3 small groups of 4 and assigned an adult (the author, the teacher or the wildspace officer) and given the freedom to explore the site. The pupils were asked to note down their responses to the above questions. At the end of thirty minutes the class reconvened for a discussion about their findings. Finally they were asked to think more closely about their answers to question 4 and explore the area again but this time focus on what they would do to improve the area for other community members. Their responses were recorded by each group on their worksheets. The afternoon session was held in school, it involved an environmental game, run by the

author, which illustrated the bioaccumulation of pollutants in the food chain. The students then discussed their own ideas for improving and managing the environment (i.e. the nature reserve). The author introduced the topic by asking them to imagine that they were in charge of the reserve, what would they do to make it "better" for people and wildlife? Some examples were discussed with the class then all the suggestions were written on the whiteboard. Any suggestions that were duplicated were only written up once. The class was then asked to eliminate through debate any that they thought were not sensible or unsuitable (i.e. build a slide from the top of the tower). The author and class teacher were present and helped to chair the session but the onus was on the children.

3.4 Results

The class recommendations for management of The Kittiwake Tower nature reserve included the following:

- Provide information leaflets about the kittiwake to inform other people, including fellow school students.
- Plant wild flowers and trees to make the banks of the Tyne more colourful.
- Provide display boards about animals and birds, including those that cannot normally be seen (e.g. those living in the muddy banks of the Tyne, nocturnal creatures etc.).
- Provide picnic tables and benches so that more people can enjoy the Tyne.
- Provide bins for litter.

The following poems *'A baby kittiwake am I' and I wonder how far a kittiwake flies*, are two of many positive outcomes of the students' work, they illustrate their commitment to the project, their knowledge of the species and their ability to view the world through the kittiwake's eyes. Although some of the information is not correct, i.e. kittiwakes do not build their nests of moss and leaves, they do demonstrate that some biological knowledge has been acquired. Examples from the first poem demonstrate that the child has understood that the birds sit on narrow ledges they eat sandeels and cormorants are also a species of bird. It also establishes local knowledge: the Tyne is mentioned by name, personal experience of working with many NE primary children has highlighted that this knowledge is unusual. In the second poem the child also names the river and the writing celebrates the "orange beak" and "red mouth" of the kittiwake. The title of the poems suggests that the topic has awoken a sense of wonder in the pupil. These descriptors link in with

research by Barbat *et al* 2012) who suggest that three of the most important skills for children's creative writing are; observation, imagination and general knowledge.

> **A baby kittiwake am I,**
> *A baby kittiwake am I,*
> *A nest on the shore of the Tyne*
> *Made of twigs, moss and leaves.*
> *My mum sits on the ledge watching,*
> *I sit still waiting and waiting for a slimy sandeel to drop into my little mouth.*
> *I can see the bridge over the river,*
> *The cormorants skimming the water.*
> *I see curious schoolchildren*
> *Looking at me.*
> *At night I dreamt that I could fly.*
> *My mum did not believe me.*
> *Suddenly she saw me flying,*
> *She was amazed,*
> *She loved me so much*
> *She said 'you are an angel'.*

> **I wonder how far a Kittiwake flies.**
> *The view of the glorious Tyne,*
> *White shining foam on the rushing waves*
> *I saw a kittiwake, washing in water*
> *Orange beak*
> *Hovering*
> *Red mouth*
> *Shining feathers in the sky*
> *I wonder how far a kittiwake flies?*

3.4.1 Post fieldtrip

Peter Shield revisited the school a week after the fieldtrip took place and was presented with the class management recommendations. A small committee comprising of Mr.

Shield, the author, a representative from *Akzo Nobel* and Mr. Innerdale met to discuss which recommendations could be implemented within the confines of the project budget. Three of the five were chosen: an information leaflet, two display boards (one at the site and one at the Tyne Bridge) and picnic tables. The adult committee decided not to plant trees and flowers as the management planting scheme for the reserve was to allow it be as natural as possible without intervention. Litter bins were not provided as there had been problems in the past with vandals setting the bins alight. The teacher put forward the proposals to the children who agreed with the decisions. The wildspace officer and the author commissioned an artist to design the display boards and leaflets then organized the printing and manufacturing. 2000 leaflets were produced, they were distributed across the region; they were left in visitor's centres, wildlife reserves and through the organizing committees networks.

3.5 The Courtroom Citizens' Day.
3.5.1 Methods.
The model described here was developed at Bill Quay Primary School (Gateshead) with a class of 26 Year 6 (aged 10/11) children. The school is a smaller than average primary with 200 pupils on the register from ages 4-11, most children are from white British heritage, very few are from minor ethic groups. The proportion of children eligible for free school meals is below average. Approximately one fifth of pupils are on the Special Educational Needs register. The most recent Ofsted report said "pupils are provided with a good standard of education" (Ofsted 2009).

The school was selected as the researcher knew from a previous meeting that the teacher had an interest in participating in the study and that he had good knowledge of salmon fisheries in the NE. Salmon were chosen as the key species in this project as they are closely associated with the River Tyne as well as being a good indicator of water quality (Environment Agency 2008). There were good 'runs' of these fish prior to the 1930s but the species became locally extinct, due to severe industrial and domestic pollution of the estuary, until the 1980s. The problem was debated in the House of Parliament in 1936 (UK Parliamentary records 1936). However, clean-up measures have now resulted in huge improvements in water quality. Salmon have returned to the Tyne and the population is supplemented by the release of juveniles from the hatchery. The Tyne is now said to be

one of the best salmon rivers in England (Environment Agency 2008). Over a half term period, the researcher spent one, two hour period a week in school working on the project. The class teacher and author used a cross curricula, project based approach, to enable the pupils to become familiar with the life cycle and biology of the salmon. They visited the salmon hatchery at Kielder Dam, at the source of the North Tyne, and the class set-up an aquarium in the classroom in which the early stages of the development of the salmon where being studied.

The pedagogical approach used in The Courtroom Citizens' Day was developed by Geraldine Ling from Professor Dorothy Heathcote's "The Mantle of the Expert" (Heathcote 1985). Heathcote's strong belief was that education should to be aimed towards developing citizenship skills in students. The Mantle of the Expert approach can be summarized as follows: the teacher raises an issue and asks the students to discuss possible solutions. To help, the teacher introduces the concept of expertise and forms a company that possesses the skills to resolve the issue. The students are asked to pretend they are workers in the company and are given the responsibility to choose their own roles within the enterprise. Students and teachers move in and out of role over a period of time, developing deeper commitment to their roles and tasks. After this period of exploration, the teacher introduces a fictional client who needs the company to solve a major issue, often one that reflects universal dilemmas. This issue preoccupies the majority of class time and becomes cross curricula. Seeking resolution requires the students to acquire knowledge and practice a variety of different skills. The students develop knowledge and skills and expertise in the areas they have covered whilst learning in a motivated and authentic way (Heathcote 2008). The 'courtroom' scenario is now a technique commonly used as a drama tool for debating issues of all sorts (Evans *et al* 2008d).

3.5.2 The Courtroom Day
The objective of the courtroom session was to introduce the children to the concept of threats to the salmon and the river environment as a whole. In this case, the 'Citizens' Day' was condensed into an afternoon session lasting for approximately three hours. It was based entirely on role play. A number of outsiders, including expert ecologists, and the class teacher were invited to play the roles of the judge and members of society whose actions pose a threat to the existence of wild salmon. They were tried one at a time for

endangering the existence of salmon in the Tyne. Each was asked to bring an item that symbolized their particular role and dress appropriately for it. The roles were as follows:

- **The Judge (the author).** Directed courtroom proceedings and read out the case for the prosecution, that is, the specific threat caused by the defendant.

- **The Defendants.** Listed below. They were expected to respond to questions posed by the prosecution, justifying their actions and position.

  1. **Industrialist (member of staff from DML)**. Responsible for polluting and therefore poisoning the Tyne but at the same time contributing wealth and jobs for the local economy.

  2. **Farmer (member of staff from DML)**. Allows sheep to graze down to the water's edge, leading to erosion of the banks. The river may become unsuitable for salmon due to shallowing and widening.

  3. **Angler (member of staff from DML)**. Removes salmon from the river but spends money on meals, hotel bills etc., as well as the fees paid for permission to fish for a day, which is good for the local economy. Anglers have also campaigned strongly to have the river cleaned-up.

  4. **Traditional salmon fisher (the class teacher).** Comes from a family that has depended on taking salmon from the seas (before they migrate back up estuaries to breed) for generations. Removes salmon before they have had chance to breed.

  5. **Fish farmer (Staff member from Environment Agency)**. The point of issue is that, although fish farming does not yet directly affect the Tyne, it has major effects on west coast rivers and may be having an effect on the genetic health of the salmon.

  6. **Car driver / global warmer (A parent)**. Prosecuted for thoughtless use of his motor vehicle and therefore contributing to global warming and the resultant imbalance in the ecosystem.

7. **Northumbrian Water** (owners of Kielder Dam, **A member of staff from NW**). Obstructions to the river are one of the biggest threats to the salmon. The idea of this role was to highlight the effect of the effect of obstructions to the passage of the salmon to their breeding grounds.

Members of the class played three roles:

- The jury, consisting of six children.

- The prosecutors, involving 14 of the class, but operating in pairs, with each pair questioning one of the seven defendants,

- The media, consisting of six children, who would report orally (in practice mimicking television news presenters), on the outcomes of each of the seven 'trials'.

Decisions on which roles were played by which children were made at the start of the session by drawing names out of a hat. Each group was a mix of boys and girls of varying academic and vocal abilities.

Each defendant was tried in turn but time was given before each trial for class discussion about the questions that would be posed. The whole of the class could contribute to this discussion, not solely the prosecutors. Once the questions had been asked and the replies heard, the jury agreed on a verdict. The jury recommended an appropriate sentence to the judge and the specific actions that should be taken by the defendant to minimize their specific threats to salmon. This was an important feature: the jury was not there simply to say 'you are wrong' etc. but to come up with management recommendations and sensible solutions to issues. The Judge ensured that a balanced overview of each case was presented to the court and the pros and cons of each defendant's case was heard. At the end of the session, members of the class decided by voting on whom among the defendants posed the biggest threat to the salmon. The day's proceedings were then summed-up, with appropriate comments, by the judge.

3.6 Results

The actions of the industrialist were regarded as the most serious threat, almost by unanimous vote. He was given strict instructions to reduce pollution. The jury evidently felt that the benefits of Tyneside's industry in creating jobs and wealth for the region did

not outweigh the negative impacts of some of its activities. The fish farmer was severely censured for allowing cultivated salmon to escape into the river, and was told to improve and strengthen his cages. The farmer was given instructions to fence off his pastures so that stock could not reach and damage the banks of the Tyne. The car owner was told to consider more carefully the effects that thoughtless use of motor vehicles can have both on the local environment and globally, contributing, for example, to greenhouse gas emissions and global warming. Northumbrian Water largely escaped criticism but were reminded of their responsibilities towards the Tyne. The traditional fisher was found not guilty. It was considered that he should be allowed to continue to fish for salmon. Similarly, the angler was not guilty. His effects on the river environment and attitudes towards conservation, as well as the economic benefits that he brought to the region, were seen as positive impacts. An advantage of using the role play approach was that each child had a voice through the medium of their assumed role. It allowed even shy and inarticulate child a means to contribute to the class judgments. Role play allowed the pupils to explore characters, concepts and interactions between people and situations. Role play is seen as an important part of cognitive development (Kind 2012).

After the courtroom session the adults were asked orally for their views on the courtroom debate. All said that they were impressed with the sensible and mature way that the children had conducted themselves and the sentences that they had passed. The representative from Northumbrian Water commented that the process was one that could easily be used with an adult group. The class teacher also said that it was a model that he would use again with his pupils.

During the next (and final) weekly session in school the researcher and the class teacher carried out an exercise to discover how the pupils' thought they could disseminate what they had learnt. The researcher asked the pupils to discuss which method of dissemination would work best with the person next to them. The ideas were written on the whiteboard, any answers that were replicated were only written up once. The children were familiar with using a 'traffic light' system for evaluating ideas so this technique was used. Each child had three cards, one red, one amber and one green. Red cards are raised for negative responses, amber for not sure/ don't know and green for positive responses. Each child had to raise a card for each question but could only vote once. Each idea was then proposed and the children cast their votes. Whilst this method proved effective in gaining responses, a limitation is that the children can be easily influenced by their peers.

Hoppe *et al* (1995) carried out a focus group study with children and concluded that It should not be assumed that the individuals in a focus group are expressing their own definitive individual view.

Table 3.1 The pupils' ideas for disseminating the information that they had learnt about the salmon in the River Tyne n=26

	No. of children raising a red card	No. of children raising an amber card	No. of children raising a green card.
Write an article in the papers	4	1	21
Ask the local news station to do a report about the salmon.	3	2	21
Make an information leaflet about the salmon	1	1	24
Do the courtroom session again and invite other schools to come into our school to listen.	5	2	19
Ask the adults who took part in the courtroom debate to tell their friends and work colleagues.	5	3	18
Make an information board (there were several ideas were this should be put)	2	4	20

The researcher discussed the ideas with Mr Peter Shield and a representative from *Akzo Nobel*. They agreed that the suggestions were valuable and decided that with resources of time and money available, to fund an information leaflet and an information panel, in the same style as those suggested in the kittiwake project. They suggested that the school could be responsible for writing articles for the newspapers, contacting the television centre and liaising with other schools.

3.7 Discussion

The methods used in The Citizens' Days detailed in this chapter have shown to be effective in achieving the projects aim. They have shown that primary school children can work alongside scientists and environmental managers to effectively promote awareness of specific, local, environmental issues to the wider public.

Evidence for this can be seen in the following ways:

3.7.1 Tangible outputs

Project Objective: to provide the pupils with opportunities to debate current environmental issues with their peers, parents, environmentalists and scientists.

The management recommendations made by the participants were, almost without exception, realistic and affordable. These views were expressed verbally during consultations with environmental managers, i.e. Mr. Peter Shield of Gateshead Borough Council, and representatives in industry from the international paint company *Akzo Nobel.* All the partners, working together, designed and published two information leaflets: *'Amazing kittiwakes on our Tyne'* and *'Super salmon in our Tyne'.* These were distributed widely throughout the region and well received and praised by locals and professional environmentalists alike. Two complimentary information panels were also designed, one about the kittiwakes nesting under the Tyne Bridge and one about The Kittiwake Tower in the local nature reserve. Due to the difficulties of where to place a notice board about the salmon it was not created. The children from Bill Quay School were successful in getting their articles published in the local papers but not in attracting television coverage. The pupils from Lindisfarne School gave a public presentation at The Sage. These initiatives have been successful in highlighting two key local species to the public. The schools' efforts have made an impact in raising awareness and promoting community management of local environmental issues.

3.7.2 Creative learning

Project objective: to offer learning opportunities which allow children to explore and develop their relationships with the natural world.

Further evidence for the success of the project can be evidence by a quotation from Lindisfarne class teacher John Innerdale:

'One of the main reasons for the children becoming so interested is that they felt a personal link to the kittiwake through the visits and taking on the role of the bird. I've noticed so many times in primary school teaching that if you give the children personal ownership, they feel more involved and it becomes relevant to them. This combined with the cross-curricular nature of the project was the key to its success…if we are to enthuse our children once more in our increasingly industrial age – make it relevant to them and use as many areas of the curriculum as possible to teach it.' There is evidence to suggest (Hernandez & De La Paz 2009) that the project based learning approach used in the Citizens' Days encourages pupils to become critical of their work as the approach champions end products such as booklets, performances or public displays. It is the knowledge that other people will see their work that encourages pupils to do their best.

3.7.3 Environmental Citizenship

Project objective: to provide opportunities for children to develop a sense of environmental citizenship.

The Citizens' Days outlined in this chapter have the potential to provide a platform on which the pupils' can debate environmental concerns and help them develop a set of personal values towards the environment. They have demonstrated they can equip the children with the knowledge and skills required for identifying local problems and provide a medium for participation so that the children can be actively involved in working towards creating a sustainable environment with partners who have the means to carry out their ideas. These concepts correspond with four pre-determined components for environmental citizenship: knowledge, skills, attitude and participation set down in 1972 in Stockholm at the United Nations Conference on the Human Environment (Hawthorne & Alabaster 1999). The pupils' knowledge increased, as evidenced in their ability to write descriptive poetry about the kittiwakes and deliver a factual yet artist performance at a public venue. Their

debating and decision making skills increased as shown in the mature handling of the courtroom session and the voting on the management recommendations. Their levels of participation also increased as seen in the joint production of the leaflets and information panels.

3.7.4 Further work

This study did not test for attitudinal change towards the environment and there is no direct evidence to suggest that any occurred. McKinley & Fletcher (2012) point out that just because a person's knowledge and capacity to act have increased it does not follow that attitudinal change will follow. This is not unusual; Eagles & Demare (1999) found that there was no attitude change in 6th grade pupils' perception of the environment after a week's intensive summer camp. This is mirrored in papers by Gillet *et al* (1991) and Lisowski & Disinger (1991). Both studies found that after a 6 week and 7 day wilderness camp/hike that students' knowledge had increased but their moralistic and ecological attitudes had not. All three studies concluded that it was family and media that had the greatest ability to evoke attitudinal change. Further work in the development of the Citizens' Day should therefore look at greater family inclusion in all aspects of the programme.

3.7.5 Additional benefits.

There have been several developments which strengthen the value placed on the outputs since the project ended. Firstly, there has been a second run of both sets of leaflets, (funded by Gateshead Borough Council). Secondly, the information panels in the nature reserve now have two additional features: a handle which can be turned to hear the sound of a kittiwake call and a button which can be pressed to play a recording of the children reading their poems about the birds. Thirdly, The Tyne Kittiwake Partnership (http://www.nhsn.ncl.ac.uk/news/cms/tynekittiwakes/) was formed in 2012 in response to people and businesses complaining about the mess and noise that the birds make along Newcastle quayside. The group, which is made up of approximately 12 academics, environmentalists, ornithologists and naturalists, have used the kittiwake leaflet on their website and hold an monthly information stall next to the panel under the Tyne Bridge during the weekend market. This is another way in which the children are continuing to educate and influence the people of the NE about environmental issues.

3.8 Conclusions and recommendations.

The Citizens' Days have shown to be an effective and creative means of allowing primary school pupils and environmental managers to work together to suggest, develop and implement sensible and affordable management recommendations that can highlight key species and local, environmental issues to the public. The Citizens' Day model can provide opportunities for children to develop a sense of environmental citizenship in line with UN recommendations i.e. an increase in skills relating to: knowledge, debating and participation. However the project did not test attitudinal change which has been shown to be strongly influenced by family values. An extension to the study would be to design methods that looked at attitudinal change and have greater family involvement. A final positive outcome is the longer term effects that the project is showing 7 years after the end of the study: the leaflets and panels are still being used by the public and environmentalists alike.

Chapter 4 Promoting environmental citizenship and corporate social responsibility through a school/industry/university partnership

A modified form of this paper has been published as: Gebbels, S., Evans, S.M. and Delany, J., E (2011) Promoting environmental citizenship and corporate social responsibility through as school/university/partnership. Journal of Biological Education, Vol 45, (1) 13-19

4.1 Introduction

The need to involve citizens in decision-making processes relating to all social issues, including those relating to the environment has been discussed in the introductions of the previous two chapters. Different sectors of society, such as industry or education, have acknowledged there are specific roles to play in promoting effective environmental citizenship. Industry is targeting much of its effort through programmes of corporate social responsibility (CSR), which encourage a new business paradigm in which companies have broader responsibilities than simply making profits for their shareholders but become contributors to the welfare of society (Carolle 1997). Businesses are expected to meet the broad expectations of society in their activities, and these include looking after the environment. It is viewed as the voluntary contribution that firms make to sustainable development (DTI 2004) requiring them to commit to improving environmental and social impacts without damaging economic performance (Murillo 2006). Whether these goals will be achieved through more restrictive practices, new legislation or voluntary codes of conduct or a combination of measures is still unclear (Didier & Huet 2008).

Many larger businesses and industries have already taken major voluntary initiatives. Probably all of the world's larger corporations now routinely disclose information about their environmental performance to their shareholders, and many of them fund environmental and other social projects for the communities in which they operate (Jose & Lee 2007). However, Fierro *et al* (2008) suggest that some companies base their activity on the ethics of self-interest, concentrating their efforts on projecting an adequate image e.g., environmental respect, rather than fundamentally behaving in an environmentally respectful way. Exxon, Nestle, Nike and Pfizer encountered severe blows to their reputations because of their failure to maintain ethical and other socially responsible

standards. In contrast, organisations such as The Body Shop and Ben and Jerry's base their business model explicitly on ethical foundations (Maon *et al* 2009).

Conversely, many small and medium-sized enterprises have yet to embed CSR into their businesses (Redmond *et al.* 2008). Williamson *et al* (2006) suggest that what drives SME CSR considerations are their business performance and regulation considerations. They argue that unless there is a clear policy or regulation SME will always shy away from CSR as they see it as a "costly optional extra" and that regulation will have the highest impact in encouraging them to become involved. Many SME do not see the benefits of engaging with their wider stakeholders (Williamson *et al* 2006). Other barriers to participation have been cited as: lack of understanding of the concept (Murillo 2006), struggles with terminology and motivation for being involved (Jenkins 2006).

Selsky & Parker (2005) propose that cross sector partnerships have been one of the most exciting and challenging ways that organisations have been implementing CSR in recent years. Googins & Rochlin (2000) propose a model of four different types of partnerships, which they refer to as "social partnerships". They have more recently been termed "cross sector partnerships that address social issues (CSSP's) (Seitanidi & Ryan 2009). Examples from large businesses include: Earthwatch–Rio Tinto and Prince's Trust–Royal Bank of Scotland.
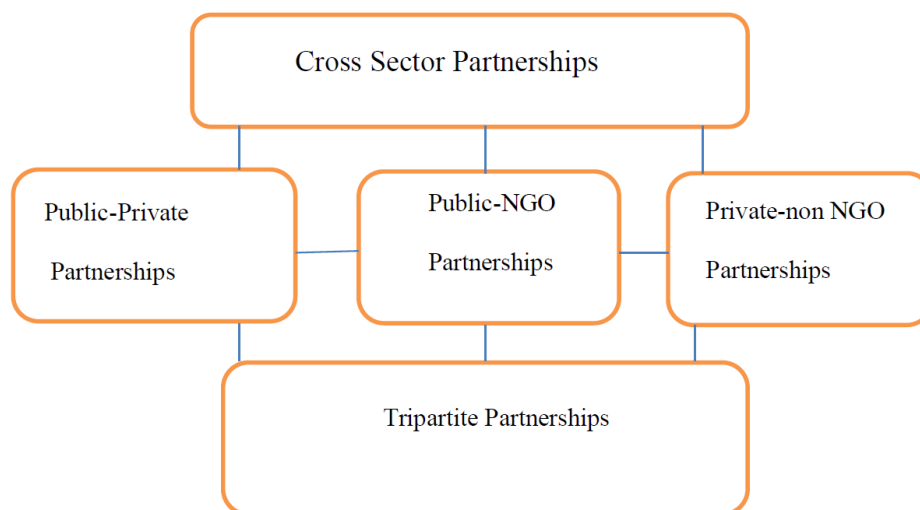
Figure 4.1 Cross Sector Partnerships (Seitanidi & Crane 2009)

There are also examples of successful partnerships within SME's. Roberts & Lawson (2006) ran a project that helped SME in the North West of England work in partnerships with other SME's in their area towards sustainable, affordable CSR. They found that this approach worked as SME preferred to learn from their peers and through networking. Partnerships allow best practice to be shared (Ball & Lamie 2010). They are integrative and have tangible and intangible benefits (Seitanidi & Ryan 2007). This evidence suggests that partnership working has the opportunity to promote CSR between SME and larger businesses and organisations.

4.1.1 Universities and CSR
Maon *et al* (2009) point out that although the concept of CSR has been around since 1950, CSR design and implementation processes remain largely unexplored. Partnerships that include universities can strengthen companies CSR programmes further. Whiter *et al* (2010) advocate that society, now more than ever, needs academic research, with its creativity and diversity to address environmental problems. Universities have frequently been regarded as key institutions of research into processes of social change (Delanty 2001). The role of the university has changed since the post-war years (Geiger 1993, Tetrevova 2010), and they are being forced to reconsider their roles with the public, stakeholders, industry and communities. Modern universities key roles are linked to communication and citizenship. CSR in a university setting relates to them contributing to the solving of important problems faced by society (Jongbloed *et al* 2008).

4.1.2 Schools and CSR
Schools are connected to CSR in their role as stakeholders. The term is explained by Carroll (1996) as "any individual or group who is affected by the actions decisions, policies, practices or goals of organisations". Buchholz & Rosenthal (2005) cited that typical stakeholders are the community. However, stakeholders are often portrayed as the beneficiaries of corporate largesse (Hill 2004). Partnerships in which schools have a strong voice can overcome this one-sidedness. One area in which young people often have a greater knowledge and awareness than their elders is that of environmental citizenship (Ballantyne *et al* 2006). There may be significant mutual advantages in developing close partnerships between schools and industry especially those in which members of both groups work alongside one another on a particular issue. For example, they might provide a basis for a wider appreciation of the dilemma facing industry: that is,

the need to manufacture goods for society, provide employment and wealth for the community, but at the same time care for the environment in ways that will ensure its sustainable future.

4.1.3 Tri-Partnerships.

In addition to the Cross Section Partnerships model outlined above, the National Institute for Triple Helix Innovation proposes a Triple Helix Model. This is a process by which academia, government and industry collaborate to create or discover new knowledge, technology or production and services that fulfil a social need. There are also Tri-Partnership models between industry, state and civil society (Warhurst 2001). This chapter proposes another triple partner model, one between, schools, industry and univerisites.
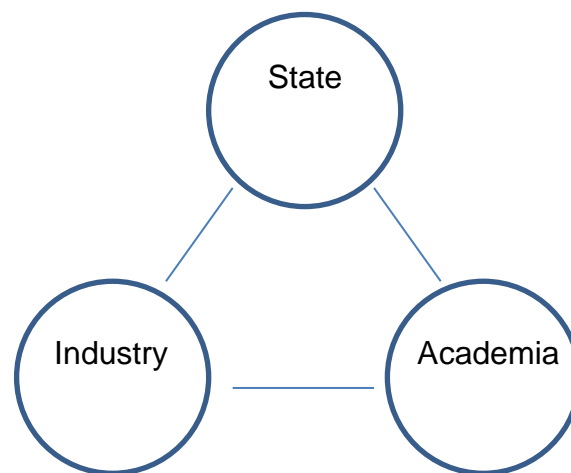
Figure 4.2 Triple Helix Model (source Tetrevova 2010)
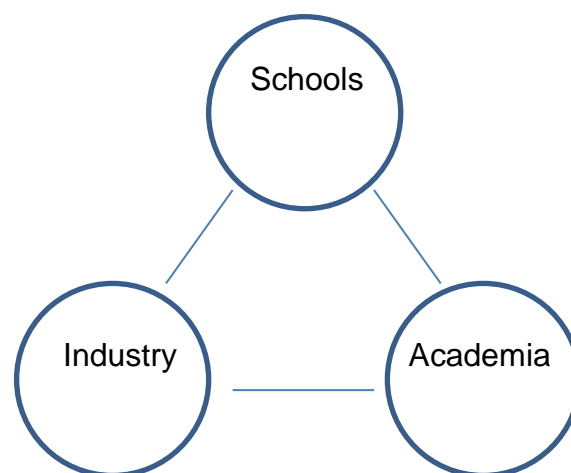
Figure 4.3 Schools, Industry, University model.

4.1.4 A Schools, Industry and University partnership: The Partners.

Merck Sharp and Dohme is the UK subsidiary of the multinational Merck & Co. Inc., the project was supported under the 'Champions of the Environment' grant programme, which is funded by the philanthropic arm of Merck & Co. Inc. The overall aim of the programme is to promote a high level of environmental awareness in the local community with the involvement of employees. MSD discovers, develops, manufactures and markets a wide range of pharmaceutical products. The company's Cramlington (Northumberland) unit, which was involved in this project, is primarily a manufacturing and packaging facility. King Edward VI School is a larger than average, mixed comprehensive Specialist Arts and Technology College which was designated as one of the first Leading Edge Schools in the country in 2003. It has excellent standards across a wide range of disciplines and activities. The most recent Ofsted report at the time of the study includes the comment that: "The School holds a special place in the local community for its history, traditions and deservedly strong reputation for high quality education". Students come from a wide range of backgrounds with a lower than average number entitled to free school meals and this number is falling. The school has a very low proportion of students from minority ethnic backgrounds and very few who are looked after by the local authority. The number of students with learning difficulties and/or disabilities is well below average. The number of students who do not have English as their first language is very low (Ofsted 2007). Newcastle University is a civic university in the NE of England. It is a Russell Group University and 17th out of 122 in the UK in The Sunday Times 2013 University Guide.

4.2 The Study Site

The study area was on a complex of habitats at Druridge Bay in Northumberland. The Bay is one of the most impressive stretches of beach on Britain's east coast. It is backed by sand-dunes. They form the Druridge Links Nature Reserve which is administered by the National Trust. There is an area of rocky shore, with an area of flat bedrock with some loose boulders and rock pools adjacent to Cresswell village at the southern end of the Bay. The area inland was formerly subject to both deep and open cast coal mining but the land has now been reclaimed so that it too provides a wildlife refuge. It includes two nature reserves, both of which are Sites of Special Scientific Interest (SSSI) and are administered by the Northumberland Wildlife Trust. One of them, Druridge Pools, covers 24 hectares and consists of a deep lake and two wet fields. It is an important overwintering and

breeding site for waterfowl and wading birds. Three wooden hides provide viewing places for the general public. The second reserve, Cresswell Pond, covers an area of 20 hectares and consists of a shallow lagoon fringed by saltmarsh and reedbed. A channel from the sea allows salt water to flood the pond so that it is a brackish water environment. The pond is an important stop-over point for migrating birds and an all-year feeding ground for wading birds. A wooden hide, which was in poor condition when this project started, has been provided for bird watchers. Human impacts, which have included farming and sand-winnowing, as well as coal mining, have affected the area over many centuries. Today, it is an important leisure and tourist resource, with provision for car parking. Field work was undertaken in June and July, 2007 by the school pupils and in October and November 2007 by the industrialists.

4.3 Aims and Objectives

The aim of this chapter was to assess if pupils from King Edward VI School, under the guidance from scientists from Newcastle University, could devise effective, practical management recommendations for two coastal habitats that could be implemented by employees of the pharmaceutical company Merck, Sharp and Dohme. This was done by:

Objectives.
1.) providing background knowledge of key environmental processes in sand dune and brackish water habitats.
2.) providing opportunities and training to pupils and employees so they were able to undertake a range of biodiversity surveys in the habitats.
3.) providing an opportunity for the pupils to devise management recommendations that the adults can act upon.
4.) evaluating the effectiveness of the management plans
5.) evaluating the effectiveness of the partnership.

4.4 Methods

The author delivered a project briefing to all the pupils prior to the start of the fieldwork. This included the aims of the study, an introduction to the study area and an overview of the survey techniques. The initial surveys of the area were carried out by 60 Year 9 (13 and 14 year olds) pupils, divided up into three working groups. Each group spent one day in the field, carrying out surveys of two of the following: (i) sand dune flora and fauna; (ii)

small mammals (by setting Longworth traps); (iii) flora and fauna of the rocky shore; (iv) birds; and (v) invertebrate fauna of Cresswell Pond. Each survey lasted between 1 to 2 hours; the pupils were assisted by the author, a teacher and either a member from the Northumberland mammal group or The Northumberland Wildlife Trust who own the rocky shore at Cresswell Bay.

4.4.1 Survey techniques.
Several basic, standard sampling techniques were used during the surveys. The methods were chosen and adapted to suit the age of the pupils, their limited experience of fieldwork, the size of the class and the time available.

4.4.2 Sand dune flora and fauna. (Druridge Bay)
The students were divided into groups of 4 and equipped with an identification guide, 0.5m quadrat, tape measure and pouter pot. They were instructed to lay out 25m of tape at four dune stations (embryo, yellow, grey and mature dune meadow) and to randomly sample 3 quadrats in each station. Students typically used numbers from their mobiles. All the plants in the quadrats were recorded along with any insects present, (they could be captured in the pouter pots if identification was difficult). The author, a science teacher and a member of staff from The Northumberland Wildlife Trust was present to help with identification. The pupils also drew a sketch of the dune and assess if they thought that the dunes were advancing or retreating.

4.4.3 Small mammals. (Druridge Bay Nature Reserve)
This survey was carried out with the help of a member from The Northumberland mammal association who had the appropriate licence to trap small mammals. The pupils were shown several different types of mammal faeces and encouraged to examine the differences in smell, size and texture. In addition they were given field guides that indicated mammal field signs, for example, footprints, burrows and feeding stations. The pupils then made their own survey of an area of scrubby woodland (approx. 1 acre) and recorded any evidence they found which indicated the presence of mammals. Finally the representative from mammal group showed the pupils how to select a site for a Longworth trap, prepare it with bedding and food and how to set it. Live trapping small mammals is a useful way of assessing what animals use or occupy a certain area. They can also be used to gauge to size of the population and how they make use of the habitat (Natural

England 2008). 15 traps were set, within the study site. The mammal expert examined them very early the following morning. The early hour meant that the pupils could not be present.

4.4.4 Rocky shore flora and fauna .(Cresswell Bay)

As in the sand dune survey the pupils were divided into groups of 4 and given a tape measure, ID guide, 0.5m quadrat. They were shown were the upper, middle and lower shores were and given an overview of some of the key species that could be found. The pupils were asked to do a line survey sampling 3 quadrats at 6 stations, 2 at each shore height. They were to ensure random sampling and to record all plant and animal species that they found. Rock pools were to be included in the survey if their quadrat landed on one. The author and a science teacher were present.

4.4.5 Brackish water invertebrates. (Cresswell Pools)

Pupils were divided into pairs and each group was issued a sweep net, 4 plastic bags and a bucket. The author demonstrated how to take a 3 minute kick sample, a sweep sample and a survey of the underside of rocks in line with recommendations from the Freshwater Biological association (www.fba.org.uk). The pupils undertook one a survey each and double bagged their samples with appropriate labels. The samples were taken back to the Dove Marine Laboratory tipped into a white tray and identified under a microscope with the help of an ID guide. All the results were recorded on the white board. The author, a teacher and DML technician were present to assist with the identification.

4.4.6 Bird surveys. (Cresswell Bay and Cresswell Pools)

Two sites were chosen for the bird surveys, one in an area above the rocky shore at Cresswell Bay and the other at the bird hide overlooking the Druridge Pools. The students were divided into pairs and given a set of binoculars and a field guide. They surveyed each site for half an hour and recorded the highest number of birds each species that they saw. Birds flying over the site were not included; birds were not surveyed by their song. This method was chosen because it is used in the RSPB's Big Garden Bird Watch (RSPB.org.uk) which some of the pupils were familiar with and these methods have proved successful with young, amateur bird watchers. The author, a science teacher and member from The Northumberland Wildlife Trust were present.

Members of MSD completed two surveys: the rocky shore survey and either the bird survey or the invertebrate survey. They used the same techniques as the students. The author collated all the recording information and passed it on to the relevant environmental managers and organisations so it could be included in their databases. The students followed up their surveys in school by searching the internet for information on relevant topics and using this, together with field data, to compile fact files for use in the school. The author asked the pupils to discuss in small groups of 4/5 to identify two recommendations that they thought would improve the sites that they had visited. The ideas were given to Northumberland Wildlife Trust for consideration. This organisation decided to implement one of the most popular ideas, to demolish the old bird hide, rebuild a new one and improve the access pathway.

A small, mixed sex representative group of 5 pupils from the school visited Merck, Sharp and Dohme in October 2007 and gave a presentation about their findings and recommendations to 25 employees. The pupils were of varied academic ability and had volunteered to give the presentation. The workers were volunteers who had been allocated 2 days each from MSD in order to participate in the project. In November 2007 the MSD staff carried out the pupils key recommendations: they demolished and replaced the hide and levelled the access pathway. They were divided into two groups and were joined in their activities by 4 pupils who worked alongside them. Group one worked at the beginning of the week, group 2 worked at the end of the work. Four children of the employees, ranging in ages from 7 to 16, also became involved in the project. Members of Northumberland Wildlife Trust funded the construction, provided the equipment and supervised the work. At the completion of the project 18 Merck, Sharp & Dohme employees and 15 pupils from King Edward VI School, all of whom had participated in the project, completed short questionnaires seeking their views on a range of environmental issues (Table 4.1).

A SWOT analysis was used to examine the feasibility of the recommendations. The values and limitations of using questionnaires and SWOT analysis are covered in the methods sections of chapter 2.

4.4.7 Statistical tests used

Both a Mann Whitney and a Wilcoxon Matched-Pairs signed rank test were used. These tests are similar as they compare between 2 medians to see if both samples come from the same populations. The Mann Whitley test was used when the samples are not entirely independent of each other but had a factor in common, Wilcoxon when there were 2 independent samples.

Mann Whitley is a non-parametric test; it has greater efficiency than a t-test on non-normal distributions and is nearly as efficient as a t-test on normal distributions, as it compares the sums of ranks. Mann Whitney is less likely than a t-test to indicate significance because of the presence of outliers. It is therefore more robust.

Wilcoxon Matched-Pairs signed rank test looks at whether the members of a pair differ in size, it resembles the sign test but is more sensitive for large numbers, and it's almost as sensitive as the t-test. For small numbers with unknown distributions it is more so. It is preferable to the t test as it is rare that normality can be confirmed (Fay 2010).

Limitations of both

If a size difference is not found one cannot say that the samples are the same. Both tests compare medians, so means must not be referred to in discussions.

4.5 Results.

Ecological surveys. The surveys were brief and there may have been some species that were not recorded as they were overlooked (only one small mammal, a Common Shrew *Sorex araneus*, was trapped). Nevertheless, the students were impressed by the rich and varied flora and fauna that was supported by the area.   An abundance of an invasive plant, the Ragwort (*Senecio jacobaea)*, in the dunes was a cause for concern after one pupil commented that the plant was poisonous to horses when it was dried. This lead to a group discussion about the effects the plant can have on livestock and the measures that are in place nationally to control the species.

The student's most popular management recommendation was connected to the poor state of the bird hide. They were surprised to find it the target for vandalism which had resulted in it being partially set alight resulting in significant damage to the structure. Most of the pupils had not used a hide before and found the experience, during the bird surveys,

rewarding. Pupils were also concerned about human impacts in the area, particularly the numbers of access points from the road and the network of paths, where vegetation had been partially or totally destroyed leaving patches of bare sand, throughout the dune system. Other indications of human usage were plastic litter and dog faeces. Management recommendations were compiled following discussions in class. In particular, it was felt that the site needed more information display boards and information leaflets / simple identification guides for visitors to learn more about the wildlife of the area. There were a total of 15 pupil recommendations.

4.5.1 Key recommendation:
The bird-watching hide at Cresswell Pool should be replaced and the access

pathway levelled to make it wheelchair and pushchair friendly.

General recommendations:

- Employ Beach wardens and ask if locals would like to be volunteer wardens.
- Provide more display boards with information about the flora and fauna.
- Produce information and identification guides (for locally common species) and sell them in the Cresswell village shop.
- Design and sell a nature trail covering the study area
- Provide more picnic places.
- Provide more litter bins and bins for dog-walkers to deposit bags of dog faeces.
- Improve car parking facilities
- Provide toilet facilities
- Construct a wooden walkway through the dunes creating easy access from the road to the shore.
- Eradicate the invasive ragwort.
- Introduce more small mammals into the area
- Introduce more plants around the pond from existing stocks

Table 4.1 SWOT analysis of the King Edward VI pupils management recommendations for Druridge Bay Nature Reserve.

Druridge Bay NR. could be **Strengthened** by implementing the following management recommendations:	Druridge Bay NR could be **Weakened** by implementing the following management recommendations
Replacing the bird watching hide	Eradicating invasive ragwort
Upgrading the access pathway to the hide.	
Employing beach wardens	
Designing a series of info panels	
Producing ID guides	
Designing a nature trail	
Building wooden walkways	
Introducing plants around the pond	
Druridge Bay NR could have **Opportunities** for improvement by implementing the following management recommendations	Druridge Bay NR could be **Threatened** by implementing the following management recommendations
Community volunteer wardens	Providing picnic areas
	Providing bins for litter and dog faeces
	Improving car parking facilities.
	Providing toilet facilities
	Introducing more small mammals to the area

4.5.2 Analysis of recommendations in SWOT table.

Strengths. The pupils' key recommendation was to replace the bird hide; it provides members of the local bird club with a valuable lookout point for their survey work and is well used by members of the public. However, due to vandalism issues the hide is only open at certain times. The poor state of repair due to fires meant that it was in danger of being closed down permanently. Members of the public and Northumberland and Tyneside bird club had been lobbying for the hide to be upgraded and repaired. After consultation

between the author, the project PI, MSD and NWT representatives, NWT agreed to finance the rebuilding of the hide and the upgrading of the 100m access pathway if MSD employees provided the labour which was a large part of the total cost. Included in this work package was the replanting of pond plants around the edge of the water body to provide stability to the edges and cover for the birds. This was to be done by redistributing some of the plants that were already growing at the site. It was agreed that implementing these recommendations would make good use of a free workforce, restore a potentially dangerous building and provide a public service. The other recommendations were praised as valid and sensible but funding constraints meant that they could not be implemented.

Weaknesses. There was concern in the project, which is mirrored nationally, about the spread of ragwort. It is poisonous to farm animals, especially horses and can cause fatal liver disease. There is an International ragwort day each year that aims to encourage people to help eradicate the plant. However, McLaren & Fait (2004) point out that over 150 species of bees and butterflies use the plant as a valuable source of nectar and removing this potentially valuable food source at a time when bees are under threat (Buglife 2013 www.buglife.org.uk) could place strain on a fragile system.

Opportunities. The area is managed by NWT which has a good network of volunteers that help carryout conservation projects. Utilising some of these people as volunteer wardens could provide a good opportunity to help manage the study area. Their presence around the hide could deter vandals; they could act as guides and provide information about the species and their habitats. This in turn could increase the volunteers' sense of ownership for the reserve and promote marine citizenship (McKinley & Fletcher 2012).

Threats. Druridge Bay is well provided with ample car parks, and a visitor's centre complete with picnic tables, a cafe and toilet facilities. These amenities focus visitors into one area. The area around Cresswell Bay and the Druridge Pools however does not have these facilities and car parking is limited. Whilst it might seem desirable to provide more provision for easy access, increased visitor presence could be detrimental to both sites which have SSSI status. A parody of modern times is that although 79% of the population (DEFRA 2008) say natural (undisturbed) greenspace is very important to them we still

expect amenities that disrupt this wildness. The funds needed to install and maintain car parks and access routes and picnic tables could potentially be used to fund conservation work. Picnic areas often attract rubbish which would require bins. Bins are vulnerable to damage from vandals, open to scavenging birds and animals and would require maintenance and someone to empty them.

Table 4.2. Questionnaire for employees of Merck, Sharp & Dohme (Blue questions) and Pupils from King Edward VI School (Black questions). Both parties answered red questions. Answers to each question, required a graded response from 1 to 10.

Q1. How valuable are the management recommendations that the pupils made for habitats at Druridge Bay. 1 indicates that you feel that they are immature and no practical value……10 indicates that they are as mature and practical as could be expected.

Q2. Do you feel that a project that involves a school/industry partnership has educational benefits?   1 = of no value……..10 = extremely valuable and should be widely encouraged.

Q3. Do you feel that the project enabled you to meet your obligations as responsible citizens? 1 = not at all……..10 = yes, to a considerable extent.

Q4. What is your own view of the chemical industry in general?   1 = a polluter of the environment………..10 = a vital industry which takes its environmental responsibilities extremely seriously.

Q5. How do you feel that the public views the chemical industry in general? 1 = a polluter of the environment………..10 = a vital industry which takes its environmental responsibilities extremely seriously.

Q6.   The project was reported in the media and received prestigious business awards. How successful was it changing the public's view of the chemical industry? 1 = not at all………………10 = it changed it totally.

Q7. Did the opportunity to work with people from industry make you more aware of the seriousness with which they take responsibilities towards the environment? 1 = not at all……….10 = yes, to a considerable extent.

Q8.   What was your own view of the chemical industry BEFORE the project took place? 1 = a polluter of the environment………..10 = a vital

industry which takes its environmental responsibilities extremely seriously.

Q9. What was your own view of the chemical industry AFTER the project took place? 1 = a polluter of the environment………..10 = a vital industry which takes its environmental responsibilities extremely seriously.

Q10. Did participation in the project increase your awareness of environmental problems? 1 = not at all…………10 = considerably.

Q11. Did participation in the project increase your knowledge of local animals and plants? 1 = not at all……….10 = considerably.

Q12. Did participation in the project increase your interest/motivation in conserving ecologically important areas such as Druridge Bay. 1 = not at all………10 = considerably.

Q13. Did you learn anything, such the names of plants or animals or other environmental information, from direct involvement with schoolchildren? 1 = nothing at all……….10 = considerable information.

Q15. Did the experience of working at the Dove Marine Laboratory give you an insight into the ways in which university scientists work? 1 = not at all……….10 = considerably.

There were 15 questions in total, 10 of which were included in the employees' questionnaire and 9 of which were in the pupils' questionnaire. Each question required a graded response from 1 to 10, depending on the strength of the individual's opinion. Interpretation of the mean scores is partly subjective but, in general, the criteria used were that scores of >5 indicate positive responses and those of >7 indicate highly positive responses. Responses to the questionnaires suggest that both Merck, Sharp and Dohme employees and school pupils gained substantial benefits from their involvement in the project (Table 4.2).

Table 4.3. Summary of questionnaire responses. Medium, the average response, are presented ± standard errors (s.e.). n=33

	Question	Merck, Sharp & Dohme		KEVI School	
		Medium	s.e.	Medium	s.e.
	Educational benefits				
1	How valuable are the management recommendations made by the pupils?	7.67	0.19	x	x
2	Do you feel that a project that involves a school/industry partnership has educational benefits?	9.27	0.25	x	x
3	Do you feel that the project enabled you to meet your obligations as responsible citizens?	x	x	7.00	0.44
	Views of industry as an environmental polluter				
4	What is your own view of the chemical industry in general?	7.46	0.48	x	x
5	How do you feel that the public views the chemical industry in general?	4.57	0.32	x	x
6	How successful was the project in changing the public's view of the chemical industry?	5.93	0.43	x	x
7	What was your own view of the chemical industry BEFORE the project took place?	x	x	5.17	0.44
8	What was your own view of the chemical industry AFTER the project took place?	x	x	6.67	0.50

	Views on the environment				
9	Did participation in the project increase your awareness of environmental problems?	7.53	0.51	7.56	0.53
10	Did participation in the project increase your knowledge of local animals and plants?	8.07	0.32	7.89	0.41
11	Did participation in the project increase your motivation in conserving ecologically important areas ?	8.13	0.27	5.94	0.41
	Intergenerational learning				
12	Did you learn anything from direct involvement with schoolchildren?	4.69	0.64	x	x
13	Did you learn anything, such the way in which industry or organizations such as the Northumberland Wildlife Trust work from direct involvement with the adults who participated in this project?	x	x	6.11	0.58
14	Did the opportunity to work with people from industry make you more aware of the seriousness with which they take responsibilities towards the environment?	x	x	6.94	0.35
15	Did the experience of working at the Dove Marine Laboratory give you an insight into the ways in which university scientists work?	7.17	0.52	7.76	0.34

4.5.3 Analysis of questionnaire.

Merck, Sharp and Dohme's employees were emphatic about the educational benefits of the project (Question 1). The employees believed that the management recommendations pupils were valuable (Question 2). The employees' view of the chemical industry was generally positive. However, they believed that the general public had more negative opinions than their own. Scores given to Question 4 (own opinion) were significantly higher than those to Question 5 (general public's view) (T^+ = 78; n = 12; P<0.001 Wilcoxon Matched-Pairs Signed-Ranks Test). Employees accepted that projects of this kind are valuable in changing the public's perceptions of industry (Question 6). Children of company employees also benefited from participating in the project. One parent commented:

> "Most of the plants and animals I already know but my children learned a good many new names and can now identify them."

The pupils also felt that the project had enabled them to meet their obligations as responsible citizens (Question 3). Their view of industry changed positively as a result of their involvement in the project. Reponses to Question 8 (after involvement in the project) were more positive than those to Question 7 (before their involvement in it) (T^+ = 91; n = 13; P<0.001; Wilcoxon Matched-Pairs Signed-Ranks Test).

All participants, both employees and pupils, claimed that involvement in the project increased their awareness of environmental issues and knowledge of flora and fauna (Questions 9 and 10). It also motivated them to become involved in further conservation projects, although the motivation was evidently higher in the employees than in the pupils; employees gave significantly higher scores than pupils in response to Question 11 (U = 33; P<0.001; Mann Whitney U Test).

The project also provided opportunities for intergenerational learning, although the extent to which this was achieved appears to have been highly variable. Six employees gave scores of between 6 and 8 in response to the question about learning that had occurred as a result of working alongside pupils (Question 13) but two of them gave the lowest possible score, 1, to this question. Similarly, four gave scores within the highest range, 8 – 10, to the question, while two gave 1 responses. The pupils were positive about the

insights they gained from spending one session at the Dove Marine Laboratory (Question 15).

4.6 Discussion.

The project achieved its main aim by showing that a model that fostered partnerships between a school, a university and industry can gather and implement effective management recommendations for an area. There were benefits to all the participating organizations.

4.6.1 The Pupils.

Huckle (1986) has argued that environmental citizenship can only be learned by practising it and this particular project enabled pupils to make a contribution to a real problem affecting the local community. The pupils themselves believed that the project enabled them to meet their obligations as responsible citizens, and their management recommendations were well-received by the environmental managers and company employees. However, an essential element was that their key management recommendation, replacing the bird hide at Cresswell Pond, was implemented. This is important because, as Hungerford & Volk (1990) have suggested, acts of this kind give pupils the opportunity to develop senses of environmental ownership and empowerment. They can also have long-term impacts. Roth & Lee (2004) argue that involvement in community projects sets up the potential for lifelong participation in, and learning of, science-related issues.

The project also provided opportunities for young people to work alongside adults and for them to interact and learn informally from one another. Pupils were clearly impressed with the attitudes and approach of Merck, Sharp & Dohme and its employees. The young people's views of industry's ethical standards was implicitly poor before the project commenced, and similar to the opinion held by the general public, at least that expressed by the company's own employees. However, pupils were significantly more positive about the ways in which industry takes its environmental responsibilities following their involvement in the project. They claimed themselves that this was the result of working with people from industry. Intergenerational learning can also occur in the reverse direction: young people can have significant impacts on the behaviour and attitudes of adults towards, for example, recycling wastes (Evans *et al* 1996). It is interesting therefore

75

that most of the adults who participated in this project acknowledged that they too had learned from the schoolchildren. Ballantyne, *et al* (2006) have suggested that intergenerational learning is an important but largely unexplored avenue for educational development, and it would have been beneficial to have provided increased opportunities for it to have occurred. This might be achieved by closer integration between pupil / adult groups and allocating more time for informal discussion.

Informal discussions with the pupils revealed that they had never taken part in any field studies before. This is not surprising as the demise of fieldwork is well documented (Lock 1998, Fisher 2001, Dillon *et al 2006).* The benefits of fieldwork and outdoor learning are reviewed later in the thesis. One advantage of field work that links in with this projects theme of environmental citizenship is the potential that it has to benefit the wider community. Barker *et al* (2002) suggest that it can help to develop understanding, attitudes and values that can lead to a more enlightened commitment in areas such as citizenship. As the fieldwork was based around marine habitats an interesting extension to the study would have been to see if the pupil's sense of responsibility toward the marine environment had increased.

4.6.2 Industry.

Positive coverage of the project in favourable reports in two regional newspapers: the Evening Chronicle and the Whitley Bay Guardian. portrayed Merck, Sharp & Dohme's Champions of the Environment initiative, and therefore the Company's corporate social responsibility programme, in a positive light.   The project won two prestigious environmental awards. It was part of a submission that won the North East Process Industry Cluster Environmental Award for 2007 and was runner-up in the Tyneside and Northumberland regional North East Business 2007 Environmental Award which recognises outstanding performance in environmental management.

It has been argued that CSR has become dominated by traditional forms of philanthropy (Hill 2004). This form of CSR is not created as an exchange relationship but rather as a "giving" or a "giving back" role. In effect is creates a hand-out mentality by which communities see industry as a source of funding and compete for "a slice of philanthropic pie" which industry dispenses in areas where it decides. Partnerships such as the one outlined in this project have the opportunity to promote a strategic corporate-community

partnership, which Googoms & Rochlin (2008) suggests are "win-win" situations, in which the community is a core element of business strategy. A theme mirrored by Elkington (1998) who proposes that financial gain, environmental sustainability and community well-being are equally important in achieving business goals. Therefore MSD by promoting their CSR through this model within the media, scientific literature and their internal networks have the opportunity to lead the way in delivering meaningful CSR programmes and gain the respect of their competitors.

4.6.3 Universities

If modern universities are to fulfil their roles in society as leaders in social change, citizenship and communication it is important that strategies and methods are investigated into how they can effectively achieve these goals. However the full benefit from a university can only be obtained if the university and society are organically linked together (Leshner 2007). Therefore the more diverse and stronger the links the more mutually beneficial they can be in helping to tackle social challenges (Ray 1999). Project such as this allow for such interactions to happen and for research to take place. The success of the project reinforces the argument forwarded by Ducrotoy (2003) he has argued that Higher Education Institutes are in strong positions to engage other groups in society in environmental issues through their outreach programmes. This particular project gave local people a real say in an issue of local wildlife importance.

4.6.4 Additional benefits.

During the course of the project, a fourth partner, Northumberland Wildlife Trust, became involved. Initially they were consulted as managers of the study site and their role was to act as support during the field days. After the pupils' had recommended the rebuilding of the hide it became necessary to involve them more closely. Although they had a financial output for the materials to build the facility they had a free labour force with which to carry-out the works and ultimately they benefited from a re-constructed bird hide with improved access at Cresswell Pond. The project also produced a large group of young people and adults who were more aware of environmental issues, more knowledgeable about dune flora and fauna and more motivated to participate in conservation work in the future.

4.6.4 Limitations

The fieldwork was carried out over a short time period resulting in a limited set of survey data from both the pupils and the adults. If more time had been available the results could have been more reflective of what was present in the habitats. The brevity of the time spent in the study areas may also have influenced the pupils' management recommendations by restricting their focus to the most obvious problems without having time to reflect on a more holistic outlook.

4.6.5 Project update.

Since this project finished in 2007 MSD, Newcastle University and NE schools have collaborated in two more successful projects. The first involved 5 primary schools (three main stream, one special needs and one private) in a project based around the topic of marine pollution. The pupils gained a greater understanding of the issues surrounding the topic through independent research and 5 workshops run by the author. During a final celebration event all the schools and MSD representatives joined together to make a "rubbish boat", a 6 foot by 4 foot outline of a boat made out of chicken wire which the children filled with recycled bottles collected from their schools, from the university recycling bins and MSD canteens. Each bottle had a message inside with a personal pledge on how the writer was going to reduce their environmental impact. A series of photographs was taken throughout the project, including those that showed the building of the boat and a montage of these is displayed in the factories foyer along with the pupils' key environmental messages. The second project involved 25 young people aged 15-16 from 4 NE secondary schools. They were invited to participate as their teachers felt that they were not engaging with their studies. During the project they were given the opportunity to take part in several university summer schools and a series of one day industrial visits which allowed them to gain a wider understanding of the world of work and the various opportunities that were open to them. MSD employees acted as mentors.

4.7 Conclusions.

The results of the project suggest that the model outlined at the beginning of the chapter can be beneficial to promoting close partnerships between schools, universities and industry. Cross sector partnerships are strong mechanisms by which organisations that would not normally collaborate with one another, can work together to fulfil their individual agendas whilst promoting environmental citizenship.

Chapter 5 The effectiveness of intergenerational learning in promoting transfer of knowledge in the marine environment

5.1 Introduction

For many years, scientists and educators have recognised that environmental education plays a key role in helping individuals and communities understand the complex nature of their interactions with the natural world and in fostering the knowledge, attitudes and behaviours needed to improve and protect the environment (Palmer 1998, Strap 1969). Knowledge held by a large proportion of the public is poor. This is evidenced in poor ability to identify even common species (Bebbington 2005). For many, experience and knowledge of the natural world is gained through routes other than that of formal education. This so-called 'free-choice' learning, which may include visits to museums, zoos and nature parks (Kola-Olusanya 2005) and activities, such as general reading, watching nature programmes on television or reading magazines and newspapers (Winett *et al.*1984, Fortner & Lyon 1985, Ostman & Parker 1985, Wright *et al. 2001*, Chauhan 2003), is undoubtedly important in acquiring environmental knowledge. Indeed, Falk (2001, 2005) suggests that it is the major source of it. Dixon *et al.* (2005) investigated children's knowledge of local bird species and concluded that their limited knowledge was probably derived from indirect sources, such as television programmes, motifs on Christmas cards and nursery rhymes, rather than from actually seeing birds in the wild. Although this means that people can recognise common species they may not be able to understand how they behave within their natural environment.

It is beneficial to all parties for the public to have a good knowledge of their natural surroundings. Stewart & Sinclair (2007) cite these benefits as: access to local environmental knowledge, promoting social leaning, strengthening the democratic fabric of society, broadening community empowerment, and sense of place (Davenport 1998). Proshansky *et al.* (1983) proposed that place identity grows from direct experiences with the physical environment and those experiences influence understanding, perceptions and values of the environment. It also extended the concept that place identity embodies the idea that "who we are" is intimately related to "where we are". This idea is developed in the next chapter. Bamberg & Moser (2007) suggest that there is an association between environmental awareness and environmentally responsible behaviour.

5.1.1 Intergenerational learning

One of the greatest sources of motivation for undertaking action for the environment, preserving communities and caring for one's immediate surroundings is the desire to protect it for the sake of future generations. Intergenerational learning is an approach in which young people find out about the world from parents or other elders in the community (Chand & Shukla, 2003, Liu & Kaplan 2006). Intergenerational knowledge takes a very particular role in the survival of indigenous people where environmental knowledge is fundamental. Knowledge of resource and ecosystem dynamics and associated management practices exists among people of communities that, on a daily basis and over long periods of time, interact for their benefit and livelihood with ecosystems (Berkes *et al.* 2000). It is through this process that the children living at subsistence levels in non-developed communities such as those of Argentina and Vanuatu learn skills for survival (Fabricius & Koch 2004). It helps them find food and medicines, avoid predators and thus underpins their survival. Unlike children in the developed world, they have good knowledge of local plants and animals acquired as a result of accompanying adults on excursions into the forests (Hynes *et al.* 1997).

The intergenerational approach to learning about the natural environment and one's community is becoming rarer. Ruddle (1994) points out that local knowledge systems are changing throughout the world due to pressures of Westernization, urbanization, commercialization and the replacement of non-traditional education by modern formal education systems. Dahl (1989) suggests that much of the local knowledge about the environment in the Kanak people of New Caledonia has already been lost and, since the old men and women who possess it are not passing it on to the next generation, it will die with them. Similarly, Hynes *et al.* (1997) comment on the loss of botanical knowledge in rural communities of Argentina and Mymrin & Huntington (1999) found that the traditional ecological knowledge of Beluga whales held by younger hunters in Alaskan and Russian villages was poor in comparison with that of their elders.

The loss of this knowledge is a cause for concern as one of the main benefits of intergenerational learning is that specialist local knowledge is often of management relevance that is shared. For example, local knowledge informs traditional management systems, such as those still practiced in Ghana (Ntiamoa-Baidu 1991), The Belize (King

1997), Kenya (Obdura 2001) and many other parts of the world (Drew 2005). The view is now widely canvassed that there are benefits in incorporating local knowledge into modern management processes (Zamparo 1997, Hamilton & Walter 1999, Failing 2007). Ruddle (1994) has argued that the best practices in traditional management systems should be blended with those in modern systems, developing new, cost-effective approaches to environmental management. Mackinson & Nottestad (1998) refer to the change in attitude that is needed to combine non-scientific information (local knowledge) with scientific data in environmental planning processes.

5.1.2 Ecosystem Services, Sustainability, Cultural and Social Benefits.

Ecosystem assessment and management by local people can fulfil several important objectives: i.e. it can inform contemporary society, but can also be influenced and supported by contemporary science and institutions. It has the potential to promote participatory processes; creating new information to share across scales; making improved use of existing knowledge; developing indicators of change and resilience to monitor ecosystem dynamics; transforming existing institutions toward ecosystem management; and developing social responses for dealing with uncertainty and change (Peterson *et al*. 2003). Local ecosystem assessment and management can create alliances between owners of formal and informal knowledge. It can establish links between governments, local users, and scientists. It can create new

Information about local ecosystem conditions to be shared vertically from local to national levels and horizontally among regional groups of indigenous peoples

(Gadgilet *et al*. 2003). Long *et al.* (2003) demonstrate that myths, metaphors, social norms, and knowledge transfer between generations of the White Mountain Apache tribe facilitate collective action and understanding of ecosystem dynamics, and provide a cultural foundation for guiding modern sustainable, ecological restoration and restoration techniques. They argue that cultural traditions have sustained a system of adaptive management throughout the 20th century, and now provide hope for restoring productive ecosystems through individual and collective efforts. The role of cultural diversity in biodiversity conservation and ecosystem restoration is further addressed by Garibaldi & Turner (2004). They stress that human cultures are crucial components of sustainability, conservation and restoration. A successful example of such integration is provided by

Becker & Ghimire (2003) in their article on the establishment of a community-owned forest reserve in western Ecuador. They show the important role of organizations, such as NGOs, in bridging traditional knowledge and scientific insights, and in providing social space for mobilizing a synergy between traditional knowledge and western knowledge for sustaining ecosystem services and biodiversity in a forest commons. Successful projects in both environmental management (e.g. Johannes 1998, White & Vogt 2000, Stockill 2006) and environmental impact assessment reinforce the importance of these arguments (O'Faircheallaigh 2010).

5.1.3 Uni-Directional Intergenerational Learning

Intergenerational learning does not have to be uni-directional from the adult; adults too can learn from children (Evans *et al*. 1996, Ballantyne, *et al.* 2001b, Vaughan, *et al.* 2003). A good example of this is found in the field of information technology where children frequently possess greater knowledge than their parents (Hampshire 2000). Strom (1988) suggests that information is growing at such a rapid rate that each new generation is better informed than its predecessors and that children's knowledge base is wider than their parents in many topics. Environmental citizenship is another area to which this observation applies. Young people have the potential to act as catalysts of environmental change, community empowerment, and social learning among their parents and other members of the community. There are several reasons for this; children have incorporated environmental thinking and a holistic approach to ecosystem functioning into their everyday lives, they take a common sense view (Strong 1998). The science behind many of today's environmental issues is 'new' and was not taught in schools to adults. Therefore whilst young people may not have the same practical functional understanding of the process of the natural world that their parents have, they are more aware of present day "green" issues. Being environmentally aware is considered trendy and gives the child peer validation (Battersby 1999). In addition, intergenerational interaction assists in dispelling stereotypes that each generation may hold about each other (Adelman *et al.* 1988), while encouraging respect for differences (Pine 1997).

Some researchers have investigated the effectiveness of introducing intergenerational learning programmes into formal school programmes and wider community settings to promote sense of community and place and to enhance environmental understanding: (Sutherland & Ham 1992, Uzzel 1994, Ballantyne *et al.,* 1998a, Ballantyne *et al.* 2001c,

Vaughan *et al.* 2003). These studies have shown mixed results as to the effectiveness of intergenerational learning. Duvell & Zint (2007) reviewed the programs mentioned above and concluded that they had only a modest potential to influence parental knowledge, attitudes and behaviour, (possibly, because of the relatively small number of studies and a number of methodological and program limitations within them). For example, Ballantyne *et al.* (1998a) reported that discussions between parents and children focused on a description of the program itself and did not stimulate the children to 'teach' their parents something new. Sutherland & Ham (1992) found that children typically passed on a vague, basic awareness of what they were studying.

If intergenerational learning techniques are going to be introduced into the modern school curricula, we need to discover which methods are effective in achieving the desired transfer of learning. The aims of the present study were to examine the effectiveness of intergenerational knowledge transfer from children to adults. The researcher focused on two topics for information transfer: environmental knowledge, which included local marine geology and biodiversity and secondly, local history, culture and sense of place. These were chosen because the area, Cullercoats in NE England, has a rich cultural, industrial and environmental heritage.

5.2 Aims and Objectives.

Aim: to examine the effectiveness of intergenerational knowledge transfer from children to adults.

This was done by carrying out the following objectives:

1.) providing a series of workshops for primary school pupils so that they could learn about the environmental and cultural heritage of their village.
2.) giving the pupils the skills, support and opportunities to disseminate the information to the adults in their community.
3.) testing the pupils' knowledge levels before and after the project.
4.) evaluating the effectiveness of the knowledge transfer between adults and child by the use of questionnaires.
5.) evaluating the project.
6.) publicising the project throughout the area.

The funding for this project came from The Heritage Lottery Fund, The "Your Heritage" section.

5.3 The Cultural, Industrial and Ecological Heritage of Cullercoats.

Figure 5.1 Cullercoats Bay and its position on the NE coastline. (the inset map is not to scale and designed to give the reader a sense of where the key features of interest in Cullercoats are).

5.3.1 Information about the village of Cullercoats

Cullercoats is a large coastal village in NE England, (OS grid ref NZ 3671) with a population of around 9000 (Census 2007. http://www.northtyneside.gov.uk). It is located in the south east area of the North Tyneside conurbation. It is bounded on the west by the A192 (Preston North Road), on the south by the A1058 (Beach Road). It includes the

estates of Cullercoats and Marden. It is a relatively tight knit community with a pro-active cohort of people and low crime rates. 54% of people from the area travel less than 10km to work, with the majority being employed in Newcastle. There are two primaries and one secondary school, a library, shops, businesses and several eateries all which make the village a popular destination for day tourists as well as its coastal setting. The area inland reflects the modern changes to the village, such as a shift in the centre of the village away from the cliff tops where the old Cullercoats had its first beginnings and the building of modern estates. However, there are several buildings and structures along the seafront which are testament to Cullercoats' rich maritime heritage. Examples include: the RNLI station (founded in 1852), The Fishermans Mission (1931), the harbour, Cliff House, (1769, a large dwelling that reportedly was involved in once thriving smuggling business) and The Watch House (1879). This latter grade two listed building historically sheltered the families of the fishermen whilst they watched for their loved ones to return from the sea. Today it is a thriving community focal point built around the Watch House Club Association which was set up in 2000 to provide a venue where people could meet and talk about the area's heritage. There remains a single street of traditional fishing cottages but the majority of these homes were demolished in the late 1960s. Cullercoats Bay consists of a semi-circular sandy beach which has been adapted as a harbour with two stone piers (built in 1846 and 1872). The bay is backed with cliffs which have an extensive cave network. Adjacent to the bay there are areas of rocky shore.

5.3.2 Ecological Heritage

The harbour is dominated by the RNLI station and the 100 year old Dove Marine Laboratory. Part of the coast has Site of Special Scientific Interest (SSSI) status for its outstanding geological features. The biology of the shore has been intensively studied by generations of marine scientists including 19th Century natural historians George Brady (1832-1921) and Albany Hancock (1806-1873). Their work, together with that of many professional ecologists from the Laboratory has been collated and published as two volumes in the "*The Flora and Fauna of Cullercoats District"* (regarded as the coastal area between Redcar and Berwick) (Foster-Smith 2000). It became evident that the North Sea supported a rich fish fauna, many species of which were commercially exploitable. Indeed the purpose of establishing the Dove Marine Laboratory was to provide information about fish species and the organisms on which they were dependent.

5.3.3 Industrial Heritage

The area has also seen substantial industrial development. During the 1670s, the coal trade was becoming prominent in the area. The quality fuel was exported to other parts of the country but the slack was used to fire 19 saltpans situated along the tops of the cliffs around the bay. The coal arrived in the harbour via a wooden wagonway, one of the first in the country, which ran from the pits in nearby Whitley Bay to Cullercoats, a distance of three miles. The success of the salt and coal industries allowed a wooden pier to be built in the bay in 1677, however, these industries declined after only fifty years. The growth of the railways led to coal shipments being relocated to harbours which were closer to the railroads. This left fishing as the main industry in Cullercoats and two piers were built on either side of the harbour to provide shelter for the many open topped fishing vessels, or cobles, that worked from the harbour (Wright, 2002). The fishing industry too has also declined and today there are only two working fishing boats in Cullercoats which catch predominantly the edible crab *(Cancer pagurus)* and common lobster *(Homarus gammarus).* Traditionally, the cod (*Gadus morhua)* and the herring, *(Clupea harengus)* and other white fish were the main catch.

 Many of the fishing scenes, seascapes and inhabitants are immortalised on canvas by the professional artists who were part of the 'Cullercoats Colony' in the period 1870-1920. The American artist, Winslow Homer, was the most famous of this accomplished group and today many of his paintings hang in galleries throughout the world (Newton, 2003).

Today, there is a substantial interest locally in promoting the rich maritime legacy of the area. Community groups, such as The Community Centre, run family days and fund raising events to support the village. The Watch House Club and the members of the Cullercoats Local History Society appreciate and try to preserve the areas rich heritage, through talks, exhibitions of photographs, pictures, artefacts and the collection of memorabilia. However, the majority of the inhabitants of Cullercoats are only vaguely aware of the village's cultural and industrial past and possess little knowledge about the plants and animals that can be found on the shore.

5.4 Methods

5.4.1 Outline of teaching programme

The project took place between April 2007 and March 2009. The researcher worked with children in four, mixed sex classes of Year 5 and 6 children (aged 9-11). The researcher had not worked with these children before although the school was familiar to her. Cullercoats Primary School is a larger than average-sized primary school with 400 pupils on the register between the ages of 4-11. The proportion of pupils known to be eligible for free school meals is lower than the national average. There are few pupils on the roll from minority ethnic groups who speak English as an additional language. The proportion of pupils supported by School Action Plus or with a statement of special educational needs is lower than average. An Ofsted report in April 2012 said that Cullercoats Primary was a "good" school. The project was based around the village of Cullercoats and aimed to look at intergenerational transfer of   knowledge. To achieve the objectives one of the two primary schools in Cullercoats needed to be invited to participate. One school was two miles away from the Dove Marine Laboratory, Cullercoats Primary was only five miles walk and for this reason it was selected for the project.

During the project there were a total of 5 topics taught in half-termly sessions between September 2007 and January 2009. Each two hour session was run four times, once for each class. The first part of the lesson took place in a teaching classroom at the Dove Marine Laboratory where the children learnt about a specific maritime topic. A range of strategies were used to promote learning including: presentations, games, touch tank sessions, storytelling and microscope work. The second part was an appropriate outdoor session for example: the lifeboat topic was complimented with a visit to the local RNLI station. (Box 5.1). The practical work was followed up by a two hour afternoon lesson in school where the children produced written work and illustrations. The children were accompanied during the study by their class teacher, a support worker and several parents (exact numbers varied with each session). The school teachers provided support only and did not teach.

Box 5 1 Topics covered in the teaching programme.

Theme 1: Flora and Fauna of the rocky shore in Cullercoats Bay.
Studies were made of the adaptations of littoral organisms to life on the shore, feeding relationships between them and animal classification and identification.

Theme 2: The Origins of Cullercoats, the village and its people.
Pupils learnt about the early history of Cullercoat's industries. They heard about the decline of these industries and the subsequent effects on the village.

Theme 3: Fishing in Cullercoats.
Pupils learnt that after the decline of the salt and coal industries, Cullercoats was being hailed as the best fish market in the north and had become a fashionable watering place. They researched the roles that each family member had in the home and community and thought about the houses that the people lived in.

Theme 4: Cullercoats lifeboats.
The children thought about why lifeboats are needed and learnt how the first one in the area was commissioned. They focused on the different designs throughout the ages paying attention to changes in the design of the boats and gear.

Theme 5. Geology of Cullercoats
The children worked with the local county geologist to find out why the Bay has SSSI status. The fieldwork comprised of exploration of Cullercoats Bay where they investigated the Merle slate, Permian Sandstone and coal seams that are of national importance.

5.4.2 Techniques used to disseminate information from the schoolchildren to adults in the community

Three different techniques were employed during the course of the study to disseminate the information that the children had learnt, to adults within the community: public exhibitions, glossy booklets and take home newsletters. All adult members across the community were considered as potential recipients, but the researcher focused on information acquired by three specific target groups: members of the Community Centre, The Watch House Club, and the children's parents. They were selected because of their strong connections with Cullercoats.

5.4.3 Public Exhibitions

Four exhibitions, each at a different venue, were organised during the project to disseminate the information that had been gathered by the children in their studies. Displays covered a wide range of topics relating to the maritime and environmental heritage of Cullercoats including black and white photographs of the buildings and people of the village, children's drawings depicting the local industries and copies of the original nudibranch paintings by local naturalist Hancock (reproduced by kind permission of the Great North Museum: Hancock). The exhibitions were organised by the schoolchildren and the researcher played an advisory and guiding role in the collection and presentation of materials. The exhibition venues included: the Dove Marine Laboratory, The Community Centre and the Watch House Club. The latter two venues are prominent focal points for the villagers; both clubs have a large membership and are easily accessible. Each exhibition was available for viewing over two days. By special request from a neighbouring town the final exhibition was also presented at Tynemouth Bowling Club. Tynemouth is immediately adjacent to Cullercoats.

Table 5.1. Detailed contents of each of the exhibitions. Each exhibition depicted one theme of the teaching programme, and was presented as three separate displays.

Exhibition:	Display 1	Display 2	Display 3
Exhibition 1. Dove Marine Laboratory.	Flora and Fauna of Cullercoats Bay: Past Present and Future. Illustrations, paintings and text about the animals and plants that have been seen in the bay in the past, what is there today and how this might change in the future.	Community memories Visual and written presentation of the memories of 6 older villagers.*	Animal classification Collection of children's work outlining which scientific groups local marine animals can be classed into.
Exhibition 2 Watch House Club Community Centre	People and buildings of Cullercoats The history of the village and its people portrayed through old photographs. (The children sourced these from family members).	Origins of Cullercoats Collection of children's work showing where the first buildings in the village were, and why they were important.	• Salt, • Coal, • Fishing Overview in text and pictures of the three industries that helped shape Cullercoats.
Exhibition 3 Watch House Club	Cullercoats lifeboats A history in pictures, photographs and words of the local boats, heroes and rescues down the ages.	Geology of Cullercoats Description of the rocks which make up the Bay and the reason for their SSSI status	100 years of the Dove Marine Laboratory. A celebration of the laboratory during its centenary year.
Exhibition4 **Community Centre.	All the displays shown above plus an exhibition about the life and work of the Artists of Cullercoats. It was held over a weekend at the end of the project.		

*6 older residents from the village were interviewed by the researcher; their childhood memories about changes in the use of the beach were recorded and the information was used by the children in articles for the exhibitions and newsletters.

**This was the final celebration event of the whole project. All of the exhibitions were displayed again, with the addition of a new theme which showed information about the artists that had studied and painted in Cullercoats.

5.4.4 Newsletters.

The children and the researcher produced 4 x 500 copies of a community newsletter at approximately six monthly intervals during the lifetime of the project. The format of the newsletters was a mixture of articles, photographs and drawings. The topics complimented those that were displayed in the exhibitions. In order to increase the breadth of interest about Cullercoats heritage, 2 supplementary articles for each newsletter were written by the researcher. Examples include a piece about local words and superstitions and one about the building of the seawall. The articles were factual and care was taken not to bias or lead the children, so independent conclusions could be reached in the analysis. Each child who took part in the study took home two newsletters, one for himself/herself and their family and one for their neighbours. Copies were also left in the Community Centre, Watch House Club, the library, local shops and other public places in Cullercoats.

Table 5.2. Contents of the newsletters and the themes covered.

	Topic 1.	Topic 2	Topic 3
Newsletter June 2007	Flora and Fauna of Cullercoats Bay	Launch of new lifeboat	Community memories
Newsletter December 2007	Origins of Cullercoats	Fishing superstitions and words	Construction of the seawall
Newsletter July 2008	Geology of Cullercoats bay	Lifeboats down the ages	Dove Marine Laboratory centenary
Newsletter Jan 2009	Cullercoats School history.	Artists colony of Cullercoats	Summary of project

5.4.5 Booklets.

At the end of the study, a range of the children's written and illustrative work was selected from the entire teaching programme to form an illustrated booklet. This was divided into

four subsections: the geology of Cullercoats Bay, the origins of Cullercoats; the fishing industry and the maritime buildings of Cullercoats. All of the children played a large part in the overall design of the booklet. They chose its title, colours and style. These ideas were incorporated into a design brief which was sent to a professional graphic designer who turned their work into a glossy A4 24 page booklet. A steering group of 6 pupils then edited the booklet and arranged for any changes to be made. Each child who had taken part in the study received a copy to take home. The remainder of the 1000 copies were extensively distributed throughout the village and wider community. 200 were left at the final exhibition, 50 copies were given to The Watch House Club and 50 copies to The Community Centre. The remaining copies were left in public places such as shops, cafés, churches and the post office for people to take home and read. 15 Copies were placed in each of the libraries in North Tyneside. The books are retained in the local history section and are available on loan.

5.4.6 Evaluation of effectiveness of dissemination techniques
Questionnaires.

Questionnaires were used to assess and evaluate how effective the newsletters, booklets and exhibitions were in disseminating the information that the children learnt in the teaching programme to the adults in the community. The questionnaire was completed by the following groups: the children's parents, members of the Community Centre and members of the Watch House Club. The questionnaire had a common 'part one' which each of the groups filled in followed by a second section of 3 or 4 questions that were exclusive to each of the groups. The questionnaire asked questions that could either be answered with a 'yes' or 'no' answer or on a graduated Likert scale from 0 to 5, (0 = nothing, 1 = a little; 2 = some; 3 = a moderate amount; 4 = a large amount; 5 = a considerable amount). Subsequently, mean Likert scores were calculated for responses to each question, and used to compare responses given to different questions. As an arbitrary criteria, a mean score of <1 was regarded as indicating a very low score.

An additional questionnaire was designed for the pupils to assess how much new information they had learnt about the local heritage of Cullercoats. They were alsogiven a questionnaire at the beginning of the project to assess their baseline knowledge and then again at the end of the project.

5.4.7 Analysis techniques.

An account of the pros and cons of using Likert scale questionnaires is detailed in the methods section of Chapter 2 along with details of the value of a SWOT analysis. A Mann Whitley U test and Wilcoxon matched pairs rank test were the statistical tools used to analyses the results of the questionnaires, the rationale behind their use and the limitations of the tests is to be found in the methods section of Chapter 4.

5.5. Results

Participating children gained a considerable amount of information about their maritime heritage and environmental education from the project. They reported to have been aware of a mean of 2.58 ± 0.15 key features out of a possible 20 presented to them in student questionnaires before the project started but that this had increased to 17.14±0.20 key features at the end of the project. This difference is highly significant (n=66, T= $P<0.001$ Wilcoxon matched pairs rank test).

Table 5.3. The percentage of adults from the various community groups who were aware of the project. (Q1)

Number	Parents	Community Centre	Watch House
who responded to questionnaire.	36	22	19
% of adults who were aware of the project	77	77	90

The children also raised awareness of the project within the adult community, as a large majority of the adults who responded to the questionnaires claimed to be familiar with the project. The results show that almost 75% of parents were aware of the project despite other responses to the questionnaire which indicate that communication about the project between parents and children was low. (Question 1). The remaining 25% may not have received the take home newsletters and booklets for a variety of reasons. 33% of the Community Centre members and 10% of the Watch House Club members had not heard of the project, and may be people who have less contact with the village's activities. (Table 5.3)

Table 5.4. Numbers of each of the four community groups who reported attending exhibitions in each of the four venues. (Q2)

Venue	Children	Parents	Watch House	Community Centre
Community Centre	7 (19.4%)	5 (26.3%)	14 (21.1%)	18 (81.8%)
Watch House	5 (13.8%	11 (57.8%)	3 (4.5%)	1 (4.5%)
Dove Marine	5 (13.8%)	0	13 (19.7%)	0
Did not attend	18 (50%)	3 (15.7%)	36 (54.5%)	3 (13.6%)
Tynemouth Bowls Club	1 (2.7%)	0	0	0

Attendance at the exhibitions was high with an average 200+ local community members present. At each of the exhibitions there was good attendance from outside of the immediate Cullercoats community, as was noted by the exhibition hosts. The event held in Tynemouth was well attended by people of the neighbouring villages (200+) but these were not members of the Cullercoats community. Patterns of attendance show that members of the Watch House Club and Community Centre visited the exhibitions in their own venues whilst parents were divided in their choice of location. Fewer parents visited exhibitions than either members of the Watch House Club or those from the Community Centre. (Table 5.4)

There is evidence from questionnaires given to the parents and children that the children talked to their parents about the project. The mean results show that the children claimed, that they talked to their parents more than their parents claimed that they had talked to them. This could be due to differences in perception. The children may have classed showing their parents the booklets and newsletters and taking them to the exhibitions and coast as communication. The parents might have interpreted the question as only referring

94

to oral communions. There are no significant differences in the mean Likert scores for these results based on the number of times that children or parents discussed the issues (Mann Whitney U test P=0.1396)

According to parents, the project led to relatively little discussion within the family (Likert scale mean 1.02±1.4). The children claimed to have talked to non-family members about the project but again only to a limited extent (mean Likert scale 1.34±1.00). Most children said that they took their parents to a feature on the coast at least once as a consequence of the project (mean Likert scale 1.41 times ± 0.09). They also claimed to have taken non family members to the coast an average of one and a half times (mean Likert scale 1.46 ± 1.00). It is difficult to validate all of these claims, it is possible that some of the children exaggerated their responses. However, when the author spoke informally to the pupils many could give examples of their visits.

Table 5.5. The number of adults from the various groups who read one or more of the newsletters and/or booklet. (Q4 and Q6)

	Community Centre	Parents.	Watch House
Number of people in group	22	36	19
% of people who read the newsletters	77.5	78.8	72.4
Mean no. of newsletters read by individuals	2.5±0.2	2.6±0.21	2.5±0.27
Booklet	80%	100%	50%

The results show that most people who received the booklet read it. All members of the Watch House Club who had one reported to have done so. A large majority, (80%) of the parents, but only 50% of the Community Centre members made similar claims. From parental questionnaires it was apparent that family members other than parents also read the booklets (29 out of 36). A mean Likert score 2.31± 0.16 indicated that just over 2 additional people in the family read them. Similarly, the newsletters were widely read by

members of different community groups. They were sent to family members living in other parts of the UK, and one family posted them to Australia. (Table 5.5)

Table 5.6. **Mean Likert scores of perceived knowledge gained for each the three community groups from the three methods of dissemination**. (Q3,5,7)

Method of dissemination			
	Parents	Watch House	Community Centre
	36	19	22
Newsletters	3.2±0.2	2.6±0.2	3.0±0.3
Booklets	3.1±0.2	2.7±0.3	3.3±0.3
Exhibition	3.6±0.2	2.1±0.3	3.5±0_

Each of the 3 groups claimed to have gained knowledge from the three methods of dissemination. Curiously, in the Watch House Club the mean scores on the Likert scale were much lower than those of the parents or Community Centre people in each of the three categories, suggesting that they felt that they gained less from these sources. (Table 5.6)

(The above scores can be interpreted using the following scale: 0 = nothing, 1 = a little; 2 = some; 3 = a moderate amount; 4 = a large amount; 5 = a considerable amount).

Table 5.7. Perception of increased knowledge as a result of the project. Values are mean Likert score with SD before and after the project as determined by questionnaires. (Q8)

Number of people in group	Parents	Watch House	Community Centre
	36	19	22
Mean score before project	1.85 ±2.0	2.94 ±2.0	3.25 ± 0.3
Mean score after project	3.76 ±0.3	3.64 ± 0.1	3.85 ± 0.2
P value	P<0.001	P<0.05	P>0.05

Parents, the Community Centre Group and Watch House Club all claimed that their knowledge of Cullercoats Heritage has increased as a result of project, however this was not a significant increase for members of the Community Centre. (Table 5.7)

The above scores can be interpreted using the following scale: 0 = nothing, 1 = a little; 2 = some; 3 = a moderate amount; 4 = a large amount; 5 = a considerable amount). P values are calculated using the Wilcoxon Matched Pairs test. The project also brought other benefits to the activities of community groups. For example there was a membership increase for the Watch House Club. Members also believed that the project increased their profile (mean Likert score = 3.29 ± 0.3) and increased the awareness of the role of club within the community (2.55 ± 0.3). Similarly, Community Centre members claimed the project focused members' thoughts on the area's maritime heritage (3.4 ± 0.3), promoted debate (3.9 ± 0.3) and increased use of the centre (4.45 ± 0.2)

Cullercoats: Past, Present and Future Questionnaire.

School Children questionnaire.

We have all had a great deal of pleasure in working on the recent project Cullercoats:Past, Present and Future. We would now like to try and find out how successful the project was, how much you and other people benefited from it. We shall be asking people in Cullercoats, including your parents, to fill out questionnaires relating to the project. We would also like to know more about your won responses. We would therefore be very grateful if you could spend a few minutes completing this questionnaire.

Q 1. The project had four exhibitions at different places in Cullercoats. Did you attend any of them? If so, please tick the appropriate venue**(s).**

☐	Dove Marine Laboratory.
☐	Cullercoats Watch House
☐	Cullercoats community centre.
☐	Tynemouth bowling club.
☐	I did not attend any of the exhibitions

Q2. How much did you learn from the exhibitions about the buildings, social and natural history of Cullercoats? Please place a tick against the answer below that most closely agrees with your own opinion.

0 = nothing
1 = a little
2 = some
3 = a moderate amount
4 = a large amount
5 = a considerable amount

0	1	2	3	4	5

Q3. Schoolchildren from Cullercoats Primary School produced an illustrated booklet about the seas and coast of Cullercoats called 'The Maritime Heritage of Cullercoats'. Did you read it ?

☐ **Yes** ☐ **No**

Q4. **How much did you personally learn from the booklet about the coast and heritage of Cullercoats? Please place a tick against the answer below that most closely agrees with your own opinion.**

0	1	2	3	4	5

0 = nothing
1 = a little
2 = some
3 = a moderate amount
4 = a large amount
5 = a considerable amount

Q5. **You produced four newsletters during the project. Did you read any of them? Please place a tick against the answer below that most closely agrees with your own opinion.**

0	1	2	3	4

0 = I did not read any of them
1 = I read one of them
2 = I read two of them
3 = I read three of them
4 = I read four of them.

Q6.
If you did read any of the newsletters, how much did you learn from them about the coast and heritage of Cullercoats? Please place a tick against the answer below that most closely agrees with your own opinion.

0	1	2	3	4	5

0 = nothing
1 = a little
2 = some
3 = a moderate amount
4 = a large amount
5 = a considerable amount

Q7. How would you rate your own general knowledge of the coast and maritime heritage of Cullercoats before and after the project, Cullercoats: Past, Present and Future?

BEFORE

0 = very poor
1 = poor
2 = limited
3 = moderate
4 = good
5 = excellent

0	1	2	3	4	5

AFTER

0 = very poor
1 = poor
2 = limited
3 = moderate
4 = good

0	1	2	3	4	5

5 = excellent

QS1. Did you talk to your parents about the project? Please place a tick against the answer below that most closely agrees with your own opinion.

0 = not all
1 = a little
2 = to some extent
3 = a moderate amount
4 = a large amount
5 = considerably

0	1	2	3	4	5

QS2. Did you talk to people other than your parents about the project? Please place a tick against the answer below that most closely agrees with your own opinion.

0 = not all
1 = a little
2 =to some extent
3 = a moderate amount
4 = a large amount
5 = considerably

0	1	2	3	4	5

QS3. Have you taken your parents to see any of the places where you made new discoveries during the project? Examples would be the rocky shore, the lifeboat station or saltpans chimney. Please place a tick against the answer below that most closely agrees with your own opinion.

0 = no
1 = once
2 = a few times
3 = often

0	1	2	3

QS4. Have you taken people OTHER than your parents to see any of the places where you made new discoveries during the project? Examples would be the rocky shore, the lifeboat station or saltpans chimney.   Please place a tick against the answer below that most closely agrees with your own opinion.

0 = no
1 = once
2 = a few times
3 = often

0	1	2	3

100

QS5. Please put a tick in the box against any of the following that can be found in Cullercoats

	Tick below if found in Cullercoats
Caves	
Starfish	
Remains of gallows for punishing smugglers.	
The clown fish 'Nimmo'	
Sea anemones	
Sea lions	
Sand dunes	
The remains of a saltpans chimney	
A wrecked submarine.	
Remains of Roman port	
Coal seams	
A house where smugglers used to live.	
Limestone cliffs	
A working coble	
A row of old fishermen's cottages	
A watch house	
A lighthouse	
The remains of an old pier	
Coral reefs	
Wartime remains e.g. searchlights used in the last world war.	

Note. The children completed this questionnaire at the beginning and the end of the project.

Cullercoats: Past, Present and Future Questionnaire.

Watch House Club questionnaire

We have had a great deal of pleasure in working on the recent project **Cullercoats: Past, Present and Future.** We would now like to try and find out how successful the project was, how much was learnt and how much it benefited the people of Cullercoats. We would therefore be very grateful if you could spend a few minutes completing this questionnaire.

Q1.
Are you aware that there was a two-year project, supported by the Heritage Lottery Fund and based on Cullercoats Primary School about the seas and coast of Cullercoats? It was called 'Cullercoats: Past, Present and Future'.

Yes ☐   **No** ☐

Q2.
The project had four exhibitions at four different venues in Cullercoats. Did you attend any of them? If so, please tick the appropriate venue(s).

☐   Dove Marine Laboratory.

☐   Cullercoats Watch House

☐   Cullercoats community centre.

☐   Tynemouth bowling club.

☐   I did not attend any of the exhibitions

Q3. How much did you learn from the exhibitions about the coast and heritage of Cullercoats? Please place a tick against the answer below that most closely agrees with your own opinion.

0 = nothing
1 = a little
2 = some
3 = a moderate amount
4 = a large amount
5 = a considerable amount

0	1	2	3	4	5

102

Q4. Schoolchildren from Cullercoats Primary School produced an illustrated booklet about the seas and coast of Cullercoats called 'The Maritime Heritage of Cullercoats'. Did you read it ?

	Yes		No

Q5. How much did you learn from the booklet about the coast and heritage of Cullercoats? Please place a tick against the answer below that most closely agrees with your own opinion.

0 = nothing
1 = a little
2 = some
3 = a moderate amount
4 = a large amount
5 = a considerable amount

0	1	2	3	4	5

Q6. The schoolchildren produced four newsletters during the project. Did you read any of them? Please place a tick against the answer below that most closely agrees with your own opinion.

I did not read any of them
I read one of them
I read two of them
I read three of them
I read four of them.

0	1	2	3	4

Q7.
If you did read any of the newsletters, how much did you learn from them about the coast and heritage of Cullercoats? Please place a tick against the answer below that most closely agrees with your own opinion.

0 = nothing
1 = a little
2 = some
3 = a moderate amount
4 = a large amount
5 = a considerable amount

0	1	2	3	4	5

Q8 How would you rate your own general knowledge of the coast and maritime heritage of Cullercoats before and after the project, Cullercoats: Past, Present and Future?

BEFORE
0 = very poor
1 = poor
2 = limited
3 = moderate
4 = good
5 = excellent

0	1	2	3	4	5

AFTER

0 = very poor
1 = poor
2 = limited
3 = moderate
4 = good
5 = excellent

0	1	2	3	4	5

QW1. Has the project helped raise the profile of the Watch House as an important part of Cullercoats maritime heritage?

0 = not at all
1 = a little
2 = to some extent
3 = a moderate amount
4 = a large amount
5 = considerably

0	1	2	3	4	5

QW2. There has been an increase in the membership of the Watch House during the past two years. To what extent do you think that this can be attributed to the project 'Cullercoats: Past, Present and Future'? Please place a tick against the answer below that most closely agrees with your own opinion.

0 = none at all
1 = a little
2 = to some extent
3 = a moderate amount
4 = a large amount
5 = considerably

0	1	2	3	4	5

QW3. Do you think that the project 'Cullercoats: Past, Present and Future' has helped to make more people aware of the role that the Watch House plays in the community?

0	1	2	3	4	5

0 = no
1 = a little
2 = to some extent
3 = a moderate extent
4 = a large amount
5 = considerably

The members of the Community Centre and the parents had a questionnaire that had an identical first part and a very similar second part.

5.6 Discussion.

The key aim of the project was to explore examine the effectiveness of intergenerational knowledge transfer from children to adults.

5.6.1 Adult's increase in knowledge.

Factual knowledge gained as a direct result of exposure to the three teaching methods was not formally assessed. Importantly however, the adult participants felt strongly that they had indeed learnt new information. The parents, the Community Centre Group and Watch House Club all claimed that their knowledge of Cullercoats Heritage increased as a result of the project and in the case of the Watch House Club and parents this perceived increase in knowledge was statistically significant, indicating that the project has been successful in accomplishing its aims. The increase in knowledge was not significant for members of the Community Centre; one explanation for this could be that they already had a high level of knowledge. It is difficult to say absolutely that any one of the three methods of dissemination provided a better route to learning than the others but this was not the aim of the study. The participants were potentially exposed to all three methods, as it would have been impossible to segregate sub-groups. The very fact that the adults said they had increased their knowledge is extremely positive, if they felt that they had learnt then they probably did.

Falk & Dierking (2000) found that one of the key difficulties in measuring the effectiveness of free choice learning is that people differ greatly in their knowledge, attitudes, interests and motivations at the start of any experience. It could explain why Duvall & Zint (2000) concluded that intergenerational environmental programmes had only a modest potential to influence parental knowledge, attitudes and behaviour. Quantitative results can be misleading, they can suggest that no learning has occurred when in fact it has and vice versa (Ballantyne & Packer 2005). Intergenerational learning is a complex and fluid transfer of knowledge and passions; one cannot measure every aspect of it. It is important to interpret learning outcomes in their broadest sense; these may include changes in attitudes and values about the environment in general, one's own place in the world or interactions with other people (Hooper-Greenhill 2004 in Ballantyne & Packer 2005).

5.6.2 Pupils' increase in knowledge.

Prior to the start of the project that pupils' scored an average of 2.5 out of 20 in a quiz that tested their knowledge of the flora and fauna of Cullercoats and its maritime and cultural

heritage, at the end of the project their score had increased to a mean of 17. In addition, their own confidence and skills to gain knowledge was raised as was their aspirations. This is a more subtle attainment but in itself not a lesser result. Jensen *et al.* (1995) have shown how students' actions can affect social and environmental changes in the community and in turn alter adults' perceptions of the traditional role schools play.

5.6.3 Examination of the effectiveness of the dissemination techniques

The respondents to the questionnaires said that each of the dissemination techniques were effective means of imparting knowledge. The exhibitions had a slightly higher score than the booklets or newsletters. The following paragraphs however offer some insight into the merits of each method.

Newsletters. The newsletters in this study had a high readership. They are appealing because they offer concise information and may be used as references over extended periods of time (Bishop 1991). They are simple to pass around the family, cheap to reproduce, easy to distribute either by direct house to house posting or by leaving them in public places. Lancaster *et al.* (1997) found that they were effective and that the people in their project were interested in continuing to receive information in this way. A newsletter may also facilitate communication by stimulating people to discuss issues that they might not otherwise mention and are a way of reaching hard to get members of the community, such as people who would not usually attend an exhibition (Garton *et al.* 2003).

Booklets. The results show that most people who received the booklet read it, suggesting that it was a good way to disseminate information. The costs of the production, however, meant that they were not as available to the wider community as readily as the newsletters, although they were available in the 15 local libraries in the region. Cullercoats Primary School sent them to their 5 partner schools in Europe. Ofsted inspectors (2009) made the following quote in their report "Year 6 pupils are rightly proud of their high quality booklet about the town's maritime heritage". A copy of the booklets can be obtained from the author.

Exhibitions. There was medium to low attendance per study group at the exhibitions but the number of people present was increased by the attendance of people in the wider community. The exhibitions provided opportunities for members of the community to

explore aspects of their heritage in the presence of other people. Social reinforcement allows people to feel positive about their memories. Cooke (2008) suggests that "when heritage and community are brought together they reinforce one another". Community heritage can become a means to express the needs of the local people and their concerns about preserving local identities. Implementing artefacts within a community exhibition becomes part of the community experience Davis (2010).

Table 5.8 A SWOT analysis to show the benefits and limitations of the three methods of dissemination Legend: Bold=Exhibitions, normal font=newsletters, Red=booklets, Blue=all 3

Strengths	Weakness
Cheap to produce	Disposable.
Easy to distribute	**Not available to all members of community**
Provide concise information	**Advertisement required**
Can be used over extended periods	**Venues required**
Provide venue for people to explore heritage with others	**Time consuming to organise**
Provides opportunities for conversation and discussion	**Hard to get people to attend**
A wide variety of information can be given	High production costs
Lasting legacy which can be placed in public libraries.	Not widely available to everyone to own
Promote a sense of place and community identity	
Many people can participate and contribute	
Opportunities	Threats
Easy to send to family members in other part of the country/world	Researcher is inundated with requests for further information about past Cullercoats inhabitants from present day residents
Can reach hard to get people.	Some community members become upset that their family histories have not been explored and displayed
Can be continued by any interested person after project ends	
Promote sense of community cohension	
Allow people from outside village to learn	
Can be posted to family easily	
Can be used as a teaching resource	

5.6.4 Outdoor learning.

The increase in children's knowledge suggests that there are benefits to outdoor learning, this maybe because learning by doing is a learning style that suited the participants. However Bentley (1998) suggested that outdoor learning can support indoor classroom based sessions and a combination of the two can be greater than a sum of their parts. This is supported by studies by Bogner (1999) and Nundy (1999) which found that a mix of teaching and learning approaches, including hands-on and differentiated learning, which characterises much of outdoor teaching, does help meet the needs of the whole class. Lai's (1999) study of secondary school students' field trip experiences found that there was a marked difference in individual's responses to the two parts of the day. Some preferred the teacher guided trip whilst other were happier with the student lead fieldwork. This evidence suggests that a combination of classroom based activities and a varied programme of outdoor sessions can promote a diverse range of opportunities for learning.

In addition to academia learning there is a growing body of evidence that suggests that outdoor learning is beneficial to other aspects of a child's emotional, spiritual and moral well-being. These include an increase in: social skills (Milton 1995), teamwork (Nundy 1999), self confidence and self-esteem (National Forest Schools (NEF) 2004) and favourable shifts in Individuals behaviour (Bogner 1998). Eaton (2000) found that outdoor learning experiences were more effective in developing cognitive skills than classroom based learning. It has a greater chance of capturing the children's imagination and interest in their immediate surroundings and, as a result, they are more likely to share this interest with their parents. Projects that promote study and exploration of local places foster a sense of ownership in children (Ballantyne *et al.* 2001c). This in turn can support intergenerational learning and promote dialogue between family members.

5.6.5 Lack of dialogue between parents and children.

The parents and children who took part in the study reported a lack of verbal communication between each other. The parents felt that there was no formal conversation however, the children did take family members to the beach and were eager to take home the newsletters and booklets for their parents to read. This perceived lack of communication could be caused by differences in perception between the two demographic cohorts and may be a reflection of modern lifestyles. This lack of direct (verbal) dialogue is mirrored in other studies. Sutherland & Ham (1992) found in their study

of a local watershed that the information that did reach home was vague and unreliable. Enabling the children to work with researchers to produce the current studies newsletters and booklets ensured that the information that was sent home was not only informative but also accurate.

"I took my mam right to the back of the Fairie Caves; she had never been in there before".

"I showed my family where the smugglers used to have their secret passage, the one that came out on Jakey's Bay".

"At the exhibition there was a photograph of our house 100 years ago, my dad was really surprised when I first showed him".

These quotations indicate that the children's enthusiasm and animation for the project provided opportunities for their parents to learn. Conceivably the questionnaire was a blunt tool for assessing the level of information that passed between the parents and children. In many families and cultures conversations between parents and children are often one sided with the parents taking the lead and seen as the more knowledgeable party. However, this is often not the case, especially concerning environmental education where children's knowhow is often more up to date than their parents (Strom 1988, Ballantyne *et al.* 2001). There is evidence to suggest that studies which empower children to refine their status, tackle preconceived ideas and allow parents and children to work together as equals have more chance of success and help promote two way learning and meaningful conversations (Hart 1994, Uzzell 1999).

5.7 Project update.
An indicator of the success of the project was the repeated calls for further studies into Cullercoat's heritage by residences of the village and the request from people from surrounding villages for projects that looked at their areas history. One project did in fact attract Heritage Lottery Fund money; "The Tale of the Herring" project which examined the herring fishery in four ports along the NE coast throughout 2010/11.

5.8 Long-term Outcomes.
In 2013 a new cohort of Cullercoats Primary School pupils took part in a project that examined their local environmental as a teaching resource "The Coast as a Classroom".

Each child was given a copy of the two booklets (The Flora and Fauna of Cullercoats Bay and "The Maritime Heritage of Cullercoats"), that the children in this project had produced to help them with their project-work. The booklets are still available in the 15 local libraries in the area and all the old photographs of the buildings and residences of "old Cullercoats" have been collated onto a CD and are for sale in the Community Centre. The profits are used to purchase equipment for the youth club and thus benefit some of the originators of the study.

5.9 Conclusion.

This study has shown that there are a range of methods that can successfully promote intergenerational learning which work well either individually or together. Each has its own merits and they provide effective tools for the dissemination of information from the younger generation to their elders. However it is difficult to quantify all aspects of the knowledge that was transferred. With the current focus on loss of traditional knowledge, habitat degradation and environmental sensitivity it is important that we continue to explore further ways which facilitate the transfer of knowledge in this way.

Chapter 6 The Tale of the Herring: Promoting community cohesion through sense of place education.

6.1 Introduction.

Globalisation, standards-based education, entertainment media, long working hours and even well intentioned advocacy for environmental causes in distant parts of the world have diverted people from meaningful interactions with nearby places (Semken & Freeman 2008). To have little or no understanding of one's own local area is to be oblivious to its aesthetic value, cultural and political significance and possibly accede to its environmental or social degradation. If we feel personally connected to a particular community we will feel more likely to protect it (Ardoin 2006). Fettes & Judson (2011) suggest that sense of place is a valuable resource for promoting people's relationships with their surroundings and environmental sustainability.

6.1.1 Ecosystem Services.

These sentiments link in with recent thinking surrounding Ecosystem Services. The Ecosystem Services (ES) framework was adopted by the Millennium Ecosystem Assessment (MA) process of the United Nations (ESA 2003). It has emerged as a formal approach to describe and categorize the relationship between ecosystems and society (Ehrlich & Ehrlich 1981, Daily 1981) and it is widely accepted within the international environmental science and policy communities (Costanza *et al.* 2011, Carpenter *et al.* 2009). The MA divided Ecosystem Services into four sub sections: provisioning services (e.g., food, fresh water), regulating services (e.g., climate regulation, water purification), supporting services (e.g., nutrient cycling, soil formation) and cultural services (e.g., aesthetic, spiritual, recreational experiences). The latter is described in terms of the "nonmaterial benefits people obtain from ecosystems," and specifically lists, amongst other things, cultural heritage values. Natural features of the environment are often associated with the identity of an individual, a community, or a society (Daily *et al.* 2009). They provide experiences shared across generations, as well as settings for communal interactions important to cultural ties (Mooney *et al.* 2007) Both tangible and intangible aspects are relevant to cultural heritage as an Ecosystem Service, these can also be described as a use value or a non-use value (Chan 2011). A use value is defined as the value derived from the actual use of a good or service within the ecosystem; such as fishing, birdwatching, or walking. A non-use value is a value that does not concern a use,

either direct or indirect, of the environment, its resources or services. An example of one these is sense of place.

6.1.2 What is a sense of place?

Sense of place is a term that is used liberally in different disciplines to encapsulate connections among people and places (Lim & Barton 2006). It is also called 'place affiliation' (Moore 1986), 'place attachment' (Altman & Low 1992), 'place identity' (Prohansky *et al.* 1983, Twigger-Ross & Uzzekk 1996) and 'place satisfaction' (Stedman 2003). The development of a sense of place is important for several reasons which are linked to intangible or non-use values. Sense of place is recognised as valuable for preserving and developing sense of community prosperity and preservation (Penetitio 2009). A sense of place and belonging to a specific, localised community is one of the most profound sources of human identity (Ardoin 2006). Attachments to places are necessary for the protection of unique and healthy communities and environments and that preservation of community is integral to the psychological wellbeing of human inhabitants (Fettes & Judson 2011). Feelings of pride, ownership and responsibility are associated with a sense of belonging (Rogan *et al.* 2005). Being part of a community fosters a sense of accountability for that place; this includes not just the physical structure of the place but also an awareness of the birds, the animals and the people around you (Davenport 1998). A strong sense of place enhances the responsibility and ownership of young people towards the environment and their commitment to act (Alkaher & Tal 2011).

6.1.3 How is sense of place gained?

Fettes & Judson (2011) propose that place-making is an active process not a passive one, that a space exists as a place for us because of the effort we expend relating to it. The passive knowledge that develops through frequent contact or second hand descriptions and explanations may provide resources for place making. However, it is by mentally reaching out to grasp the possibilities of a place, its past, its future, its meaning for us that really shapes the relationship. Tuan (1980) views sense of place as a critical awareness that is different from "rootedness". He describes sense of place as a self-conscious, reflective awareness that allows one to appreciate and create a place. Whereas rootedness, on the other hand, is an unselfconscious unreflective state made possible by a lack of curiosity toward the world at large and insensitivity toward the flow of time. These ideas suggest that place identity takes shape through the experiences one has had

(Sandberg 2003). They also significantly shape how one comes to understand one's current and future place in the world. Place experiences are filled with diverse objects, spaces and places that may or may not satisfy one's biological, physical, social and cultural needs. Therefore sense of place has an evaluative quality; it can lead a person to make positive or negative assessments within their community (Proshansky *et al.* 1983). In this article sense of place is defined as being the social and cultural contexts in which people describe and define a space into a place.

6.1.4 Sense of place in childhood.
The development of a sense of place often starts in childhood on several scales. There is the child-scale experience of learning about places through activities such as climbing trees and playing with friends. There is a family scale experience of place that provides an historical and cultural context for experiences and there is a community level sense of place were broader, cultural values and place relations are formed. Each scale is important in what children learn from it, in what benefits they gain and ultimately the type and extent of connections they will hold for place and nature (Derr 2002). Measham (2006) found that the most frequently emerging theme in his research was the importance of learning about sense of place through childhood experiences. Environmental psychologists have quantified links between exposure to natural environments in childhood and environmental and social preferences later in life (Bixler 2002). Positive place experiences contribute significantly to children's understanding of the world around them (Proshansky *et al.* 1983).

Evidence would suggest that children are not acquiring a sense of place and community accountability from their families and communities in a way that past generations have. Family structure has changed and the interaction and exchange of knowledge between generations is not as strong as in the past (Measham 2006). Learning about local environments during childhood is strongly influenced through the role of family (Derr 2002). Unfortunately families now spend less time together; children spend more time in their bedrooms than they do exploring outside. In 2008, UK children spent a daily average of five hours twenty minutes on screen-based activities (Palmer 2008). There is far more social mobility now than ever before. The demographic structure of many rural and coastal towns has changed during the past two decades. A lack of affordable housing and employment has meant that young people have had to move away from the places that

they grew up in. Hood *et al* (2011), suggest that social, economic, political and industrial issues all influence young people's ability to view their future in a local area. The houses that young people once might have hoped to buy are bought by wealthier people for holiday cottages. This has the effect that in tourist areas, (for example in fishing villages) the sense of place has shifted (Urquhart & Acott, 2011).

6.1.5 Sense of place education.

Gruenewald (2003) suggested shaping the development of a socio-ecological, place-conscious education. Among educational practitioners there has been increasing interest in and attempts for, sense of place approaches and practices. This includes pedagogical practices that encompass experiential learning in and about local natural and social settings. Also transdisciplinary and cross cultural place related knowledge and pedagogy (Semken & Freeman 2007). There is evidence for the effectiveness of sense of place learning in several areas, for example; significantly enhanced student performance on standardised multi-disciplinary achievement tests (Lieberman & Hoody 1998). 14 schools took part in a pilot study based around the approach "The Environment as an Integrating Context for Learning" (EIC). The concept centred on using a school's surroundings, locality and community as a framework for students to construct their own learning. Athman & Monroe (2004) found significantly improved student achievement motivation. The results of this study provide evidence of environment based-education's ability to improve high school pupils' motivation, achievement, environmental awareness and sense of community. Ernst & Monroe (2004) propose that students participating in place-based education often show more enthusiasm for learning because it is more relevant to their daily life, their home and community. Their research shows that pupils often exhibit, higher scores on standardized measures of academic achievement, improved behaviour in class, greater pride and ownership in their accomplishments; increases in self-esteem, conflict resolution, problem solving and higher-level thinking skills. The use of a sense of place approach to learning has the potential to enthuse and equip young people with the necessary skills needed to make positive contributions to their local environment and communities (Alkaher & Tal 2011). Early positive experiences with the natural environment have been identified as one of the "significant life experiences" associated with responsible environmental behaviour (Tanner 1980). Experiences during childhood give

form to the values, attitudes, and basic orientation towards the world that individuals carry with them throughout their life (Williams *et al.* 1992).

6.2 Aims and Objectives

The aims of this chapter are:

- to work with five coastal communities to show that tailored, cultural and environmental workshops and exhibitions can raise school children's awareness of their locality and promote sense of place.
- to enable children to see that the heritage of their area is connected to that of other communities.
- to show that workshops and exhibitions can be a method of involving adult community members in children's learning.
- to develop a travelling exhibition that promotes the maritime heritage of each area.

This was done by implementing the following objectives:

1. researching and developing, unique bespoke workshops.
2. delivering the workshops in a classroom and outdoor setting.
3. inviting members of the wider community to participate.
4. training volunteers to run the exhibitions.

The project was funded by The Heritage Lottery "My Heritage" fund. The project developed after the success of the project "Cullercoats: Past, Present and Future".

6.3 Methods.

During 2010 five First or Primary Schools were selected to take part in a marine themed project exploring the concept of sense of place education. The researcher opted to work with this age group because at this time in their development, children are becoming more independent, separate from their families and actively seeking out and expanding place based experiences (Moore 1986). Four of the schools were based in villages in NE England; North Shields, Cullercoats, Amble and Newbiggin, the fifth, Lowestoft, was based in the Southeast. The villages were chosen because they are all linked by a shared fishing heritage, in particular, a connection with the herring fishery. This fishery had been important in shaping the character of all the five areas involved. The project was named

"The Tale of the Herring" and it focused on the role that individuals within a family played in the industry, the fish that were caught and the boats that were involved.

6.3.1 Summary information about the schools involved and their locations.

North Shields

North Shields is a town on the north bank of the River Tyne. It is located eight miles (13 km) east of Newcastle upon Tyne. Its fish quay was once one of the busiest in the England; a popular saying was that one could walk across the harbour without getting wet just by stepping from herring drifter to herring drifter. Today the working quay is much quieter, very few people are employed in the fishing industry and the main town centre has migrated inland away from the river. The town's population is approximately 10,000 (Census 2007).

Percy Main Primary School

Percy Main is a smaller than average sized primary school with 223 mixed sex pupils. Almost all pupils are of White British heritage, with very few at the early stages of learning English. An above average proportion of pupils have special educational needs and/or disabilities with close to one-third of pupils identified. The proportion with a statement of special educational needs is almost double the national average. Almost two-thirds of pupils are known to be eligible for free school meals and this is high in comparison with the national average. The school extends its services in that it provides a breakfast club. The school has gained International School, the Next Generation Learning and the Eco-Schools Silver awards. The last Ofsted inspection in July 2011 stated that the school was "a good school" (Ofsted 2011).

Cullercoats

As discussed in the previous chapter, Cullercoats is a large coastal village with a population of around 9000. It is located in the south east area of the North Tyneside conurbation. It is a relatively tight knit community with a pro-active cohort of people and low crime rates. 54% of people from the area travel less than 10km to work, with the majority being employed in Newcastle (Census 2007). Please see previous chapter for a description of Cullercoats Primary School.

Amble

Amble is a small town and seaport situated on the North Sea coast in north Northumberland with a population of approximately 6,000. Although the fishing industry is much reduced it does survive, albeit with a smaller number of vessels. There is also a small marine industry, mainly concentrated around the construction and repair of yachts and other pleasure craft. It was once one of the principle places where the Northumberland coble (a wooden fishing boat) was built. Tourism forms an important sector of the town's economy. Part of the harbour has been redeveloped into a marina, and a caravan park, guest houses and B&Bs exist to serve visitors to the Northumberland coast (UK National Statistics).

Amble First School

The school is a smaller than the average first school with 108 pupils. An above average proportion of pupils are eligible for the pupil premium (this is additional funding to support pupils in the care of the local authority and pupils who are eligible for free school meals). The proportion of pupils supported at school action plus is above average. The proportion of pupils with special educational needs who are supported at school action plus or with a statement of special educational needs is above average. Very few pupils speak English as an additional language. An Ofsted report in December 2012 gave it a "good" rating (Ofsted 2012).

Newbiggin by the Sea

Newbiggin is a small coastal town in north Northumberland with a population of approximately 7000. Fishing has always been associated with Newbiggin, although later many inhabitants were employed in coal mining. In Victorian times, Newbiggin was Northumberland's favourite seaside town, attracting hundreds of visitors every day in the summer months, although this is not the case in 2011. The town has recently benefited from a sizable grant to develop a new maritime heritage centre. The bay has been improved with the building of a new breakwater, a huge statue and the importing of 500,000 tonnes of sand to replenish the beach. Unemployment rates are twice the national average whilst earnings are below it (UK National Statistics).

Moorside First School

This is an average sized school of 286 pupils which serves a coastal village with considerable social and economic disadvantage. Almost all pupils have white British

heritage, with a few from traveller heritage. All pupils speak English as their first language. The percentage of pupils with learning difficulties and/or disabilities is above average. The school was in its final year as a first school during the project and was due to amalgamate with another first school in the village at the end of the academic year. A 2008 Ofsted report stated that Moorside was "a good school" (Ofsted 2008).

Lowestoft
Lowestoft is the most easterly town in the United Kingdom. The once bustling fishing port and ship building industries are still associated with Lowestoft although they are no longer dominant industries in the local economy. Lowestoft is now a quiet residential town with population of about 60,000. Average earnings are below the national average and unemployment slightly above it (UK National Statistics).

Dell Primary School
This average-sized primary school of 286 pupils is in an urban location. In May 2011 it was in the process of expanding from being a first school to a full primary school. The oldest pupils are currently in Year 5. Virtually all pupils are of white British origin, with hardly any from other minority ethnic groups. A greater than average proportion of pupils are known to be eligible for free school meals. The proportion of pupils with special educational needs and/or disabilities is above average, particularly in the older classes. The proportion who have a statement of special educational needs is above average. Most of these pupils have moderate learning or behavioural difficulties, and are taught in the 'small class'. A further 'upper small class' serves pupils from Years 4 and 5 who are withdrawn from their usual classes for literacy and numeracy. The school has Healthy School status, Artsmark Gold and the Activemark award. A 2011 Ofsted awarded the school "good" status (Ofsted 2011).

Table 6.1. The age and number of pupils involved in the project. Prior to the start of the project each school was asked to select a suitable year group to participate. The researcher did not have any influence over the availability of the pupils which resulted in the mixed aged groups.

School	Year group	Number of pupils
North Shields	4 (aged 8-9)	22
Cullercoats	6 (aged 10-11)	58
Amble	3 (aged 7-8)	33
Newbiggin	5 (aged 9-10)	52
Lowestoft	4 (aged 8-9)	98

Prior to the start of the project, the heritage of the areas was investigated. This was accomplished by site visits, viewing museum collections, engaging in dialogue with the residents and studying the history of the area through literature and archives. Archival records provided details about the lives of the inhabitants of the villages, the roles that men, women and children played in the fishing industry and details of their daily lives. The archives also contained old photographs, items of clothing, film and songs. This background information allowed specific, tailored workshops to be devised for each area's selected school group. There were many similarities between the five study areas, but each contained something unique to it that highlighted its distinctive place identity. The archival research allowed this feeling of place and individuality to be tangible and easily discernible in the workshops.

Each school was offered 7 workshops; these were a mixture of classroom based activities, outdoor learning (in the pupils' local community) and a session at the Dove Marine Laboratory. A session lasted approximately two hours or in the case of some of the visits, a whole school day. The sessions were delivered by the researcher in the presence of the class teacher. The sessions were focused on communicating key features and events based around an areas environmental and maritime heritage that would provide the children with a deeper and richer background with which to interpret their own sense of place. Reference was made to the differences and similarities between the other fishing towns to enable the children to put their sense of place in a wider context. Most of the sessions started with a presentation of information and images about the topic to be investigated. This was then followed by a practical activity, whilst this was guided, enquiry-

based learning was encouraged. The children were given the freedom both inside and outside the classroom to direct their own learning.

Box 6.1 Outline of teaching sessions.

Fish preservation experiment
The children considered how herring were traditionally preserved focusing on the method of salting. Each child had the opportunity to explore the fish's physiology before gutting and preserving their herring in salt.   They considered how the fish reproduced and what their life cycle entails.

Food technology
This session links in with the herring gutting activity. The children were asked to consider other methods of preserving herring: smoking (kippers), preserving in vinegar (rollmops), canning and freezing. The pupils then had the chance to taste fish preserved using these methods alongside other seafoods that are caught in the North Sea. At the end of the session the children voted for the class favourite. The foods offered in this session were: prawns, crabs, kippers, rollmops, mussels, cockles and salmon.

Boat design
Sailing herring drifters were the traditional boats that were used to catch herring along the east coast.   During this session the children considered some of the design features of these boats, made a detailed plan, then, using a range of tools, made their own boats.

The coble is the traditional wooden fishing vessel in the Northeast. The children visited some of the local boats and spoke with some of the remaining fishermen who still use them. The children then made models of the coble using modroc and chicken wire. When they were dry they named them and painted them in bright colours.

Fish Identification
As well as herring, several other species of fish are caught in the North Sea. This session introduced the children to a wide range of them. A selection of fresh fish was available for them to handle and learn key distinguishing characteristics.

Box 6.1 continued.

Classify this
All marine animals can be divided into scientific groups. We can place the animals in the correct groups by looking carefully at them and identifying key characteristics which are exclusive to each group. Classify this is a game encouraged the children to examine a selection of preserved animals and place them in the correct phyla.

Seabed game
Fishermen today use a wide range of electronic equipment to know what type of sediment the seabed under the boat is composed of. In the past however fishermen used other methods, one of these would involve casting a lead line over the side with grease on the end. This would collect a sample of the sediment on it which could be identified when it was pulled to the surface. This was an important tool as certain fish can only be found on certain sea-beds. This game reproduced this method of seabed investigation, the children had to determine the sediment type in several containers and make a map of an improvised seabed.

Auxiliary trades
Many trades grew up around the fishing harbours, the children learnt about some of these then made their own class creel (fish basket) out of willow.

Table 6. 2 Workshop timetables.

	Newbiggin	Amble	Cullercoats	North Shields	Lowestoft
1	General intro to project. Touch tank session	General intro to project. Touch tank session.	General intro. Outdoor exploration of beach. Now and then game	General intro. Make a herring drifter	General intro. Make a herring drifter
2	Visit to Woodhorn archives. Museum staff to deliver two workshops.	Dove Marine lab Fish identification, herring dissection, preservation and lifecycle taste session.	Fish identification, herring dissection, preservation and lifecycle.	Dove Marine lab (whole day session). Fish identification, herring dissection, preservation and lifecycle	Fish identification, herring dissection, preservation and lifecycle.
3	Visit to Newbiggin Shore.	Visit to Amble Shore.	Coble making. Demonstration of traditional fishing methods	Visit to fish quay, tour of facilities.	Visit to maritime museum and herring drifter museum.
4	Dove Marine lab (whole day session). Fish identification, herring dissection,	Coble making	Winslow Homer: Art Tour. Painting from real life.	Auxiliary trades: rope making, rigging, canning, coopers, ice making. Make a creel	Classify this game

	preservation and lifecycle taste session				
5	Coble making	Activity to demonstrate fisherman's knowledge of seabed. Signs of herring in the water.	Making fisherman's cottage. Tour of village to visit site of old homes	Family roles.	Activity to demonstrate fisherman's knowledge of seabed. Signs of herring in the water.
6	Visit to RNLI and boat yard to see cobles	Visit to North Shields Fish Quay visit and Newcastle University (whole day activity)	Watch House/Lifeboats. Visit to these buildings, discuss about their history	University visit. Make a paddle steamer	Taste session
7.		Making Fisherman's cottages	Visit to Amble and Newbiggin harbours and shores (whole day activity)	Rocky shore visit	
	Exhibition	Exhibition	Exhibition	Exhibition	Exhibition

6.3.2 Steering committee

A steering committee was formed to oversee the project, this comprised of the university researcher, a school teacher from one of the northern schools, 2 pupils (a boy and a girl) and 3 community members. The committee decided early on in the project that they wanted to share the individual town's perception of their unique sense of place with the other towns involved. To facilitate this they opted to design 6 glossy pop-up banners using the archive information as background materials. These formed the basis of a travelling exhibition which was manned by trained volunteers. Each village had its own banner telling the story of its maritime history and association with the fishing industry in words and photographs. The sixth banner acted as an introduction to the project. A professional designer assisted with layout of the information and printed the banners.

6.3.3 Role of volunteers

During the project, parents and family members were invited to participate in the workshops and to attend the fieldtrips. This provided an opportunity for an exchange of information between the children, the parents, the school and the university. The weekly workshops also acted as training sessions for individuals who had offered to man the travelling exhibitions.

6.3.4 School exhibition

A major part of the project was for the young people to disseminate their knowledge and sense of place with the wider community. At the end of each series of workshops the children hosted an exhibition of their work. This comprised of the 6 pop up banners, several stalls and display boards set up in the school hall. The activities on the stalls reflected the children's learning and were both interactive and visual. Examples included: marine touch tank displays, fish identification games, herring drifter and coble displays, seafood taste sessions, classification games, displays of old and modern photographs, written work and demonstrations of herring gutting and preservation. The children organised all the arrangements for their exhibition, sent out the invites, choose who was going to man each stall/display and acted as the hosts. Their target audience was their immediate and extended family, community members and the rest of the school.

6.3.5 Travelling exhibition

The pop up banners, in addition to being shown in the school exhibition, visited each village again and was shown in a public venue, (a library, two community halls, a museum

and a maritime centre). They were on display for time periods that varied from a weekend to 6 weeks. Volunteers were on hand to answer any questions that visitors might have. There were also information leaflets available which directed people to the "Tale of the Herring" website where more information about the project and photographs could be viewed. The website also had a section where people could upload stories and images. www.taleoftheherring.co.uk

Table 6.3. Information about the people involved in the project.

Number of children involved in the project	252
Number of volunteers	63
Number of schools	5

6.3.6 Ethics

In line with Newcastle University's ethics policy a full ethics approval form was completed and approved before the start of the project. The studies in the early chapters did not require this as no policy was in place during the early stages of the thesis**.**

6.3.7 Data collection tool.

A questionnaire was used to assess the effectiveness of the project in achieving its aims. The same questionnaire was given to the children at the beginning and end of the project. Most of the questions required a response based around a Likert scale, those that did not (questions 13 and 14) have been presented as percentages. In those two questions the children were asked to tick appropriate boxes. The advantages and disadvantages of using a Likert scale have been discussed in the methods section of chapter 2. Other authors have used a Likert scale in their sense of place studies (Ardoin 2006, Semken *&* Freeman 2008). Other methods that have been used for analysing this topic are: are open ended questions (Schroder 1996), in depth interviews (Smaldone *et al.* 2008), and narrative approaches (Burley *et al.* 2005). The author kept a reflective diary throughout the project and recorded key developments and findings, anecdotes and quotes.

6.4 Results

6.4.1 Questionnaires and evaluation

At the end of the project all the young people involved were asked a series of 16 questions to measure the success of the research. A Likert scale was used to measure the responses: (the scores can be interpreted using the following scale: 0 = not at all, 1 = a little; 2 = some; 3 = a moderate amount; 4 = a large amount; 5 = a considerable amount). The children were told that it was not a test, that there were no right or wrong answers and not to merely write down what their neighbour had. The results from the Newbiggn by the Sea school have not been shown as it was not possible to administer questionnaires to the children.

Table 6.4 showing responses from individual schools to question 1. Have you enjoyed the project? Scores are shown as percentages in all tables.

Likert Score	0	1	2	3	4	5
North Shields n=21			4	6	19	71
Lowestoft n=82					13	87
Amble n=25						100
Cullercoats n=44	2		4.5	20	54.5	18

Table 6.5 showing responses from individual schools to question 2. Has studying your local area made lessons more enjoyable? The scores can be interpreted using the following scale: 0 = not at all, 1 = a little; 2 = some; 3 = a moderate amount; 4 = a large amount; 5 = a considerable amount.

Likert Score	0	1	2	3	4	5
North Shields n=21				19	9.5	71
Lowestoft n=82			1	6	19.5	74
Amble n=25		8		12	32	48
Cullercoats n=44	2	11	20	31	20	16

Table 6.6 showing responses from individual schools to question 3. Has the project made you want to learn more about the place in which you live?

Likert Score	0	1	2	3	4	5
North Shields n=21		14	4		4	76
Lowestoft n=82	1	1		7	20	71
Amble n=25	1		8	16	8	77
Cullercoats n=44	5	18	9	29	14	25

Table 6.7 showing responses from individual schools to question 4. Did the project make you feel proud to be part of your community? The scores can be interpreted using the following scale: 0 = not at all, 1 = a little; 2 = some; 3 = a moderate amount; 4 = a large amount; 5 = a considerable amount.

Likert Score	0	1	2	3	4	5
North Shields n=21	4			11	14	71
Lowestoft n=82			3	7	22	68
Amble n=25			4		12	84
Cullercoats n=44	7	5	18	16	36	18

Table 6.8 showing responses from individual schools to question 5. Did the project want you to take part in more community activities?

Likert Score	0	1	2	3	4	5
North Shields n=21	4	4	4	9	54	25
Lowestoft n=82	4	2	6	11	16	61
Amble n=25				12	12	76
Cullercoats n=44	15	7	21	23	9	25

Table 6.9 showing responses from individual schools to question 6. Has a member of your family been present at any of the sessions? The scores can be interpreted using the following scale: 0 = not at all, 1 = a little; 2 = some; 3 = a moderate amount; 4 = a large amount; 5 = a considerable amount.

Likert Score	0	1	2	3	4	5
North Shields n=21	66	4	9	4	6	11
Lowestoft n=82	26	15	7	6	13	33
Amble n=25	14	18	14	38	4	12
Cullercoats n=44	65	11	7	12	9	6

Table 6.10 showing responses from individual schools to question 7. Did you discuss the project with your parents?

Likert Score	0	1	2	3	4	5
North Shields n=21	4	4	4	10	4	74
Lowestoft n=82	5	1	5	11	20	58
Amble n=25	8	8	4	24	12	44
Cullercoats n=44	14	23	14	16	18	15

Table 6.11 showing responses from individual schools to question 8. 4 other schools are taking part in the project, does this make you feel excited? The scores can be interpreted using the following scale: 0 = not at all, 1 = a little; 2 = some; 3 = a moderate amount; 4 = a large amount; 5 = a considerable amount.

Likert Score	0	1	2	3	4	5
North Shields n=21	10	10	2	13	4	61
Lowestoft n=82	4	3	5	11	21	56
Amble n=25	4	10	8	10	16	48
Cullercoats n=44	23	8	30	18	9	9

Table 6.12 showing responses from individual schools to question 9. Did you think that having a travelling exhibition was a good way of letting people know what you had learnt?

Likert Score	0	1	2	3	4	5
North Shields n=21		4	6	4	4	82
Lowestoft n=82	1	5	3	4	8	79
Amble n=25				4	4	92
Cullercoats n=44	2	5	15	23	18	37

Table 6.13 showing responses from individual schools to question 10. Has going outside helped your learning? The scores can be interpreted using the following scale: 0 = not at all, 1 = a little; 2 = some; 3 = a moderate amount; 4 = a large amount; 5 = a considerable amount.

Likert Score	0	1	2	3	4	5
North Shields n=21			4	10	14	72
Lowestoft n=82				3	6	91
Amble n=25					8	92
Cullercoats n=44	5	5	5	18	34	33

Table 6.14 showing responses from individual schools to question 11. Do you think that topic based study helps your learning?

Likert Score	0	1	2	3	4	5
North Shields n=21			10	16	4	70
Lowestoft n=82			6	2	17	75
Amble n=25				8	12	80
Cullercoats n=44		5	16	27	20	32

Table 6.15 showing responses from individual schools to question 12. Does carrying out a practical activity help you learn? The scores can be interpreted using the following scale: 0 = not at all, 1 = a little; 2 = some; 3 = a moderate amount; 4 = a large amount; 5 = a considerable amount.

Likert Score	0	1	2	3	4	5
North Shields n=21			4	14	10	72
Lowestoft n=82			3	20	2	75
Amble n=25			8	12	4	76
Cullercoats n=44	5		7	23	20	45

Table 6.16 showing responses from individual schools to question 13. What subjects have you been studying during the project?

	North Shields n=21	Lowestoft n=82	Amble n=25	Cullercoats n=44	Total
Science	76	54	100	75	305
Maths	19	57	100	7	183
English	47	62	100	43	252
History	52	87	100	100	339
Art	47	63	100	97	307
DT	19	78	100	90	289
Citizenship	47	50	100	39	236
Geography	61	62	100	82	305

Table 6.17 showing responses from individual schools to question 14. During the project you have used materials from museums, archives and art galleries. Which have helped you learn the most? The scores can be interpreted using the following scale: 0 = not at all, 1 = a little; 2 = some; 3 = a moderate amount; 4 = a large amount; 5 = a considerable amount.

Likert Score	Film	Artwork	Written work	Photographs	Oral History	Museums	Living creatures
North Shields n=21	80	Not used	66	85	66	Not used	90
Lowestoft n=82	82	Not used	Not used	73	Not used	87	98
Amble n=25	92	92	84	92	Not used	Not used	95
Cullercoats n=44	41	77	43	70	Not used	Not used	84

Table 6.18 showing responses from individual schools to question 14. Before the project what did you think about using things from museums and archives to help you learn?

Likert Score	0	1	2	3	4	5
North Shields n=21	19		19	52		
Lowestoft n=82	5	6	44	45		
Amble n=25		28	36	36		
Cullercoats n=44		41	41	18		

Table 6.19 showing responses from individual schools to question 15. After the project what did you think about using things from museums and archives to help you learn? The scores can be interpreted using the following scale: 0 = not at all, 1 = a little; 2 = some; 3 = a moderate amount; 4 = a large amount; 5 = a considerable amount.

Likert Score	0	1	2	3	4	5
North Shields n=21		13		4	71	2
Lowestoft n=82		1	1	13	84	1
Amble n=25					4	96
Cullercoats n=44		25	21	23	22	9

Table 6.20. Mean responses to each question as answered by each individual school. N=172, range 0-5.

Questions.	North Shields	Lowestoft	Amble	Cullercoats
1. Have you enjoyed the project?	4.5	4.6	5	3.7
2. Has studying your local area made lessons more enjoyable?	3.0	4.7	4.1	3.0
3. Has the project made you want to learn more about your local area?	4.8	4.5	4.1	2.8
4. Did the project make you feel proud to be part of your community?	4.4	4.6	4.7	3.2
5. Did the project make you want to take part in more community activities?	4.4	4.1	4.6	2.8
6 Has a member of your family been present at any of the sessions?	1.0	2.6	0.96	0.8
7. Did you discuss the project with your family?	4.1	4.0	3.3	2.5
8. Four other schools took part in the project; does this make you feel excited?	3.8	4.0	3.6	1.6
9. Do you think that having a travelling exhibition is a good way of letting people know what you have learnt?	4.6	4.4	4.9	3.5
10. Has going outside helped your learning?	4.0	4.9	4.9	3.6
11. Do you think that topic based learning helps you study?	2.1	4.6	4.7	3.5
12. Does carrying out a practical activity help you learn?	4.5	4.6	4.7	4.9
15. Before the project which did you think about using things from museums and archives to help you learn?	1.5	2.2	2.1	1.7
16. After the project what did you think about using things from museums and archives?	1.9	2.8	3.0	2.5

Questions 13 can be seen in table 6.16 and question 14 in table 6.17, the author did not think that it was necessary to repeat the information in the above table.

Table 6.21. Mean responses to the questionnaire as answered by all the participants collectively n=172

Question number	Mean ± SE (range 0-5)
1. Have you enjoyed the project?	4.5±0.2
2. Has studying your local area made lessons more enjoyable?	4.0±0.2
3. Has the project made you want to learn more about your local area?	4.0±0.2
4. Did the project make you feel proud to be part of your community?	4.0±0.2
5. Did the project make you want to take part in more community activities?	4.0±0.2
6 Has a member of your family been present at any of the sessions?	1.4.0±0.3
7. Did you discuss the project with your family?	3.6±0.1
8. Four other schools took part in the project; does this make you feel excited?	3.1±0.1
9. Do you think that having a travelling exhibition is a good way of letting people know what you have learnt?	4.4±0.2
10. Has going outside helped your learning?	4.5±0.2
11. Do you think that topic based learning helps you study?	3.6±0.1
12. Does carrying out a practical activity help you learn?	3.9±0.1

6.4.2 Evaluation of results.

Q1) The results show that a very high proportion of the school pupils enjoyed the project, mean Likert score 4.5±0.2, Cullercoats pupils enjoyed the project least, mean score 3.7, Amble pupils enjoyed it the most, mean score a maximum of 5.

Q2) Studying the local area had made learning more enjoyable and stimulated enthusiasm for further study, mean Likert scores 4.0±0.2. Lowestoft children gave the question the highest rating of 4.7 opposed to Cullercoats and N. Shields who gave a mark of 3.0. One reason for this could be that the Lowestoft children had a particularly exciting trip on an ex-herring trawler, *The Lydia Eva*, one of the countries National Heritage Vessels, which the other children did not experience.

Q3) Participants reported that the project made them feel proud of where they lived and that they would like to take part in more community based activities, mean Likert score 4.0±0.2. However, Cullercoats pupils only gave a mean of 2.8 which links in with their response to question 2.

Q4) Children from N.Shields, Lowestoft and Amble reported a strong sense of community pride for where they lived (mean score 4.0±0.2). Cullercoats scored the lowest response of 3.2

Q5) The results were similar for question 5 (mean score 4.0±0.2), again the Cullercoats pupils gave the lowest response when asked if they wanted to take part in further community activities, mean score 2.8

Q6) A mean Likert score of 1.4.0±0.3 showed that some parents had visited the exhibition or taken part in some of the workshops. The Lowestoft children gave the highest responses, one reason for this could be that they filled in their questionnaires immediately after the final exhibition which their parents attended and the event was therefore fresh in their minds.

Q7) A mean Likert score of 3.6.0±0.1 revealed that the project was talked about in the home between family members. North Shields and Lowestoft gave the highest mean scores of 4.0 and 4.1 respectively. The mean score from Amble was 3.3, possibly they

talked less to their parents because they were the youngest children in the study. Cullercoats pupils said they did not talk to their parents very much (mean 2.8).

Q8) The children reported a mean Likert score of 3.1±0.1 when asked if they felt excited that 4 other schools were taking part in the project. Lowestoft children were most excited by the scale of the project (mean score 4.0) Cullercoats pupils collectively gave a score of 1.6.

Q9) A high mean score of 4.4±0.2 showed that the participants thought that a travelling exhibition was a good way of disseminating information.

Q10) The pupils were asked if going outdoors helped learning, a high mean Likert score of 4.5±0.2 showed that this was perceived to be true. Amble and Lowestoft's results were a very high mean of 4.9.

Q11) The pupils considered topic based study aided learning, mean Likert score of 3.6±0.1. The N. Shields pupils' responses were the lowest at 2.1. Amble and Lowestoft were the highest (means 4.6 and 4.7).

Q12) All the children gave high scores when asked if they thought that practical tasks aided learning (mean 3.9±0.1). Interestingly Cullercoats pupils scored it the highest at 4.9.

Q13) The project had a cross curricula approach in its delivery style. The children perceived that they had been learning mostly about history, followed by art. Science and geography were in a joint third position. Maths was not perceived to have a high prominence.

Q14). It is difficult to say which methods of dissemination worked best as not all the children benefited from all of them due to local availability. 95% of children thought living organisms (sea creatures and fish) were beneficial to learning. The use of archive materials and museums are shown to have been enjoyable learning tools; 87% of children reported to have enjoyed museums; 80% benefiting from art sources; 80% found photographs useful. Film, 74%; oral histories; 66% and written materials, 64% of pupils thought notes were valuable learning aids.

Q15 & 16). The pupils were asked how beneficial they though museums and archives were as learning tools before the start of the project and then again at the end. Although the scores were low in both questionnaires all the pupils had scored them higher the second time around. Amble first school's pupils' views showed the largest change.

6.1 Discussion.

The results of the project show that the methodologies used have been successful tools to connect young people to their local environment and promote sense of place. The unique approach taken in the study was to link 5 coastal communities with shared maritime heritages, through interactive workshops and a travelling exhibition. The workshops were based on historical evidence and artefacts sourced from archives and museums. Another unusual aspect of this study is that most other research into sense of place has focused on adults. Two other studies have worked with young people; Vaske & Kobrin (2001) in a natural resources based work program and Kudryavtsev *et al.* (2010) in an urban environmental education program. These two were focusing on an ecological dimension whilst "The Tale of the Herring" also examined social historical and built (buildings and boats) dimensions. One boy in Lowestoft told the author that the week he took part in the project was *"the best week of my life"*.

6.1.1 Topic based learning and workshops.

"The Tale of the Herring" was essentially a practical, topic based study. Burroughs (2008) found topic-based learning has the potential for facilitating the match between classroom-based teaching and individual learners' styles. Topic-based sense of place education can be an important tool for connecting with a wide range of children. Lewicka (2005) suggests that children's sense of place develops through multiple ways, routes and dimensions. Some of the activities in the workshops were new to the children and the parents were surprised to see their children handling animals with confidence, using sharp knives with care and preparing food dishes with ease. One quote from a parent was *"it was delightful to see such displays of adventurous learning".* The project allowed pupils a secure environment to take risks which facilitated the laying down of memories and a layered understanding of their place. Griffin (1998) found that by allowing personal interest and curiosity to drive the students' learning through engagement in a practical task, learning happened in a natural way. Practical tasks enable children who do not always shine in a traditional classroom setting to show skills and abilities that may otherwise remain hidden.

139

Direct experience plays an important role in shaping children's sense of place (Derr 2002). It was interesting to see in the results that the Cullercoats' pupils valued the practical approach to their learning higher than the other participants yet gave most of the other questions the lowest marks. One explanation could be that the author observed that the standard approach to learning in that school is didactic and teacher led. Perhaps the children appreciated practical activities because they don't get to do them very often?

The outdoor element to some of the workshops allowed the children to be active explorers of their locality. This was found to be important in enabling children to develop a sense of place in a study by Lim & Barton (2010). They state that children's sense of place is neither a passive response to the environment they are positioned in nor a mere product of long term residency. Rather they are "actively and purposefully exploring their environment and nurturing their sense of place" The pupils reported that studying the local area made lessons more enjoyable, outside play and exploration, were perceived to help learning. This is supported with evidence from other studies: Lim & Barton (2010) reported that outdoor learning allowed pupils to perceive, engage and make meaning of their place.

The workshops incorporated three educational sense of place approaches; an *experiential approach* based on the idea that sense of place emerges from experiences in physical settings (Relph 2007). The *instructional approach*, which nurtures sense of place through indirect means such as storytelling, books, art, films and other media, which has been used successfully by other authors (Cormack *et al*. 2008, McClaren 2009). Also the *combined approach* which takes advantage of nurturing sense of place through both direct place experiences and through instruction. This final approach facilitates the idea that place meanings are constructed not only through direct experiences but also through social construction through conversations with others and the use of artefacts (Young 1999).

The project stimulated a feeling of community pride in the pupils and encouraged them to want to take part in more community based activities. As the workshops progressed the children brought in artefacts and photographs from home that showed how their families had used the sea in the past. The pupils would take pride in standing before the class and recounting tales about their family's history. Archive materials and museums were successfully used to enhance feelings of sense of place by connecting pupils to events

that happened in the past. They made the topic more relevant and memorable. Historical records encourage people to view everyday buildings and spaces with fresh eyes and make connections between past events and contemporary usage (Vaske & Kobrin 2001). Sandberg (2003) theorises that sense of place is formed through an accumulation of cognitions and affects about the environment encompassing the past and present. Sense of place is never a final product; it is always in progress (Proshansky *et al.* 1986*).*

The results from the questionnaires suggest that in this study the combined approach has been successful in promoting a deeper sense of place in the majority of the pupils and raising their awareness of key aspects of their locality. Interestingly the results suggest that the Cullercoats pupils benefited least from the project. They enjoyed the study the least, did not feel particularly proud of their locality or community, nor were they enthused to participate in any other community events. They did not talk very much to their parents about the project and were least supported by their parents in the workshops. There are several possible reasons for these results; the children were slightly older, perhaps the workshops were not tailored sufficiently well to challenge their academic abilities. Each of the other schools participated in the research one day a week for several weeks on a regular day; Cullercoats teachers opted to space the sessions out over a term. Therefore sometimes several weeks would elapse when the researcher did not see the pupils which potentially disrupted the flow of the project. Finally the teachers took a far less participatory role in the workshops than the teachers from the other schools; this may have affected the children's enthusiasm for the sessions being taught and explain why fewer parents were involved.

6.1.2 Connecting Communities.
The pupils gave a mean score of 3.1 when asked if they were excited that other schools were taking part in the project. Cullercoats children gave a low score of 1.6. These results are perhaps not surprising, the other villages and their heritage might have seemed very abstract to the children. The Amble school teacher told the researcher that many of the children from Amble rarely visited Newcastle, a 50 minute drive away. Brocato (2006) argues that people cannot be attached to places that they have never been to or have only been to a few times. However White *et al.* (2008) suggest that people may be attached to a place that they have never experienced directly if they think that this place may "afford them a unique setting in which to achieve their goals". Similarly, Warzecha & Lime (2001)

propose that "it is possible for people to develop emotional/symbolic ties without ever visiting a particular place". Semken *et al.* (2009) found that 386 first year university geology students in Arizona showed some level of place attachment to the Grand Canyon even though they had not been there. It was however weaker than in students who had visited it.

'The Tale of the Herring' allowed the pupils direct observation of their own local community at work and play thus promoting a deeper understanding of the workings of a place. When a child experiences nature, culture and family as an interwoven entity, his or her connections and attachments are stronger and more meaningful (Derr 2002). I suggest that it also makes children more aware that they can be active stewards for their natural and built surroundings, a conclusion also reached by Hood *et al.* (2011).

6.1.3 Workshops and exhibitions as a means of involving the community in children's learning.

The project was discussed outside of school. Several of the parents came along to the workshops and learnt alongside their children. These parents became experts in local knowledge themselves and then acted as guides for the travelling exhibition. Their presence also helped the flow of information between home and school. Educational practitioners (Ho Sui-Chu & Willims 2006) have suggested that increased parental involvement is a critical component needed in modern education reform. They have suggested that home-learning such as discussions of school activities was strongly related to student achievements and that active involvement of parents was linked to improved self-esteem, and behaviour, higher life aspirations and better school attendance (Norton & Nufeld). It was interesting to see from the results that the Cullercoats children reported the lowest levels of parental involvement and the least connection to their locality. Duvell & Zint (2007) report that educational reformers in the United States have begun to re-examine the importance of the school-community relationship and increasingly regard schools as catalysts for improving the community and its citizenry through encouraging participation in local issues and events. Uzzell (1999) suggests that if schools wish to be successful in this catalytic role they must think of themselves as agents of social change which means involving community members in the schools and students in their local communities. By seeking to engage students and adults in local issues, school-community partnerships may foster a greater sense of ownership among citizens and increase their

willingness to get involved, ultimately creating a more cohesive and participatory community.

Several adults commented that they had been inspired to revisit places that they had connections with during their childhood but had not been to for several years. As time passes, our environments and the way that we use them become ordinary and routine. Penetito (2009) comments that "in order to get people to change something you have to get them to think about it. In order to get them to think about it, you have to make it visible to them". This project allowed people to reappraise the way they connect with their surroundings.

6.1.4 Travelling exhibitions as a means of dissemination.

The pupils felt that sharing their knowledge through a series of travelling exhibitions was a beneficial way of dissemination. Research has shown that place based events provide a stimulus for people to learn about their environment (Gursoy. *et al.* 2004). They support people to step outside of their daily reality and consider their environment and their community differently (Measham 2006). They assist in developing a sense of belonging which facilitates an increased understanding and commitment to the environment. They promote discussion, debate and community cohesion (CERES 2005). Stokowski (2002) suggests that "people actively create meaningful places through conversation and interaction with others at community events". One school had not had an exhibition before and the teachers were apprehensive about the idea. However they were delighted with the way the children rose to the occasion, with the number of parents who came along and how everyone joined in the activities. They now intend to include exhibitions in their curriculum.

6.1.5 Limitations of the study/further work.

A criticism of the study was that it was difficult, if not impossible to make meaningful analysis of the results as the children were different ages. Whilst the author recognises this she does believe that valid analysis can be inferred. Lim & Barton (2010) worked with a mix aged group in their sense of place study as did Kudryavtsev *et al.* (2010). As scientists we analyse adults of different ages together even though there could be a fifty year age difference. I suggest that   the results of this study are not affected by an age range of 4 years, with the possible exception of the Cullercoats children whose workshops

143

may not have been challenging enough. It was the pupils attachment to a place that was being investigated not their academic ability. The results from each individual school have been presented for clarity. To ensure this criticism did not arise again the author would endeavour to work with children of the same age in any subsequent projects. It can be difficult to arrange for identical cohorts of children to take part in multi school projects if the schools cannot free the desired classes from curriculum constraints.

Many sense of place studies have used Likert scales in questionnaires as an analysis tool (Stedman 2002, Young 1999) however the results are only as good as the questions asked. On reflection this chapter's questionnaire would have benefited from having some questions that were worded in a negative way to test opposites and to assess more objectively. The responses in table 6.21 are very bunched together which could be an artefact of the method used to collect the data. Ketelhut *et al.* (2010) investigated whether questionnaires were a good means of testing enquiry-based learning and they concluded that they did not pull out sensitive points of interest. Future work should examine other methods of assessment in addition to questionnaires. Further research is also needed to see if the ethical commitments that flow from connections to a place can be translated into positive action for the future benefit of local environments and greater participation in environmental policy making.

6.1.6 Long term benefits.

The project has continued beyond its one year planned duration, some of the schools have incorporated the workshops into their longer term schemes of work so that the topics are covered in depth over a half term. The project resources have been left in school to facilitate this. Schools that visited the museums are going to take future cohorts of children there. All the teachers involved commented how much they had learnt and that they had grown in confidence. School children from the other classes asked if they could take part and wanted to know "when it was their turn".

6.1.7 Conclusion

Sense of place, responsibility, meaning and attachment, are at the heart of what place based education hopes to instil. Methods which actively engage all the senses, enhance a feeling of belonging and community and raise awareness of the past in the present can all be used effectively to increase young people's sense of place and academic achievement.

Chapter 7. Global Environmental Citizenship

A modified form of this chapter has been published as: Nunoo, F. K. E., Evans, S. M., Gebbels, S. & Murphy, L. A. (2009) Act local, think global. Biologist, 56 (3), 164–169

7.1 Introduction.

Humanity has entered a new epoch in the history of civilisation globalisation is happening extremely quickly, access to other parts of the globe via travel or the media is more easily facilitated than ever before. Nowadays Europeans can think of Australia or New Zealand or countries in the Far East as holiday destinations or as stopping-off places for 'gap years' and even those of us who do not travel can enjoy world sporting events that are beamed into our living rooms by satellite television or can communicate instantly with distant relatives via the internet. Social mobility too, and consequent multiculturalism, has brought a range of new experiences, influencing our eating habits or interests in various forms of art, including music and literature. However, the global dimension of life also brings a host of pressing human and environmental issues to the fore. Problems, such as sustainability of natural resource exploitation, conflict resolution, human rights, poverty, democracy and inequality, are seen as part of the global agenda. They have high educational priority and schools now find themselves with the responsibility of bringing citizenship, especially in its global context, into the classroom.

7.1.1 Global Citizenship in the Curriculum

While global education or world studies has been advocated and practiced in schools and colleges across the world since the 1970s, global citizenship education is a relatively new concept (Brownlie 2001). The insertion of 'citizenship' into global education implies something more than, or different from, previous conceptions (Ibrahim 2005).

The UK Oxfam Curriculum for Global Citizenship (1997) defined a 'global citizen' as someone who:

- is aware of the wider world and has a sense of their own role as a world citizen.
- respects and values diversity.
- is willing to act to make the world a more equitable and sustainable place.
- participates in and contributes to, the community at a range of levels from the local to the global.

In this definition, motivation for change is high and importance is drawn to the 'active' role of global citizens. This has implications for teaching and learning, and may not sit easily with current pedagogical philosophies tied to content knowledge and passing of examinations. The requirements for curriculum would be equally demanding in terms of the comprehensive understanding of how the world works and the preparation for active participation. This definition also raises the issue of whether a person in a low-income country who has little access to formal education or wide-ranging knowledge, and does not have the opportunity to participate internationally, can receive the title of a 'global citizen' (Osler 2000). At one level, one could argue that we are all global citizens just by virtue of living in the world; yet clearly a global citizenship education demands more than this.

7.1.2 What is global citizenship?

Griffiths (1998) proposes that global citizenship is based on rights, responsibility, and action. Whilst Brownlie (2001) suggests that it is about the global dimension to local issues, which are present in all our lives, localities, and communities. Davies *et al (*2004) argue that the key task of any citizenship education should be to give students a disposition to participate through actions to improve local or global communities. The challenge for schools is how can they develop and deliver a meaningful curriculum, presenting real world issues in relevant and exciting ways that will enable young people to understand the links between their own lives and those of people in other countries, and motivate them to seek a more just and sustainable world (Myers 2006). NGOs and individuals in the field suggest that global citizenship education can be delivered in a variety of ways in schools. Figure 7.1 illustrates some of the ways schools can develop a 'global dimension'. This figure incorporates the chosen terminology of the NGO/DFES/DFID 2000 document 'Developing a Global Dimension in the School Curriculum' and some of the criteria of the British Council's International School Award (awarded to schools in the UK since 1998 who can prove that they have developed an international dimension; see www.britishcouncil.org).

Figure 7.1. Methods of incorporating Global Citizenship into the curriculum adapted from 'pedagogical ideals of global education' (Davies 2006).

Other methods include promotion and broadening of language learning, working with NGOs and staff development.

7.1.3 International School Partnerships.

International School Partnerships present effective opportunities for integrating global citizenship into the curriculum. This ideal is supported by several prominent organisations that have developed partnerships and resources to facilitate global schools links (Oxfam, Global Schools Partnership Programme, BBC World Class). British Council Schools Online (previously the Global Gateway) has more than 40,000 schools and colleges from all over the world registered in its database who are interested in starting a school partnership. There is a growing body of evidence that international links can not only allow children to become more "world aware" but they can help young people to appreciate the

interconnectiveness of everybody and everything (Global Schools Link) live their lives in a more sustainable way (Oxfam 1997) and recognise a common humanity (Torney-Purta 2002). International links can also use environmental topics as discussion points.

7.1.4 Advantages of International School Partnerships.

Parents/Guardians and the Community

- Parents engage directly in educational processes by helping their children with partnership-related schoolwork, attending international school partnership functions and supporting partnership exchange programs (Davies 2006).

- Partnerships provide opportunities for parents who have relevant cultural, linguistic or travel experience to share their experiences in the classroom (Davies 2006).

- Partnerships also provide a forum in which respect for differences can be explicitly modelled. Extending the outreach of an International School Partnership allows new information and ways of thinking to permeate throughout the community (Blaney 2002).

- International School Partnerships encourage a better understanding of different societies, cultures and religions and an appreciation of such values as social justice, democratic processes, equality and sustainable development (Schweisfurtha 2004).

School Staff and Teachers.

- Relationships among staff members are strengthened as school staff identify and work toward the achievement of common goals and outcomes for an International School Partnership (Pike 2002).

- An International School Partnership or initiative provides the impetus for the establishment of international professional learning communities (Schweisfurtha 2004).

- International School Partnerships provide teachers who are skilled at, or interested in, international relations, language and culture with an opportunity to use their skills or explore an area of personal interest (Pike 2002).

- As International School Partnerships involve students in engaging, authentic and motivating activities, they open doors for teachers to use diverse and differentiated

approaches to support student learning. Peer connections made through partnerships also help teachers engage "hard-to-reach" children from diverse sociocultural backgrounds and with diverse academic abilities (Pike 2002).

- Opportunities for sharing good practice.

Students

- Partnerships provide students with the opportunity to learn about another country or culture from the people who know it best—those that live and study there. As students engage with primary sources of information, they begin to question previously held assumptions, evaluate media biases and develop a greater appreciation for difference (Marshall 2005).

- While learning about another place and way of life, students are often forced to reflect upon their own lives. International School Partnerships provide opportunities for students to research, discuss and consider their own identities (Steiner 1996).

- Partnerships illustrate the concept of global interconnectedness in a tangible way. Conversing with their partners on issues of common concern can deepen students' understanding of international issues and enhance their sense of active citizenship at local, national and international levels (Schweisfurtha 2004).

- By incorporating collaborative learning activities, partnerships encourage students to locate and explore common ground and develop cooperative learning skills. Partnerships also bring a unique intercultural element to collaborative learning activities (Steiner 1996).

- Opportunities for language learning.

- Students become aware of environmental issues that affect both countries (Marshall 2005).

This chapter considers the benefits that have already occurred, and are still occurring, from an International School Partnership between Epinay Business and Enterprise School in Jarrow (South Tyneside, UK) and the University of Ghana Primary and Junior High School in Accra (Ghana). It describes the development of the link, the initial activity (an environmental Citizen's Day as described in Chapter 3), which helped to create a bond between pupils from the two schools, and the resulting curriculum development.

149

7.1.5 University Links.

This International School Partnership has its origins in a long-term collaboration between scientists from the Dove Marine Laboratory (Newcastle University) and those of the Department of Oceanography and Fisheries at the University of Ghana. Staff training programmes for Ghanaians in the UK, together with cooperation in teaching and research enterprises, have seen the Ghanaian department progress from a one-man unit, when it was first established in 1988, to a medium-sized department with 12 academic staff in 2012. A particular emphasis of its programmes is on integrated coastal zone management and this relatively new department in the University of Ghana is leading the drive to develop successful policies for sustainable exploitation of coastal resources, not only for Ghana, but for the whole of the West African sub-region. The two universities are also conscious of the need to raise awareness of marine and coastal issues in the general public and both have productive outreach programmes.

7.1.6 School Links.

The two schools that have been linked together in this project were not exact matches for one another, there were several differences. Epinay Business and Enterprise School caters for slightly more than 100 pupils who have slight to moderate learning difficulties and are between the ages of 5 and 16. Class sizes are small, normally of about 12 pupils. The school has excellent ICT, food technology, interactive whiteboards, creative arts and other facilities. The age range of children in the University of Ghana Primary and Junior High School is similar to Epinay, from 4 (nursery) to 14, but the classes are huge by UK standards – most of them are in excess of 50 pupils. Classrooms have relatively few teaching aids. The style of teaching in this, and probably most schools in Ghana (e.g. Ash & Severs 2004), is didactic but children are responsive, participate actively in classroom discussion and are attentive learners. They are very conscious of the important role that education will play in their own personal well-being and in the future prosperity of their country.

7.2 Aim and Objectives.

Aim: To explore the benefits of an International School Partnership in raising awareness of coastal environmental issues and lifestyle differences in pupils in Ghana and the UK.

Objectives:

- provide opportunities for both schools to learn about their local coastal habitats through Citizens' Days.
- invite both schools to produce management recommendations for their study sites.
- disseminate the results extensively, from the Ghanaian school to the UK school and vice versa and to each countries wider community.
- distribute 'lifestyle' questionnaires to each pupil.

7.3 Methods.

Pupils in both schools were asked to participate in local Citizens' Days based on areas of nearby coastline: the coast of Accra in Ghana, and of South Shields in the UK. They were then expected to share knowledge and opinions on a specific problem: sustaining our coasts. The project was based around the model of the Citizens' Day as described in chapter 3. The researcher worked with each school for 6 sessions, these were a mixture of full and half day events in and outside of the classroom. Whilst working in the Ghanaian School the researcher worked in collaboration with Dr. Francis Nunno, a marine scientist from The Department of Oceanography and Fisheries. The author planned and taught the classroom based sessions, Dr. Nunno ran the fieldwork day. In both schools the teachers were present, they helped organise the children and ensured their safety but they did not teach during any of the sessions. The researcher worked with the Epinay children during February/March 2008 and the Ghanaian pupils during a ten day period in May of the same year.

Table 7.1 Outline of project events and teaching timetable.

Session number	UK School	Ghanaian School
1	Introduction to project and full day fieldwork	Introduction to project and presentation about UK school
2	Mapping session	Full day fieldwork
3	Discussion about issues. Poster making	Mapping session
4	Ring of Change and questionnaires.	Discussion about issues. Poster making
5	Full day Celebration Event	Ring of Change and questionnaires.
6	Follow up session	Celebration Assembly

For both schools session 1 comprised of an introduction to the project including a discussion about the other school involved. In the case of the African school the introduction included a presentation about life in the NE and some photographs showing Epinay School. The UK students found Ghana on a world map and talked about what they thought life in Africa might be like. They did not see any photographs of the other school as none were available at that time.

7.3.1 Study Sites.

The two chosen areas of coast are both of considerable importance. Accra's coastal zone is characterised by sandy bays with several (potentially biologically-rich) lagoons and wetlands that range from clean to severely polluted, immediately behind the shore that harbours a large number of shore birds. The study area supports a huge human population and includes coastal slums, a fish market and harbour, where there are literally hundreds of traditional wooden dug-out canoes which form the basis of the region's artisanal fishery, badly eroded cliffs and a palm and mangrove-fringed leisure beach, lined by expensive western-style hotels. The South Shields' coast is also biologically rich. It consists of sandy bays backed either by limestone cliffs which support huge colonies of breeding seabirds and a unique flora, or sand dunes. Cliff erosion has left impressive stacks and arches along the shore and caves that harbour tales of smugglers and ghosts. An impressive arching sandy beach is the centre of leisure and recreational activity but the

sand dunes behind it have become severely trampled and degraded. Sand particles are no longer bound by this vegetation and quantities of it are blown over adjacent roads during winter gales.

7.3.2 Fieldwork

The opportunity for fieldwork, albeit restricted to a single day, was welcomed by both classes. Epinay's children were frequent visitors to the coast but the trip was a novel experience for many of the Ghanaians, one quarter who claimed that they had never before seen the sea. During their fieldwork sessions the students visited key points along their stretches of coastline. They were given the brief that they had to envisage that they were in charge of the area and produce plans relating to how the area should be looked after for the benefit of the people, plants and wildlife of the area. They travelled between locations in the schools mini bus or coach. At each site they explored the area, listened to stories about historical events that had happened there and discussed how it is used today for work or recreation. At each place they were expected to make notes and sketches and take photographs using disposable cameras that had been allocated to each group of 4/5 children.

7.3.3 Mapping session.

After the fieldwork session each class was instructed to produce a large map of the areas that they had visited using the photographs and field notes for guidance. Working in small groups the children were allocated a specific area to design, they drew the outline of the coast out on large sheets of paper and attached these to the walls or poster boards. Then, using art materials they drew key features either directly onto the map or on to sugar paper which they cut out and stuck on. The result was one giant map of the area that each child had had a unique part in producing. As well as physical structures the map showed areas of pollution and beauty, slums (in the case of Ghana), wildlife, industry, recreation and sites of historical events. The mapping exercise gave the children a chance to reinforce what they had seen and fix in their minds the sequence of places and locations along the coastal strip.

7.3.4 Poster session

This session started with a recap about the project and a discussion about some of the issues connected to their study sites that the class felt strongly about. These included litter and dog mess problems, coastal slums and poverty, wildflower meadows and the beauty

of the marine environment. The pupils were instructed to work in pairs and produce a poster using art materials that depicted one of the issues (either positive or negative) that they felt strongly about. Many pupils used their maps and photographs for inspiration. The work was displayed around the classroom.

7.3.5 Wheel of Change.
This is a management tool that allows students to decide democratically which issues they perceive are threating the coast and which are most important to them as a class. 1.) Each child is allocated two 'Post It' notes upon which they must write the two most important recommendations that they think would help to preserve their coastal strip for the benefit of people and wildlife. 2.) The results of the 'Post It' note poll are written upon a black/white board any replica ideas are only written up once. 3.) A new series of 'Post Its' are then written up by the class teacher which represents the class ideas, for example, put more bins along the footpaths, remove coastal slums. 4.) Each child then comes forward and170 chooses the theme that they think is most important and places it on the outside ring of the wheel, this continues until all the pupils' have had a turn or the 'Post Its' run out. 5.) Any 'Post Its' that have not been used in the first round are left. 6.) Next the pupils come forward again and move another 'Post It' into the second section of the wheel, any 'Post Its' that have been left on the second section are left in the outer ring, they can be moved inwards later if a pupil choses them. 7.) The pupils come forward for a third and final time and move a 'Post It' into the centre section. At the end of the session the most popular ideas are found in the 'bull's-eye.' The results of the wheel of change were recorded and are presented in the next section.

The Wheel of Change was introduced to the author by her first supervisor, Professor Steward Evans, several years ago before his death. Unfortunately the author cannot find any references in the literature to support the use of this management tool.

7.3.6 Lifestyle questionnaires.
The researcher, the pupils from Epinay and the class teacher, designed a questionnaire to discover more about the lives of the children in the Ghanaian school. The questions were structured to find out about their food preferences, schooling, family life, housing, religion and free time activities. There were 20 questions all together. The Ghanaian pupils completed the questionnaire during their final session. The Ghanaian children enjoyed

154

informing the English children about their lives so they adapted the questionnaire and returned with the author for the Epinay children to complete. During the English children's follow up session the pupils completed the Ghanaian questionnaire and participated in a presentation which depected information and photographs about the Ghanaian children's project and way of life.

Figure 7.2 Final Phase in the Wheel of Change.

Write letters to MP's	More litter bins
Ban dogs on beach	Ban coastal slums
Put signs up	Stop people using sea as a toilet
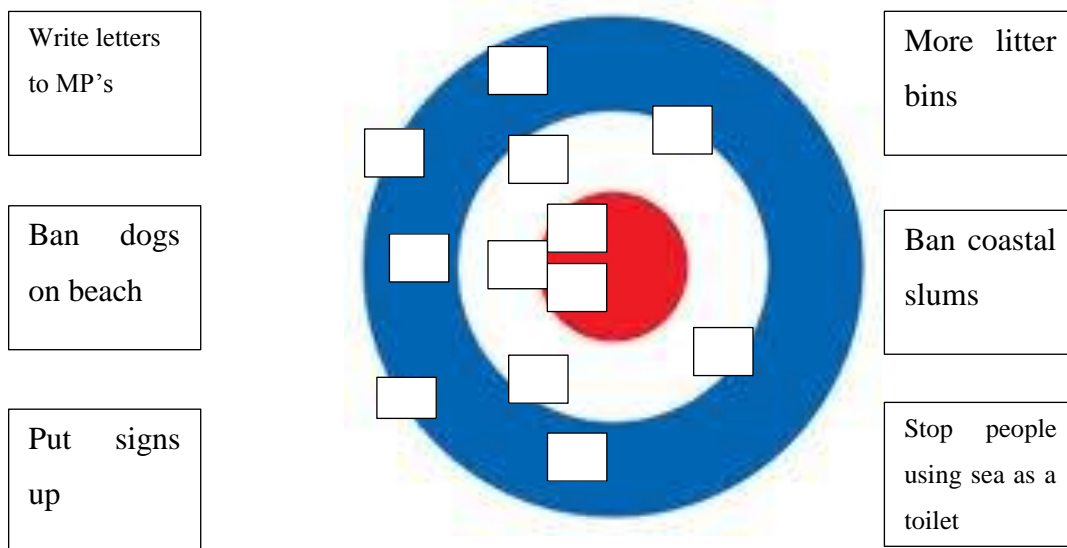
7.4 Results

Table 7.2 Coastal management recommendations produced by class consensus by schoolchildren involved in Citizens' Days in the UK and Ghana

Epinay School: South Shields coast:	University of Ghana Primary and Junior High School: coast of Accra
Educational:	
1. Write letters to the local people explaining why it is important to preserve the dunes and links. 2. Design a nature trail 3. Employ a coastal warden.	1. Educate people
Litter:	
4. Provide information signs about the hazards of dropping rubbish and the financial consequences of doing so. 5. Put more litter bins along the coastal footpath. 6. Employ some council cleaners.	2. Arrest people who drop litter 3. Provide litter bins at vantage points 4. Send litter for recycling 5. School children could clean beaches during their school holidays
Habitat protection:	
7. Build a fence to exclude people from parts of the dunes. 8. Plant more marram grass plants to stop the erosion of dunes. 9. Place sand on the rocky places.	6. Protect areas by fencing them off 7. Introduce planting schemes to create new habitats.
Human-related	
10. Provide bins for the dog mess. 11. Put up some signs asking people to pick up the dog mess and warning them that there are fines if they do not do so.	8. Remove coastal slums 9. Provide toilets in public places 10. Fine people for defaecating on the shore 11. Treat human sewage 12. Make sure that outfalls carrying pollutants extend a long way out to sea.

7.4.1 Coastal management recommendations.

Management issues were debated maturely by the pupils, although the recommendations were occasionally over-stated and/or unrealistic, they were as sensible as those that might have been expected from equivalent groups of adults. Some recommendations, such as the need for education programmes, the enforcement of penalties for dropping litter, habitat protection or fouling coastal areas in other ways, have much in common (Table 7.2). Others, including the comment on slums, reflect differences in the coastal environments in the two countries.

7.4.2 Celebration events.

At the end of each project the pupils disseminated their findings. The recommendations by the Epinay pupils were well-received at an open day for the rest of the school and guests, including the Mayor of South Tyneside, parents, representatives from industry and school governors. The Mayor invited the class to make a further presentation to her councillors, and the media, who were also in attendance, covered the project on TV, local radio and in the regional press. At least one recommendation was taken further: In an extension to the project the same pupils designed a nature trail and produced a booklet giving information on the coast of South Shields for the people of South Tyneside. The Ghanaian school's open day was equally successful. The class shared their findings with the entire school of over a thousand pupils, teachers and governors of the school. There was also coverage by press and radio, and a report of the event appeared in the University of Ghana's campus newsletter *Campus Update*. As an offshoot of the Ghanaian project, the school's abandoned fish pond was rehabilitated with support of funds collected by pupils of Epinay School. Staff from the Department of Oceanography and Fisheries use the pond as a teaching resource to sustain pupils' interest in nature.

7.4.3 Questionnaire results: religion, footballers and poverty.

The questionnaires revealed some interesting comparisons, especially in religious practices – almost all of the Ghanaian children were regular church-goers, compared with almost none of their English counterparts. However, football provided an area in which there was more common ground. It was a favourite sport in both schools – especially games played in the English Premiership (which are regularly shown on Ghana's TV). Although Ghana has its own well-supported Premier League, young Ghanaian's allegiances were mostly with English clubs – Manchester United, Liverpool and Arsenal

but especially Chelsea as Ghanaian star Michael Essien is one of Chelsea's players. He, like so many other talented African players, has been able to transform his life by trading his football skills in Europe for financial rewards. So many Ghanaian children, especially perhaps those living in abject poverty, aspire to follow in his footsteps.

7.4.4 Questionnaire results: food, diet and fair-trade.

The questionnaire also revealed differences, although rapidly diminishing ones, in eating habits. Fast foods were overwhelming favourites of the Epinay children. Many young Ghanaians, at least those in cities like Accra where fried chicken and pizzas are becoming readily available, are acquiring a similar taste. Nevertheless, some traditional dishes 'red red' (fried ripe plantain and bean stew) and 'jollof rice', were still popular among children in Ghana. The Epinay class searched the internet for recipes and ingredients so that they could try them for themselves, they discovered that items such as plantain (vegetable banana), black-eyed beans and coconut milk could all be found on local supermarkets' shelves. The pupils then used one of their food technology lessons to concoct these Ghanaian, and some other African, favourite dishes. Surprisingly, there was uniform approval for them at the sampling session which ended the lesson - what had started out as an evaluation session was rapidly transformed into a feast with everything edible consumed. In addition, the lesson provided far greater opportunities than simply a fun exercise in preparing and tasting unfamiliar foods. It gave the class a platform to consider a range of globally-important problems: Is the move to eat more fast food than traditional dishes good for a nation's health? And what about the ethical problems relating to feeding the world, such as in 'fair-trade', family life values and those concerned with the environmental costs of transporting foods across international borders? The pupils also discussed food production issues, such as organic farming and animal welfare in intensive farming establishments.

7.5 Discussion

Aristotle considered citizenship primarily in terms of duty. Modern day authors e.g. Etzioni-Halevy (1993) argue that citizenship should involve a balance between rights and duties, with the later resulting from a feeling of responsibility and belonging, rather than compulsion. Today debates about citizenship are taking place and have come to include wider issues which include the environment and identity. The Citizenship Education Policy Study (1993-97), looked at new, multidimensional models of citizenship education; it

suggested that a sense of identity to one's local and global environment was fundamental to the development of the global citizen, although interestingly Pigozzi (2006) suggests that globalisation leads to a loss of identity. The project promoted considerable debate in both countries about the differences and similarities between the children's lives and localities allowing the pupils' to explore the issue of their own identity in a wider context. Dialogue is seen as a vital contributor to the promotion of good citizenship in school and beyond (Jackson 2000).

One of the unique points of this study is that pupils from two very different schools studied real life problems that are facing both their countries and exchanged sensible practical ideas for sustainable management of their local environments which were relevant and reasonable. Keating *et al.* (2009) propose that the best citizenship projects are those that put theoretical knowledge into practice and transfer skills outside of the school context. Perhaps the most striking finding for the pupils themselves was the realisation that, despite differences in scale, we face similar environmental problems in both countries. It was certainly a surprise for some of the Ghanaians who told the author that the UK was a rich and very clean country, with few environmental problems.   Epinay children were less informed about Ghana so that the poverty and pollution in coastal areas there was new information for them. However, exchanging knowledge enabled children in both countries to appreciate that their generation now has the responsibility for the future custody of the coastal and marine environment. The coast, indeed the environment, is a responsibility that they share with young citizens throughout the world.

It was also interesting to note just how similar the pupils' recommendations were. One explanation could be that the pupils from both countries were influenced by the researcher although every care was taken to ensure neutrality. Another observation is that until 50 years ago Ghana was ruled by the British, perhaps there is still some residual influence from those times still in Ghana today which might have been transmitted through authority figures and the media to the Ghanaian children. This does seem unlikely as citizenship and environmental concerns were not on the political and educational agenda in Ghana 50 years ago. The similarity in responses also rejects suggestions that schools have to be direct social and academic matches for each other for meaningful and valid results to be obtained in studies between them.

An obstacle for this type of project is that, in wider discussions with colleagues, it is invariably mentioned that although citizenship is a requirement of the national curriculum it is difficult for teachers to find the time to employ creative and enterprising approaches to teaching it. Some, Saha (2001, (ETGACE Report 2003) argue that there is no direct relation between formal education and active citizenship. Other researchers argue that formal education does not guarantee that every student who goes through active citizenship education will be an active participant in the society (Veldhuis 1997, Lopes *et al.* 2009). Other difficulties that have been raised include: lack of provision and training for student teachers at teaching training collages (Pike 2000), overcoming the issue that different countries have different agendas (Blaney 2000) and establishing and maintaining suitable International School Partnership links (Steiner 1996). A strength of the particular link outlined in this chapter is that it was facilitated between academic colleagues in two universities. This not only enabled the pupils to benefit from academics with a science specialism in the topic that they studied but in addition made the link more genuine and more likely to succeed than one that had been facilitated by an external organisation.

7.6 Long term benefits/ further work

The strong relationships formed during the project helped to ensure the longevity of the study aided by teachers and academics from each country visiting the other. A particularly encouraging feature of the project was the way in which it progressed beyond its original remit. It stimulated pupils' interests in one another's lives and cultures, and a desire for more information. Since this initial project three others have taken place between the two schools. These used the same model developed in this chapter. Children from different classes in the same schools investigated new topics which included: climate change and global warming, local artisan fisheries and traditional wooden fishing vessels. The pupils' continue to correspond with each other via email, and through a pen pal scheme. The Epinay teachers have produced a semi-permanent display about the partnership which showcases work from both schools. The partners continue to write proposals to obtain funding for further projects. It is hoped that further work can aid the formation of partnerships with other schools in the UK and Ghana so that a network of like-minded educational establishments can be developed which can promote the international Citizens' Day model and research new pedagogical approaches which allow young people to flourish as effective and motivated global citizens.

7.7 Conclusion.

International School Partnerships have the potential to successfully promote effective and efficient global citizenship teaching. For these partnerships to be successful they should address real life issues that are relevant to the young people involved and which they can make valid contributions to. They should not be partnerships for partnerships sake. The environment is an ideal topic to base global citizenship projects around as many of the issues that it is facing are multinational and are relevant to most countries in the world. It is a topic that can also lead to discussions and dialogue about other aspects of young people's lives and encourage them to be proactive in making a positive contribution to the world.

Chapter 8 The Natural Environment as a means of engaging Special Educational Needs pupils in science

8.1 Introduction

The importance of effective science teaching in schools has been the source of considerable debate. One particular force that has driven discussion related to the disillusionment of science among secondary school pupils. During the 1990s and the early years of the 21st century, the number of UK pupils choosing to study science declined (Osborne *et al.* 2003, Angell *et al.* 2004). In efforts to counter this trend, Braund & Reiss (2006) argued that laboratory-based science should be complemented by out-of-school science that draws on the actual world (e.g. through field trips), the presented world (e.g. through science centres) and the virtual worlds that are available through information technology. These views were supported by innovations, such as the science-technology-society approach to teaching science (Bennett *et al.* 2007) and out-of-school enquiry programmes (Luehmann 2009) that almost certainly improved attitudes and motivation towards the subject. There were also arguments that cross-curricular approaches could enliven teaching science. Kempton (2004) recommended the use of paintings and cartoons to teach ethics in science, and Francis (2007) found that drama-based science lessons have positive impacts on both attainment and attitudes in science lessons. Students attitudes to the studying of science appeared to have changed in 2013 as the uptake of STEM (science, technology, engineering and mathematics) subjects has increased across all subjects (National STEM centre 2010).

There are however calls for a shift in balance from the principles of science (core science) towards literacy and citizenry in curricula so that school science becomes more relevant to the everyday lives of pupils. This is given high priority by many educationists. Roth & Lee (2004) emphasise that science courses should provide ways of enabling pupils to cope with issues and problems that are of immediate concern to their own lives and those of the community, and Bourn (2005) believes that strategies for promoting education for sustainable development and citizenship should be linked to people's active engagement

in society. Holbrook & Rannikmae (2007) comment that science education should relate primarily to enabling citizens to participate effectively in the real world. This trend towards science literacy is reflected in modern curriculum development (Lewis 2006, Millar 2006).

An additional factor that affects science teaching is the challenge posed by the policy of inclusive education for children of all abilities. Teachers must cater equally effectively with pupils who range from those of outstanding ability and to those that are of special educational needs (Keogh & Naylor 2006, Ferguson 2008). Smith & Gunstone (2009) argue that there should be a re-focusing of the priorities of school science, with a new emphasis on the education of those who will become our scientific elite. At the other end of the ability range, several authors have drawn attention to problems facing schools in adopting programmes of science teaching that do not work actively against children with learning difficulties (Reid & Hodson 1987, Palinscar *et al.* 2000, Wellington & Ireson 2008). Fletcher-Campbell (2005) has argued that pupils with moderate learning difficulties need neither a different pedagogic approach to teaching nor supplementary curricula. They should follow similar programmes of learning to their age peers. There should, nevertheless, be differentiation in learning tasks so that pupils with learning difficulties face less complex tasks and more straight forward analyses of situations than their peers. Similar arguments have been proposed by Carter (1989), Hansen & Burr (1989), Duerden & Jury (1993) and Wellington & Ireson (2008), specifically in relation to SEN science teaching. Programmes of work given to children with special educational needs should be challenging and significantly more than 'watered down' versions of those given to other members of a class. The level of achievement that can be expected of such children is therefore an important consideration in designing teaching materials and in adopting particular teaching strategies.

8.2 Aims and Objectives.

The aim of the current project was to evaluate the effectiveness of an enquiry-based science programme taught to a group of Key Stage 3 children, primarily with moderate learning difficulties, on their interest, attitude and motivation towards science.

Objectives.

- to develop a teaching plan that introduces concepts of science relating to features of the local marine and coastal environment.

- to use a wide variety of teaching approaches including classroom based learning, outdoor learning and enquiry based learning.

- to teach the project using a cross-curricular approach allying science closely with the arts, citizenship and ethics.

- to evaluate the project using three methods, pupil and parental responses and Creative Partnership's evaluation criteria.

8.2 Methods.

The project lasted for one academic year from September 2006 until July 2007. It involved a total of 24 teaching sessions, 10 of which were whole day sessions and the remainder of which were half-day (two-hour) sessions. It was part of Creative Partnerships, the Government's flagship creative learning programme. The programme, which was first established in 2002, was designed to develop the skills of young people across England, raising their aspirations and achievements and opening up more opportunities for their futures. These objectives would be achieved by bringing creative practitioners, in the case of the current project, a scientist, (the author) from the Dove Marine Laboratory, into schools in order to introduce creative and innovative teaching practices. Each project within the programme was monitored and evaluated by a representative of Creative Partnerships. The independent evaluator for this project was Anne Curtis an artist and educationalist.The project was based in a school in northeast England that currently caters for 108 pupils, aged from 5 to 16 years, who have moderate to severe learning difficulties and a number of whom exhibit challenging behaviour. The school is located in a deprived area, defined by NICE as "a geographical area that has significantly higher levels of unemployment and lower rates of income per head than national averages (www.NICE.gov.org). The school has not been named for confidentiality reasons as requested by the Headteacher.

The study involved a class of 16 pupils at Year 7 (mean age in September 2006 was 12.2 ± 0.1 years). There were 10 males, 9 of whom were classified as having moderate learning difficulties and 1 as having severe learning difficulties, and 6 female students, 5 of whom had moderate and 1 severe learning difficulties. In addition, one pupil suffered from hearing impairment, one had attention deficit hyperactivity disorder and 6 had speech, language and communication difficulties. Throughout the world educational practitioners and physiologists use the results of IQ tests to assess learning disabilities (Klassen *et al.*

2005). The mean IQ for the whole group was 62.5 ± 2.9, ranging from 44 to 70, anything below 70 is classed as intellectually challenged. The average intelligence level of the population regardless of age is 100. IQ has been found to influence self-perception of learning difficulties and an individual's ability to see their learning difficulties as non-stigmatising, non-defining and modifiable (Rothman & Cosden 1995). Thirteen of the pupils (81%) had free school meals, which are available to children whose parents receive government social security benefits.

The objectives of the research were explained fully to the teaching staff, pupils and parents from the outset of the project, which was given full and unanimous support. Subsequently the findings were presented to these groups, together with school governors and educationists from the local authority, at an 'open day'.

8.2.1 Study area

The teaching programme, which is summarised in Box 1, was planned by the author. It focused primarily on the northeast coast of England between Blyth and South Shields, and adjacent parts of the North Sea. It was taught by the researcher, the class teacher and two classroom assistants, with additional input from teaching staff specialising in ICT, food technology and music, and a visiting specialist in drama, art and literature. The study area is geologically, biologically and historically rich, and much of this coast is of conservation importance. Magnesium limestone is one of its unique features and the cliffs there support a unique flora and large colonies of breeding kittiwakes and other seabirds. Apart from specific habitats, the coast has a number of outstanding historical features, including a disused windmill at Whitburn village, a lighthouse, disused lime kilns, and a restaurant which was adapted from a former home that tunnels into the limestone cliff face.   There are also leisure areas of the shore, adjacent to South Shields itself, but they have been poorly managed. In particular, what were once impressive sand dunes at Sandhaven beach have been severely damaged by trampling. The marram grass there is so sparse that it no longer binds sand, and this is blown over the adjacent coastal road during winter's gales. There is also a rich maritime history, with strong influences from the Roman invasion and the industrial revolution. The Tyne estuary is still the hub of the area's maritime industrial activity including what remains of its fishing industry.

8.2.2 Questionnaires.

A questionnaire was used as a teaching exercise roughly two-thirds of the way through the programme so that pupils could assess their own knowledge of the coastal and marine environments and compare it with that of adults in the local community. It was hoped that by doing this the pupils would show a higher level of knowledge than the adults in their community which would increase their confidence, promote the pupil voice and allow them to be able to take on the "Mantle of the Expert" as discussed in chapter 3 (Heathcote 1985). The questionnaire was designed by the researcher and teaching staff (Table 8.1). Pupils worked through it on a 1:1 basis with a classroom assistant in order to ensure that each of them understood the questions and what was expected of them in responding to them. They were given no guidance on correct answers. The questionnaire was divided into two parts. The first part investigated knowledge of the presence or absence of 22 organisms in the local coastal and marine environments. Respondents were asked to indicate whether or not each of them occurred locally. The second part asked questions about historic features of the coast. Subsequently, each pupil took home blank questionnaires and asked family members or other adults over the age of 25 to complete them. They were told to give no help at all to the adults in answering questions. Thirty-two questionnaires were returned and were collated in class. The comparison between the knowledge of pupils and adults was compromised in the sense that there was no control over the ways in which the adults answered the questionnaires and, in particular, colluded with one another in ways that would enhance their scores. However, this problem provided a useful basis for class discussion on the difficulties in designing, using and interpreting questionnaires. The benefits/difficulties of using questionnaires as an analysis tool have discussed in the methods section of chapter 2.

8.2.3 Statistical methods.

Wilcoxon Matched-Pairs signed rank test was used to analyse the questionnaires to test the hypothesis that: an enquiry based science programme taught to a group of Key Stage 3 children, primarily with moderate learning difficulties, will increase their interest, attitude and motivation towards science more than a traditional classroom based approach. A discussion of the Wilcoxon Matched-Pairs signed rank test merits and limitations can be found in the methods section of chapter 4.

Box 8.1 Outline of teaching sessions

Core science

An investigation was made of the composition and properties of sea water. This included practical work on the value of salt in preserving fish. Studies were also made of adaptations of littoral organisms to life on the shore, feeding relationships between them, animal classification and the rock cycle.

The spirit of discovery in science.

Pupils investigated marine life in the North Sea and coastal areas. The Dove Marine Laboratory's Research Vessel *Bernicia* collected trawled and plankton samples, which were examined at the Laboratory. Field surveys were made of three coastal habitats: rocky shore, magnesium limestone cliff-tops and sand dunes. *Research: testing hypotheses.* A study was made of the effectiveness of different patterns of shell colouration in the banded snail, *Cepaea nemoralis*, which is common in sand dunes along the north-east coast, in camouflaging it against its major predator, the song thrush *Turdus ericetorum.* Comparisons were made of proportions of different colour forms (morphs) in the natural population with those in the remnants of shells at thrush's' anvils (that is, shells of snails whose soft parts had been eaten by thrushes). This research was based on the classic studies by Cain and Sheppard (1950). The hypotheses were developed between the researchers and the class and in line with the recommended science curriculum for the age and ability of the students. Developing and testing hypothesis is a standard procedure for all secondary age pupils.

Survey of environmental knowledge.

 Pupils used a questionnaire on knowledge of marine organisms and historical features of the coast to assess the extent to which adult members of the local community are aware of marine and coastal features in their own locality.

Environmental citizenship.

Pupils produced their own independent recommendations for sustainable management of the 10km stretch of coast at South Shields from Souter Lighthouse to the mouth of the Tyne.

Box 8.1 continued.

The seas as an inspiration for works of art, music and literature.

The class participated in a range of maritime related activities: they sang sea shanties and composed their own songs, performed the sailors' hornpipe and other traditional dances, composed poems about the seas, constructed papier mâché models of sea creatures, painted versions of a 'Turner sunset' over the sea, and adorned mirror tiles with marine artefacts. The class also held its own photographic competition in which pupils were given disposable cameras to photograph coastal features of their own choice.

Ethical issues; human impacts on the marine environment.

Drama was used to turn the classroom into a courtroom. Role play was used to put members of the elder generation on trial for their neglect of the environment (Evans, Green & Ling, 2008). Adults played the roles of the judge and defendants (an industrialist, a holiday tour operator, a local government official and a farmer). Pupils acted as prosecutors, the jury and TV presenters who reported on the court proceedings

8.4 Questionnaire to assess Knowledge of the South Shields coast and the North Sea

Please can you help us by filling out this questionnaire? We have been studying the coast and North Sea and want to find out how much people know about it. We are not asking you to put your name on the form and we will not reveal how well you do to anyone else.

1. Please put a tick against those creatures listed below if you think that they normally occur in our part of the North Sea (the sea and shore adjacent to the Tyne). Put a cross against those that do not occur there.

Dolphin ☐

Scampi ☐

Shark ☐

Clown fish (Nimmo) ☐

Whale ☐

Plankton ☐

Sponge ☐

Octopus ☐

Sea anemone ☐

Sea horse ☐

2. Please put a tick against those birds listed below that breed on the cliffs at Marsden. Put a cross against those birds that do not breed there.

Puffin ☐

Kittiwake ☐

Arctic tern ☐

Fulmar ☐

Cormorant ☐

Albatross ☐

3. Please put a tick against those plants listed below if you think that they occur either on the seashore, in the sand dunes or on the cliff tops at South Shields. Put a cross against those that do not occur there.

Orchids ☐

Sea lettuce ☐

Rhododendron ☐

Laminaria or kelp ☐

Canadian pond weed ☐

Marram grass ☐

4. What is the name given to the life-sized statues at Little Haven?

5. What was the local name for the train that once operated along the coastal railway?

6. What was the name of the man who blasted caves for homes in the cliffs at Marsden?

7. What kind of rock was taken at Trow Quarry?

8. Where do the fishing boats land their fish catches in the River Tyne?

9. Which bird feeds on the banded snails in the sand dunes?

10. What was produced from the kilns at Marsden?

11. How old is the Dove Marine Laboratory? 10 years, 50 years or 100 years?

12. Does Souter Lighthouse still operate as a lighthouse?

13. Why don't they mow all of the grass along the links (cliff tops) at Marsden?

8.5 Results.

8.5.1 Management recommendations.
Towards the end of the project the students were asked to propose management recommendations for their study areas. They used the "Wheel of Change" management tool to aid them. An explanation into how this works is described in the methods section of chapter 7.

Box 8. 2. Class recommendations for managing the coasts**.**

General:

1. Design and publish an information booklet on the coast and sea, including a nature trail, for the people of South Shields.
2. Write letters to the local people explaining why it is important to preserve the dunes and links.
3. Employ a coastal warden.

Sand dunes:

4. Build a fence to exclude people from parts of the dunes.
5. Plant more marram grass plants to stop the erosion.

Litter:

6. Provide information signs about the hazards of dropping rubbish and the financial consequences of doing so.
7. Put more litter bins along the coastal footpath.
8. Employ some council cleaners.

Shore:

9. Place sand on the rocky places.

Dog-walkers:

10. Provide bins for the dog mess.
11. Put up some signs asking people to pick up the dog mess and warning them that there are fines if they do not do so.

The majority of the recommendations were sensible and attainable, the emphasis was placed on what the class could contribute as a whole, not on an individual's desires. One or two of the suggestions were unobtainable; the researcher discussed these with the

student who had suggested them, reassured the pupil that their contributions were valuable and reflected upon the reasons why they could not be implemented.

8.5.2 Project evaluation.

The project was evaluated in three ways: a pupil evaluation to assess the participant's view of the project, an external and therefor unbiased appraisal led by a representative of Creative Partnerships and thirdly, an evaluation through informal discussions with members of staff who were involved in the project and through media interest. These three methods helped to ensure that a balanced view of the value of the project could be assessed.

8.5.3 Pupil evaluation.

The researcher designed a questionnaire to test pupils' attitudes towards the teaching programme and assess the extent to which these were different from than their attitudes towards 'normal' lessons (Table 8.2). There were 7 pairs of questions and pupils were asked to base their assessments on a five-point Likert scale. A discussion of the merits/limitations of questionnaires can be found in chapter 2. One question of each pair asked them to assess a particular feature of the current teaching programme, and the partner question asked them to grade the same feature for 'normal' lessons. . The questions were not reworded for the pupils, each question was read out to the class by the researcher, and the whole group discussed its meaning to ensure that its content was understood before the pupils answered individually. A teacher and teaching assistant worked through the questionnaire with pupils on a 1:1 basis to ensure each individual understood the question and what was expected of him / her in answering it. Five questions related to views the programme itself:

- Students' pride in their achievements.
- Their motivation towards science.
- Their confidence to pass on their knowledge to other people.
- Their enjoyment of the programme.
- The extent to which they developed bonds of friendship with other members of the class through the programme.

The two remaining questions were concerned with the perceived long-term benefits of the teaching programme and the extent to which it enabled pupils to learn more about the local community and environment

Mean Likert scale scores ± their standard errors are presented in Table 8.2 (below). Scores in such tests may be influenced by various factors including, for example, the number of scale points used (Dawes 2008) so that considered alone they are difficult to interpret. Paired comparisons between scores given by pupils to the current programme and normal lessons are more meaningful and more emphasis has been placed on them. The Wilcoxon Matched-Pairs Signed Ranks Test was used in the statistical analysis of these data to test the hypothesis that: an enquiry based science programme taught to a group of Key Stage 3 children, primarily with moderate learning difficulties, will increase their interest, attitude and motivation towards science more than a traditional classroom based approach.

Table 8.1 Mean responses of pupils to a questionnaire designed to assess their perceptions of the benefits of the science programme (known to the class as the project). Pupils were asked to give a graded response from 1 to 5 to each question, where 1 meant not at all and 5 meant as much as possible. In comparisons of responses to pairs of questions: *P<0.05; **P<0.01 (Wilcoxon Matched-Pairs Signed-Ranks Test).

Question	Mean score ± standard error
1a. To what extent has the project given you a sense of pride in what you can achieve?	4.78±0.22 **
1b. To what extent do normal lessons give you a sense of pride in what you can achieve?	2.44±0.34
2a. To what extent has the project increased your wish to learn more about science?	4.44±0.29*
2b. To what extent do normal lessons increase your wish to learn more about science?	3.33±0.44
3a. To what extent has the project given you more confidence to tell other people about what you have learned at school?	4.56±0.44*
3b. To what extent do normal lessons give you more confidence to tell other people about what you have learned at school?	
	2.44±0.58
4a. To what extent is the project good fun?	5.00±0.00**
4b. To what extent are normal lessons good fun?	2.78±0.46
5a. To what extent do you think that the project will have helped you gain experiences from which you will benefit when you leave school?	4.44±0.38*
5b. To what extent do you think that normal lessons will help you gain experiences from which you will benefit when you leave school?	3.32±0.32
6a. To what extent has the project helped you to learn about local people and the local environmental?	4.67±0.24**
6b. To what extent do normal lessons help you to learn about local people and the local environment?	2.56±0.41
7a. To what extent has the project helped you to form friendships with other people in the class?	4.22±0.43*
7b. To what extent do normal lessons help you to form friendships with other people in the class?	2.67±0.47

8.5.4 Creative Partner Evaluation.

An independent and objective evaluation of the project was carried out by a representative of Creative Partnerships, Anne Curtis, who was responsible for monitoring the progress of the project. The teaching team was not involved in the design of this evaluation which adopted the standard Creative Partnerships protocol. The evaluation involved interviews with the pupils involved in the project as well as school staff and the governing body. The evaluation invited comments and suggestions into improvements in learning or teaching practice. The evaluation was assessed in a number of different categories using a four point 'Likert attitudinal scale' as follows:

1 = no value   2 = some value   3 = good value   4 = high value

Assessments were made in four categories:

Section A   The project's impact on the learning of young people.

Section B   The project's impact on the learning of teachers and school staff.

Section C   The project's impact on the learning of creative practitioners.

Section D   Input, process and quality.

There were 9 possible assessments in each of the first three sections (A, B and C) but 7 only in Section D. The Creative Partner evaluated the project in three of the assessments for Sections A, B and C and for all seven assessments in Section D but gave no evaluations in the remaining assessments. A summary of the Creative Partner's report is included as Box 8.3. It has been edited by removing unanswered assessments and comments that were specific to the researchers. Wording that remains has not been altered from the original.

Box 8.3 Creative Partner's evaluation of the project. Question Score Notes including evidence. Numbers refer to valuation, see last page.

A. The project's impact on the learning of the young people involved

1. Problem finding and solving. **4**

"The first part of the term has been extensively used to raise awareness of natural habitats via a range of external visits".

2 engagement, enjoyment and motivation **4**

"Pupils are highly motivated, engaged and confident. They say that the teachers listen to them and what they are doing is fun but clearly understand that they are learning".

3. Achievement beyond subjects. **4**

"The project has a strong emphasis on community involvement and pupils are involved in creating a publication. They are aware of the importance of what they are doing as a community initiative".

B. The project's impact on the learning of the teachers and school staff involved:

1. The ability to identify and address new problems and challenges creatively **2**
"Not all staff are involved in this project".

2. The development and communication of new skills, ideas, knowledge and understanding **1.**

"Governors have not yet been involved in the programme".

3 The development of creative teaching and learning beyond projects **4.**

"This element of the programme is progressing well. The teachers are highly engaged in the whole project. There is input from other members of the staff supporting poetry, storytelling and drama".

Box 8.3 continued

C. The project's impact on the learning of the creative practitioners involved:

1. Reflecting on learning. **4.**

"The creative practitioners have gained an understanding of the importance of practical experiences and 'fun' and this continuously reflects on how children learn".

2. Establishing and maintaining positive relationships with young people. **4**

"The creative practitioners have been very successful in establishing relationships as evidenced in pupil feedback. They are very skilled in communicating with pupils who demonstrate a range of challenging behaviours.

The development of creative teaching and learning beyond projects. The lead practitioner, although a highly successful and published Teacher of Marine Biology stated that this was the most important thing she had done in her life and that the outcomes would have a lasting impact on the community".

D. Input, process and quality – assess the quality of the following:

1. The project idea **4**

"The focus of the enquiry question has been consistent throughout the project".

2. The ability of the practitioner to communicate effectively with both teachers and young people **4**

"Communication with staff and pupils involved in the project is excellent".

3. The language/professional vocabulary, skills, qualities and resources contributed by the practitioners.**4**

"The standard of communication between the Creative Practitioners and

the pupils is excellent. Pupils feel they are listened to and that they are active within the development of the project".

4. The organisational arrangements **4**

"The safeguards of working practice are ever present. There have been a series of successful organised trips with teacher and other adult support and normal risk assessment procedures".

5. Relationship building and communication between young people, teachers and practitioners.**4**

"Publicity and feedback sessions, invitations to governors and the local communities have all contributed to the continuing success of this project".

6. Collaboration – was it a joint project, equally authored, owned and driven? **4**

"Yes the project has grown throughout the period of the schools involvement with CP and demonstrates the important benefits of sustainability".

7. Young people's involvement as co-constructors of learning **2**

"Pupils have not been directly involved in the planning and direction of the project. However they feel completely involved in the project. Their interest and motivation is directing the adults to make decisions".

8.5.5 Staff assessments and media interest

Informal discussions were held with members of teaching staff who were involved in the programme. The class also gave a presentation of their coastal management recommendations and other aspects of the programme at an assembly, local councillors, parents, and media representatives.

Means are presented ± their standard errors throughout this chapter.

The programme was clearly successful in the eyes of the participating pupils. Their positive attitudes to it are reflected in their responses to both the evaluation questionnaire (Table 8.2) and the Creative Partner's evaluation (Box 8.2). Assessments of pupils to the programme in the evaluation questionnaire were significantly higher than those to normal lessons in answering each of the 7 questions (Wilcoxon Matched-Pairs Signed-Ranks Test; details in (Table 8.2). The Creative Partner gave the project the maximum rating possible (4) in each of the 13 categories in which assessments were made of pupils' attitudes to the programme (Box 8.2). There were three lower scores but they were in categories that were not related to pupils' views of the quality of the programme.

In particular, the programme was regarded as good fun. This is emphasised by responses to Q4 of the pupils' evaluation questionnaire. It achieved the maximum possible mean

score of 5.0. Pupils also claimed a sense of pride in the programme's outcomes (Q1), motivation to learn more science (Q2) and the confidence to tell people about their work (Q3). In each case, mean scores to questions were substantially higher than those given to assessments of 'normal' lessons. The Creative Partner's evaluation also refers to pupils' enjoyment in participating in the project, high motivation and confidence (Box 8.2).

Pupils believed that the programme would have long-term benefits (Q5) and enabled them to learn about local people and the local environment (Q7). In addition, they claimed that participation in the programme had helped them to form friendships. This finding accords with comments made by school staff. They believed that improved team-work and social cohesion had developed from the group working together in the field, sometimes in challenging weather conditions. Staff were also impressed that during the teaching programme pupils showed increased tendencies to question issues and became confident in presenting their ideas to their classmates. An additional aspect was that teachers believed that some pupils saw the visiting lecturer (the author) as a positive role model.

Pupils acquired a good knowledge of the local coastal and marine environments during the course of the study. They achieved mean percentage scores of 72.9 ± 8.7 and 76.3 ± 4.5 correct answers respectively to questions about marine organisms and historic features. The samples of adults had significantly lower mean scores of 54.9 ± 8.7 and 56.7 ± 5.4 correct answers ($P<0.001$ in both cases; Mann Whitney U Test), (Table 8.1).

8.6 Discussion
Evaluations of the teaching programme suggest that participating pupils benefited from it in several ways:

8.6.1 Pupil engagement
Pupils clearly enjoyed the programme. They claimed that they were motivated to learn more science, were keen to tell others about their findings and were convinced of the programme's longer-term benefits to their own personal development. These positive attitudes can be attributed in part to measures that Carter (1994) identified as good practice in science teaching for SEN children. They included open-ended opportunities to test ideas, learning tasks in meaningful contexts and practical work that is 'good fun'.

8.6.2 Engendered pride

The project successfully engendered a sense of pride in the participants. Several authors have stressed the importance of maintaining self-esteem in teaching SEN science (e.g. Wellington & Ireson 2008). This was undoubtedly facilitated in the current project by complimentary comments on work at the assembly. The pupils' voice was being heard by a wide audience. The knowledge questionnaire was also important in this respect because, although it was not conducted under scientifically rigorous conditions, the children gained confidence by realising that their knowledge of the coastal and marine environments was superior to that of adults in their own community. It put them in a position whereby they could adopt the unfamiliar role of teachers because they had knowledge to impart to other people.

8.6.3 Cross curricular approach

The cross-curricular approach enabled the attainment of educational goals other than those in science itself. They included the enhancement of skills in computing, numeracy, food technology, creative writing, art, literature, music and crafts.

8.6.4 Flexibility

The flexible and open-ended approach to the syllabus also countered what Dadds (2001) has described as the 'hurry-along' curriculum, whereby children's understanding of issues suffers because of the pressure of curriculum delivery. However, the reasons for the success of the programme are undoubtedly complex, and cannot be attributed solely to any one particular factor. While there is debate about the value of concept of the so-called "Hawthorne effect" (a term referring to the tendency of some people to work harder and perform better when they are participants in an experiment), (Cook 1962, Chiesa & Hobbs 2008), there is little doubt that some of the distinctive features of the programme contributed to its achievements. The novelty of working in the 'adult atmosphere' at the Dove Marine Laboratory, the use of facilities such as the Research Vessel *Bernicia*, the contribution from a university scientist as a teacher, field work, highly favourable staff/pupil ratios and involvement in a "special" project, will all have helped to motivate the class.

A finding that was a source of surprise, and also delight, to many informed observers was that this group of pupils, with a mean IQ of only 62.5, was able to make valuable and constructive recommendations for the sustainable management of the local coast. Their

views were well-received by their peers and adults at the assembly. The experience may also have a lasting impact on the lives of the young participants, giving them the confidence and motivation to act as responsible environmental citizens when they reach adulthood (Roth & Lee 2004, Holbrook & Rannikmae 2007) and facilitating their enjoyment of the environment as a lifelong experience. The project also reinforces the belief in the value of listening to the views of young people on a range of educational and other issues (e.g. Palmer 2003, Barratt Hacking *et al.* 2007, Logan & Stamp 2008). They have a vested interest in sustainable management of the environment and their management recommendations were, not only mature, but they are likely to receive local community support. There are now several examples in which specific management proposals from schoolchildren have either been implemented or incorporated into local environmental plans (Nunoo & Evans 2007; Evans *et al*. 2008).

Although the approaches used in teaching the current science programme were designed with low achievers in mind, they are likely to be equally successful with pupils of different levels of ability (Dyson & Hick 2005). Most topics, including those considered here, can be adapted for pupils of different abilities. For example, the exercise on selective predation of banded snails by song thrushes can be considered from the intriguing, but straight forward, perspective of camouflage of the prey (as it was here) or the difficult concept of natural selection which is challenging for even the most able student. The cross-curricular approach also encouraged pupils to realise that science should not be considered in a vacuum but is relevant to (probably) all facets of life, with aspects, such as food technology and art, music and literature bringing the classroom to life and providing a stimulating learning environment. Similarly, the introduction of ethical questions into the science curriculum provided an opportunity for stimulating debate. Problems, such as those concerning the health of the local environment, abound in contemporary science and undoubtedly have a place in the school curriculum (Levinson & Reiss 2004). Their treatment may be particularly effective if issues are considered initially from the local perspective (e.g. foods available in the local super-markets, local agricultural or fishing practices, changes in weather patterns that may be linked to climate change, environmental research at the local university) and then broadened out to wider national and world contexts (Nunoo *et al.* 2009).

8.7 Limitations

The students completed their questionnaires under the supervision of the researcher and the class teacher; therefore the author can be certain that the answers were their own work. However, one of the difficulties was getting the parents to complete the questionnaires and at the same time ensure the validity of their answers. The children travel to and from school in a taxi which means that the parents do not come into school; therefore the opportunity to ask the parents to complete the questionnaires, in a controlled setting was not available. One approach to overcome would be to call the parents at home at a pre-arranged time and carry out an interview over the telephone. This would guarantee that the parents had not 'Googled' the answers and also increase the number of respondents.

It has been pointed out to the author that the pupils might have been answering the questions in a positive way to please her. This may have been the case although care was taken to remain neutral. An improvement to the study would have been the addition of a question that should have resulted in a marked preference for a classroom based/normal activity.

8.8 Further work

The results of the pupil questionnaire indicate that the pupils believed in the long term benefits of the project. This perhaps was not a surprising outcome as they clearly enjoyed the project and gained a lot of confidence and knowledge from it. An interesting extension to the study would be to interview the students now in 2013 and see if their views have changed or if the ethos of the project remains with them.

8.9 Conclusion

Pupil and Creative Partnership evaluations show that the project was perceived as being successful in achieving its aim to show that an enquiry-based science programme tailored towards SEN pupils can increase their motivation, interest and attitude towards science. A strength of the project was its strong links with the pupils' locality and a wide variety of teaching approaches and cross curricula links.

Chapter 9 Schoolchildren's use of poetry and paintings in conveying environmental messages

A modified form of this chapter has been published as: Gebbels, S., Hunter, J., Nunno, F.K.E., Tagoe, E. & Evans, S.M. (2012) School Children's Use of Poetry and Paintings in conveying environmental messages. Journal of Biological Education. Vol 46 (2) p93-102

9.1 Introduction.

As mentioned in chapters 1-8 of this thesis there are concerns about the public's familiarity with scientific knowledge and the environment. An explanation for this perceived lack of understanding is that science is frequently communicated using rather dry uninteresting methods (Bauner *et al. 2007, Olson 2009)*, the scientific report, the academic conference, and the late night debate. With technology and science evolving faster than ever before it has never been more important to communicate new ideas and concepts to the public and young people in a meaningful yet lucid way. Watts (2001) has argued that it is necessary to move beyond the customary curricular constraints within schools. He suggests that school science can be both a scientific and literary experience and highlights the power of poetry in stimulating observation, imagination and emotion in school science. This view is supported by Osbourn's (2006) findings that children of primary school age can use scientific images, such as The Earth as viewed from space, salt crystals under the microscope and thermograms of houses, as inspirations for creative writing and art. Other art forms may also have parts to play. Kempton (2004) recommends the use of paintings and cartoons to teach ethics in science, and Francis (2007) found that drama-based science lessons have positive impacts on both attainment and attitudes in science lessons. Tobin & Elmesky, (2005) demonstrated how the principles of wave energy movement could be taught through dance. Emdin (2010) puts forward the idea that students develop communal relationships and collective identities based on the common experiences expressed in hip-hop culture and that if urban students find their lives portrayed in this culture, it logically follows that teaching science in the context of these expressions could coalesce students' identities around pertinent science experiences in the same way.

This penultimate chapter explores and expands on the themes suggested in Chapter 3 that young people have the talent and motivation to use art forms, in this case poems and paintings, to communicate views and information on the environment and biological world

to wider audiences. This should include adult audiences because, in many cases young people's knowledge of current ecological issues far exceeds the knowledge that their parents have (Ballantyne *et al.* 2001b).   Young people may not have the intuitive knowledge that their elders have gained from years of experience working or living in the natural environment (Dixon *et al. 2005*, Beddington 2005) however many are more conversant with modern scientific and environmental terms and concepts (Hampshire 2000). There is also some evidence to show that they can influence their parent's environmental awareness and actions (Uzzell 1994).

Using the arts to convey environmental messages may be a particularly fruitful line of exploration within the African context because the arts have always been used as means of communicating political or social messages (Edite 2002). Theatre has been especially important.   Rwangyezi & Woomer (1995) describe the performing arts as the great books of the African continent. Information was once stored in theatrical styles and disseminated through ceremonies and enacted in songs and stories.   This function has evidently diminished in the modern world but there are still many examples in which public performances are used to convey messages on health, agricultural or social issues (JOICFP News 2000, Ghosh *et al.* 2006, Daykin *et al.* 2008, Heong *et al.* 2008). Biology and art both rely on observation and synthesis: taking what is seen and creating something new from it. Society could hardly exist without either, but when they come together cultures are enriched, sometimes in unexpected ways.

This chapter is based on a programme of environmental education, focussing on the effects of climate change on Ghana, in particular the coastal zone of that country. As outlined in chapter 7, the author and the department that she works for, has excellent links with colleagues in Ghana and has established an International Schools Partnership between a school in the NE and one in Ghana. Originally the project's methods were going to mirror the model developed in chapter 7 whereby a school in the UK and one in Ghana examine how an identical problem is effecting the coastline of each country. Unfortunately the funding to carry out the UK part of the study was rescinded just before the start of the project and the UK PI and author's supervisor became too ill to oversee the project. It was decided to continue with the project but without a UK schools involvement. The project was taught at the University of Ghana Primary and Junior High School. Pupils took part in

a series of workshops based on the topic, visited a range of coastal areas around Accra and took part in a debate. Further, each pupil was asked to: (i) compose a poem and (ii) make a painting as a means of expressing their views about the effects of climate change on the coastal environment.

9.2 Aims and Objectives.

Aim To investigate if young Ghanaian students can effectively disseminate their learning about climate change to their peers, parents and wider community using poems and paintings.

Objectives.

- to devise and teach a stimulating and novel teaching programme centred on the topic of coastal climate change.
- to provide opportunities and materials for the young people to produce paintings and poems.
- to provide opportunities for the young people to disseminate their work.
- to analyse the artwork using a range of techniques to assess the effectiveness of the teaching programme.

9.3 Methods.

The teaching programme was taught in English, which is the formal language used in all schools in Ghana, to a single class of 50, mixed sex, 12 – 14 year olds in October 2009 at the University of Ghana Primary and Junior High School (UGP&JHS). The UGP&JHS was chosen for this programme because of the established links that this school has with The University of Ghana. The programme was taught intensively over a two-week period by two professional marine scientists, one from Ghana, Dr. Francis Nunoo (Department of Oceanography and Fisheries, University of Ghana) and one from UK, Mrs Susan Gebbels (Dove Marine Laboratory, Newcastle University). As the programme was being taught as part of the school's curriculum during school hours the pupils were all expected to participate and complete any homework set. Permission to take the students on the field trip was sought from the parents.

Prior to the start of the programme the students had limited knowledge about climate change. They understood the basic concepts and how they were relevant on a global scale but they could not apply this knowledge to local issues. The majority of students were not able to recognise or name correctly commonly landed marine fish (e.g. the round sardine, *Sardinella aurita*) or common bird species (e.g. the little egret, *Egretta egretta)* that they encountered in the field. Over half had not visited the coast before despite living thirty minutes away. Many parents and guardians normally refrain from allowing children to visit beaches unaccompanied. Culturally, the diet of Ghanaians usually includes fish as a major source of animal protein and some lessons on biodiversity are taken during science class at basic school. Many of the students were therefore expected to have come across some of these species in their studies or in their social life.

The theme of the project was climate change and its probable biological and physical impact on the coastal zone of Ghana. The first session was held in the students' classroom; the researcher from the UK gave a presentation, written jointly by both scientists, about the likely causes of global climate change and how they were affecting Ghana's businesses, and livelihoods of citizens. Emphasis was given to the problems that the native species of flora and fauna would face in the event of sea level rise, erosion, ocean acidification, habitat loss and changes in predator prey interactions due to species redistribution. For instance, the above named sardine has its occurrence and abundance determined by the strength of upwelling of seawater and this is driven by a lowering of sea surface temperature (SST). Observed increases in SST has tended, in recent years, to cause changes in the annual timing of the fish in catches as well as reduction in its abundance. Lack of electricity in school resulted in the presentation being printed and distributed to the children. The session ended with a game to consolidate the pupils' learning.

9.3.1 Group work sessions
During session two the students recapped their knowledge from the previous lesson before being divided into 7 sub-groups of 7. Each subgroup was allocated a social group that they were asked to represent. Both researchers explained that for the remainder of the project the students had to imagine what it would be like to be the people in their subgroup and to gather evidence as to how climate change could affect them. The

students were informed that at the end of the project they would be required to relay this information to the rest of the class via a ten-minute presentation and answer any questions that their peers might have. There are several advantages of using a group work approach with school pupils; it allows them to socialise with classmates that they might not normally talk to, form new relationships or strengthen existing ones and explore complex issues in a secure setting (Johnston & Johnston 2003). More specifically, it helps pupils gain information and experiences of a topic by enabling them to comprehend several perspectives of a subject (Westergaard, 2009).

The social groups that the children were asked to represent included: fisherfolk, environmentalists, social sceptics (who did not believe climate change was happening), farmers, community leaders, business owners and scientists. Each group was presented with a file that contained basic qualitative and quantitative information about the probable causes and effects of climate change on the earth and specific information about how it was likely to affect the social groups that the pupils had been given. This included newspaper articles, interviews, case studies and photographs. For example, the business leaders file contained information about how erratic rainfall patterns in Ghana had led to water levels in the country's main power generation reservoir, Akosombo Dam, being dangerously low. This in turn was affecting the efficiency of the hydroelectric dam which in turn was affecting the country's electricity supply and therefore their businesses.

A researcher or class teacher/assistant helped the students consider the problems that their subgroups were facing, but they were instructed to allow the pupils to lead the dialogue. Their role was to: encourage the students to work together, help them share out tasks, take responsibility and encourage the pupils to listen to the views and ideas of others. Two Masters students from the Department of Oceanography and Fisheries of the University of Ghana were also present to assist with the class.

9.3.2 Fieldwork
During a whole day fieldtrip the class visited a range of habitats around the coast of Accra to be exposed to potential effects of climate change at first hand. The students visited Tema harbour which is one of the largest artificially constructed ports in western Africa. It handles freight and cargo vessels from all over the world. The harbour provides mostly unskilled casual jobs to the local population, most of which lives in squalor and poverty in

shanty homes which surround the harbour. There is a large fishing port where fish can be bought wholesale from stalls lining the water's edge. In the canoe basin up to 500 traditional wooden dug-out canoes can be seen that form the basis of the region's artisanal fishery. These canoes land predominately sardinella, mackerel shrimps and anchovies. The offshore industrial fleet target, among others, Skipjack, (*Katsuwonus pelamis),* Grouper (*Epinephelus aeneus*) and Red Snapper (*Lutjanus fulgens).* The students discussed how warming of the seas could change the distribution of the native fish species and disrupt the prey that they traditionally feed on. The welfare, housing and health of the fisherfolk were discussed, as the pupils were surprised to see the conditions in which many fishing families lived. Several miles along the coast there is an inland brackish water body, Sakumo II Lagoon, an internationally protected RAMSAR site noted for its high biological productivity. The size of the open lagoon varies from 100–350 ha depending on the season. The lagoon is separated from the sea by a narrow sand-dune, on which the Accra–Tema road is built, and is connected to the sea by a small, (permanently open) sluice, constructed to prevent flooding of the coastal road. Large portions of the lagoon dry up in the dry season, resulting in hyper-saline conditions. The flood-plain is periodically inundated and the flooded areas are largely devoid of vegetation. There are also areas of freshwater marsh and coastal savanna grassland, the latter composed mainly of *Sesuvium portulacastrum* with various grass species associations.

Seventy species of waterbirds have been recorded at the site with estimated maximum numbers of some 30,000 birds. Other common species include: Western Reef Heron, *Egretta gularis*, the Common Pratincole, *Glareola pratincola*, *Charadrius hiaticula,* Ringed Plover and Common tern, *Sterna hirundo.* Breeding waterbird include: Kittlitz's Plover, *Charadrius pecuarius* and Little Tern, *Sterna albifrons.* Three species of marine turtle: Olive Ridley Sea Turtle, *Lepidochelys olivacea*, Green Turtle, *Chelonia mydas* and Leatherback Sea Turtle (*Dermochelys coriacea*) have been recorded nesting on the beaches eastern to the site. The Ghanaian researcher helped the pupils identify the wading birds present and explained how the area's fish stocks are preserved by the implementation of sensitive traditional management practices. The road opposite the lagoon is under threat from coastal erosion; large boulders have been deployed to protect the highway but these have been damaged because the seas are breaking through. This is a problem that is common along Ghana's coast and one which community leaders are

concerned about especially when it is coupled with sea level rise. One town, Ada, has been reduced to a rapidly disappearing strip of land.

Avicennia germinans and Rhizophora racemosa were two of the principal species present at a coastal mangrove swamp visited. The Ghanaian researcher explained the potential effects climate change could have on Ghanaian mangrove forests.   Pernetta (2003) argues that present rates of sea level rise are responsible for loss of mangrove systems. This is of concern as mangrove forests have many uses. They are important supplies of natural renewable resources such as firewood, dyes, poisons, food and construction materials. They provide nursery areas for offshore, commercial species of fish and prawns, sediment traps for land accretion and coastal protection from tidal erosion and storm surges. In addition they serve as habitats and refuge for a large number of species of conservation concern. These swamps paradoxically line a beach of expensive, but low lying, western style hotels which are also at threat from sea level rise. The final field site destination was at the highly polluted Korle Lagoon an area of the coast where raw sewage from the country's capital is dumped into the sea.

9.3.4 Homework

Both researchers led a brief plenary session back in the classroom to consolidate the day's teaching. The pupils were asked to compose a poem for homework to express their individual views on climate change and the probable impact on Ghana. They were asked:

- To write in English
- To write no more than 500 words
- To complete the task in a maximum of two days

To use the information gained during the project for information and inspiration.

9.3.5 Art Session

The following day the UK researcher led a two hour art session supported by the two class teachers. The researcher provided children with coloured felt tip pens, coloured pencils and chalks, water colours, brushes and A3 coloured card in pastel and bright tones. Pupils were told:

- To compose a picture which illustrated the possible consequences of climate change on the biological, social and physical features of Ghana.

189

- That they could use any of the resources made available to them.

- To think about colours and images that they saw during the field trip

- To give the picture a suitable title

9.3.6 School Assembly

A debate was held in the final teaching session, during which each subgroup gave a presentation about how their social group would be affected by climate change. The pupils read out their poems to the class, some pupils sang or rapped their prose. Six were chosen to be read out in a whole school assembly the next day. The assembly was held outdoors; the whole school attended along with all the researchers, and masters students. The University of Ghana's Dean of Faculty of Science was the guest speaker. Two children gave an overview of the teaching programme, and six pupils read out their poems. The local press covered the story; articles appeared in two papers; one a national, publicly-owned newspaper, The Ghanaian Times and a popular privately-owned newspaper, New Crusading Guide. This coverage allowed the children's messages to reach an even larger audience.

9.3.7 Painting and poems: content analysis

Directly after the art session 47 pupils (all those present) were interviewed on 1:1 basis and asked two questions: 'What is the main feature of the picture?' and 'Which words are represented in the picture?' (Table 9.1). The interviews were held in a separate classroom and undertaken by the English researcher and teacher. The responses were not audio recorded but noted on paper. The pupils were asked to self-generate words used in the responses but this was not a vocabulary test as they were words that had been discussed and used repeatedly in context during the entire teaching programme. They were asked to use a single word in responding to the former question but could use as many as they wished in responding to the latter question.

Paintings and poems were used in this teaching programme, as they were a means of communication that the students could relate to and they utilised skills that they already had. The art works could easily be produced in a confined space and the poems could be attempted at home. When the paintings were dry they were mounted on backing card and displayed on boards. This was a novel concept for the Ghanaian children who were not

used to their work being on show. The walls of their classrooms are completely bare. The display boards were placed outside in the school grounds so that the whole school, visitors and parents could view the art. The pictures were photographed individually for analysis in the UK.

Content analysis was chosen to interpret the poems and paintings as it is considered a suitable method by many social scientists (Bereslson 1952, Krippendorff 1980, Stemler 2001) for studying the meanings and messages found in texts and for coding drawings (Wheelock *et al.* 2000). It allows the researcher to identify the frequencies of the most used words in a piece of writing by counting the number of most used key words after they have been categorised into mutually exclusive groups.

When the researchers returned to the UK, all the poems and paintings were subjected to content analysis. None of the paintings were unable to be analysed. Two researchers coded 47 paintings and 45 poems, each researcher checked the accuracy of the others work by double checking their results.   Poems were scanned for the use of words that conveyed specific messages, referred to as descriptors. This approach has been used successfully in a range of disciplines including medicine (Taylor *et al,* 1994) and literature (Stirman & Pennebaker, 2001).

  In the case of poems, descriptors were words of four different kinds (Table 9.1):

- Positive descriptors, such as beauty or enjoyment, which conveyed positive images of the marine or coastal environment;
- Negative descriptors, such as pollution or degradation, which conveyed negative images;
- Descriptors with religious, national or global meanings. Descriptors which attributed environmental responsibilities to particular groups of people;
- Descriptors which recommended particular actions with regards to the environment;

These descriptors were chosen because of the frequency that they appeared in the poems. No words were used that did not fit the descriptors. The number of descriptors per category was counted, as were the number of poems including the descriptors, the total number of times that the descriptors were used and the mean times that the descriptors were use per poem (Table 9.4). To overcome the concern that content analysis can show

a bias on context, the phrasing in the poems was checked for any oxymoron that could occur. However none were found. Words were sometimes used in different forms. This was the case, for example, in using descriptors, such as pollute, pollution and polluted, or beauty and beautiful. These forms were regarded as the same word in the content analyses.

In the case of paintings, descriptors were images within the painting. Both positive (wildlife) and negative (agents causing pollution) descriptors (images) were identified. As in the poems, descriptors were based on the frequency that they appeared (Table 9.6). Images were also used to convey uses of the seas (e.g. boating). Since use of colour was allowed, attention was given to the use of colours used for the sea, sand, clouds, sky and sun. Analyses of both poems and paintings focussed on content. Literary or artistic merits were ignored.

9.4 Results.

Both poems and paintings included clear environmental messages. Poems were relatively short. The mean length was 73.12 ± 0.29 words; range 33 to 149 words. Poems normally used a range of descriptors (Table 9.2) to describe the habitat. Typically, it was described as a valuable place of national importance but one that is being degraded by human activities. Many poems named particular groups of individuals (Citizens; Family; President) as being responsible for environmental degradation and stated measures that were needed to control it ('stop' polluting, 'clean' the environment).

Table 9.1. Pupils views of the main features of their paintings, and words that most aptly describe the painting.

What are the main features of the picture	Times quoted	Which words are represented in the picture?	Times quoted
Pollution	34	Pollution	43
Climate change	19	Degradation	33
Sea level rise	1	God's creation	23
Other	5	Animals/plants	19
		Source of food	16
		Beauty	14
		Shipwrecks	13
		Vastness	12
		Enjoyment	4
		National pride	2

Table 9.2. Descriptors that were identified in poems.

Positive descriptors:	Descriptors with religious, national or global meanings:
Beautiful	Africa
Bright	Creation
Enjoy	Ghana
Happily	God
Lovely	Godliness
Wonderful	Motherland
	Nation
Negative descriptors:	World
Bad	
Damage	
danger	**Descriptors that attributed responsibilities to particular groups of people:**
Defaecate	
Destroy	
Dirty	
Disease	Citizens
Dump	Family
Filth	Government
Harmful	Industry
Health	People
Litter	President
Pollute	
Refuse	**Descriptors that recommended particular actions with regards to the environment:**
Rubbish	
Shame	
Sick	
Spoil	Awake
Urinate	Clean
Waste	Protect
	Save
	Stop
	Tell
	Inform

Table 9.3. The most commonly-occurring descriptors in poems.

Descriptor	Percent of poems in which used
Positive descriptors:	
Beautiful	20.8
Negative descriptors:	
Defaecate	10. 4
Destroy	25. 0
Dirty	14.6
Litter	18.8
Pollute	31.3
Descriptors with religious, national or global meanings:	
Creation	16.7
Ghana	50.0
God	22.9
World	43.8
Descriptors that attributed responsibilities to particular groups of people:	
Citizens	25.0
Family	14.6
President	10.4
Descriptors that recommended particular environmental actions	
Clean	31.3
Stop	43.8

Four of the five categories of descriptors are evident, and have been highlighted; in the following poem '*Nature's Beauty*' by Lady Dadjo aged 12:

Society needs education
*So that it can help the **nation*** *(religious, national or global category)*
*To **stop pollution**.* *(negative category)*
The coast has lots to offer
But not to suffer.
*This **lovely** treasure* *(positive category)*
We love it for pleasure *(positive category)*
*Some love it for **beauty*** *(positive category)*
It's nature so keep it
*As **God** first intended.* *(religious, national or global category)*

However, there was an imbalance in the use of positive and negative descriptors. Overall, 20 negative descriptors were identified and most poems included several of them (Table 9.4).

Table 9.4. The relative use of descriptors in each of the five categories.

Descriptor:	Number Recorded	Number poems including descriptors	Percent poems including descriptors	Total numbers of times descriptors used	Mean times descriptors used per poem (± s.e.)
Positive	6	19	39.6	39	0.58±0.15
Negative	20	40	83.3	117	2.44±0.30
Religious/ National/ Global	8	42	87.5	117	2.44±0.25
Responsibility	6	19	39.6	39	0.81±0.20
Action	6	34	70.8	74	1.60±0.23

Five of them, especially defaecate, destroy, litter and pollute, were in particularly common use and appeared in more than 10% of poems. The following poem by Abena Anima Osei Berko, aged 12, includes six negative descriptors (destroying, damage, littering, wastes, harmful, bad), although it still concludes with an optimistic message:

*Oh! My **God** what is man trying to do.*
With our minds thinking that what we're doing is right,
*We're rather practising something that is **destroying** our water bodies and causing **damage** to our lands*
Global warming and climate change are one thing that is bringing our country's name to shame.
*Through our **littering** and our industries throwing their **wastes** into the lagoons and sea.*
*It is **destroying** our lagoons and seas.*
*This same situation is causing sea level rise and coral bleaching as well as **harmful** things.*
*Some **bad diseases** turn out as a result of this **bad** thing we're practising.*
*So my fellow **Ghanaians** let us put our heads together and reason as one to **stop** practising these **bad** things.*
*Because **Ghana** we see today will be better tomorrow.*

Relatively few positive descriptors were used in the poems (Table 8.4). 'Beautiful' was the only commonly occurring one of this kind. Nevertheless, many poems created positive images referring to the seas as national assets of global value and of God's creation (see poem by Lady Dadjo above).

There was some overlap in the use of descriptors in poems and paintings. Acts, such as defecation and urination, which reflect the general absence of sanitary facilities for many coastal communities, featured in both paintings and poems (Tables 9.2, 9.3 and 9.6). Nevertheless, images and colour in paintings were used to convey different kinds of messages from those in poems. For example, paintings often illustrated uses of the seas, through images of people boating, fishing, washing and swimming.

Table 9.5. Images included in paintings

Uses of the sea	N	%	Negative descriptors	N	%
Fishing	11	22	Defecation	7	14
Boating	14	28	Urination	12	24
Washing	5	10	Lorry discharging effluents	9	18
Swimming	3	6	Factory effluents	10	20
Positive descriptors			Dead palms	9	18
Living palms	16	32	Dead trees (not palms)	3	6
Trees (not palms)	22	44			
Fish	22	44			
Birds	19	38			
Flowers	3	6			

Images also identified specific causes of environmental degradation, including lorries or factories discharging their effluents into the environment (Fig. 9.1). The consequences of pollution were also depicted by litter on the shore or dead trees and wildlife (Fig. 9.2).

Many paintings recognised the importance of the coast as havens for wildlife and included images of living trees; fish; birds and flowers. The majority of pupils used 'natural' colours in their paintings: blue or green for the sea; brown for sand; and yellow for the sun. However, the sky was usually left uncoloured in which case clouds were usually coloured blue.   Most pupils claimed either that they used colour in this way to convey the beauty of the seas or simply to depict them accurately.

Table 9.6. The use of colour for images included in the paintings.

Coloured image included in painting:

Colour used:	Sea N	%	Sand N	%	Clouds N	%	Sky N	%	Sun N	%
	50	100	25	50	32	64	11	22	44	88
Black	12	24	6	24	5	16	0	0	0	0
Brown	0	0	17	68	1	3	0	0	6	14
White	0	0	0	0	2	6	2	18	0	0
Red	3	6	0	0	0	0	0	0	4	9
Yellow	0	0	1	4	0	0	0	0	34	77
Green	9	18	0	0	1	3	0	0	0	0
Blue	26	52	0	0	23	72	9	82	0	0
Purple	0	0	1	4	0	0	0	0	0	0

Black was used as an indicator of degradation, and was commonly used to colour the sea. Black was also used to colour sand and clouds in some paintings. Six pupils used brown to colour the sun. Interviews with students (Question 1) confirmed that these colours had been chosen deliberately to depict a polluted environment. Eighteen of 25 of those using black or brown for the sea, sand or clouds claimed to have use them in this way

Despite the emphasis on climate change in the teaching programme, many pupils (24; 49%) used the term pollution in the titles of their paintings; only 10 of them (20%) included the phrase climate change in the title; 2 included sea level rise (4%); and 13 used some other form of words (27%). This emphasis on pollution, rather than climate change was also reflected in responses to the questions: 'What are the main features of the picture?' and 'Which words are represented in the picture?' (Table 9.1).

Figure 9.1. A painting entitled "Water Pollution"

Figure 9.2. A painting entitled "People Polluting the Sea"

These pictures were chosen as examples as they depict a range of positive and negative descriptors. Fig 9.1 shows descriptors of the sea: such as washing and swimming, positive

descriptors: cattle drinking, living palms, fish and birds and negative descriptors: polluted water, defecation, urination, a dead tree and fish and a lorry discharging effluents. The artist has also painted the sun with an unhappy face. Fig 9.2 portrays uses of the sea: one person bathing and another washing clothes, positive descriptors: living palms, birds and fish and 6 negative descriptors: a lorry discharging effluents, a dead tree and dead fish, polluted water, and a choked drainage channel with dead vegetation. Both artists have used colour to depict pollution, brown lorry effluent and brown for the sea in fig 9.1 and black sand in fig 9.1.

9.5 Discussion

Poems and paintings of Ghanaian schoolchildren contained a range of different environmental messages. Content analysis of both poems and paintings revealed that particular themes or messages tended to recur in them. There were, nevertheless, differences in the ways in which these two art forms were used to convey messages. Both of them depicted the negative impacts of pollution and habitat degradation, which reflected the current state of the coastal area of Accra. Poems also used words to stress the national importance of the seas, their value as assets of God's creation and the need for actions, such as everyone working together in order to manage them at sustainable levels. Paintings, on the other hand, used images to identify specific causes of pollution and to illustrate the uses of the seas. There was an unexpected emphasis on pollution, rather than climate change in the paintings, probably because pupils had difficulties in creating images of climate change, which is an abstract concept. This could be a reflection that none of the local Ghanaian languages have as yet a word or phrase accepted as direct translation for climate change. Pupils were consequently reluctant to use the term 'climate change' in their titles of paintings and many of them regarded 'pollution', which is more easily depicted by images, as the major feature of the painting.

Poems and songs are particularly powerful tools of communication to non-specialists because they can convey messages in forms that are far more palatable and persuasive to the general public than a scientific report or a media interview. In part, this is because they can reflect the composer's innermost feelings (Stirman & Pennebaker 2001, Furman *et al.* 2007) and views in them can be expressed with passion and commitment. Common themes in the compositions produced in the current project are the subjective views of

202

young people who had carried out brief surveys of the coast and therefore lack scientific rigour, which is essential in communication between scientists. However, rigour is less important in communication with the general public. Unlike the scientific report, the message(s) within the poem or painting are probably as important as scientific data generated by environmental surveys because the general public can associate with images or language used in their daily lives. Although descriptions of the marine and coastal environments as places of beauty and enjoyment, part of the people's national identity and God's creation, may have no part in the standard scientific report, they enrich poems and paintings, bringing the topics under consideration to life. They are probably more effective than reports in generating interest in the conservation cause.

9.5.1 Intergenerational learning

Intergenerational learning (see chapter 6), through which young people learn about the environment from parents or other elders in the community (Liu & Kaplan 2006) has probably always played a significant role in enabling young people to learn about the environment. However, while detailed information on the way in which the transfer of knowledge of this kind occurs is lacking, poor environmental and biological knowledge in the adult population (see above) suggests that, at least as far as children learning about the natural world from adults is concerned, the influence of intergenerational learning is in decline. This then shifts the onus because young people are likely to be more knowledgeable than their elders on environmental issues. The education process is reversed because children have the opportunity to become the educators. Ballantyne *et al.* (2006) have already emphasised that young people have the potential to become teachers of the adult population on environmental issues.

9.5.2 Increased subject knowledge.

After a weeklong programme the children were passionate about the subject of climate change and keen to impart their knowledge to a wider audience. They participated in the class debate, with great maturity and good understanding. The pupils offered up some possible solutions to combat the problems surrounding climate change and offered ideas that individuals could act upon such as energy saving tips and driving less. The students had gained sufficient knowledge about the topic to compose provoking poems and paintings that powerfully expressed their views about the subject to their peers and elders.

9.5.3 Increased environmental knowledge.

The increase in the students' environmental knowledge was not statistically tested, as it was not part of the aims of this project, however, the children expressed a keen interest in learning more about the flora and fauna of their country. Seeing native species in their natural habitat helped the students understand the complexity of effects of climate change when the interconnectedness of a whole ecosystem is considered. This was one of the main concepts that the students learnt during the course of the project.   Several of them said that they wished to in the near future take their families to some of the sites that they had visited during the fieldwork.

9.6 Limitations/ Further work

The project was originally developed to be a study that worked with UK and Ghanaian students; however, as discussed in the introduction, the UK part of the project had to be abandoned. An extension of the project would therefore be to undertake an identical study with a UK school.

9.7 Conclusions

As discussed in Chapter 7, there is evidence that young people have the potential to influence environmental attitudes and the behaviour of adults in positive ways (Evans *et al.* 1996, Liu & Kaplan 2006, Nunoo & Evans 2007), and the creative arts provide one means by which they can do so. Studies by Ballantyne *et al.* (2001) and Vaughan *et al.* (2003) found drama and art to be successful tools in raising paternal awareness of conservation issues in intergenerational learning projects. When science meets art and the two work together, the result can be extraordinarily productive, as gaps in our understanding are filled and new ways of expressing problems and communicating with people are established.

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Chapter 10 General Discussion

10.1 Overview of study

There are many benefits to society in involving citizens in scientific and environmental decision-making processes and governance. Seeking to involve non-specialists as partners in conducting scientific investigations "engaged research" is one way in which scientists may interact with society (Bonney *et al.* 2009). Evidence strongly suggests that environmental knowledge created through engaged research is most likely to achieve social acceptance, become policy relevant (Mackintosh & Nottestad 1998) and influence outcomes having favourable environmental impacts (Overdevest *et al.* 2004). Other benefits include increasing environmental democracy (Pollock & Whitelaw 2005), scientific literacy (Pace *et al.* 2010), social capital (Schwartz 2006) and citizen inclusion in local issues (Lynam *et al.* 2001). Democratization of the environment is a relatively new concept based on making environmental science and expertise more accessible to the public while also making scientists more aware of local knowledge (Carolan 2006). Some authors suggest that it is inappropriate to leave environmental science solely to institutions and that community science is necessary (Carr 2004). The inclusion of the public in scientific projects also plays an important educational role in communities. By participating actively in projects, community members increase their scientific literacy. This can take the form of augmenting knowledge of scientific processes or by an increased understanding of their role in the local environment. (Evans *et al.* 2005) and lead to a more educated community (Pollock & White 2005, Cooper *et al.* 2007) and a stewardship ethic (Whitelaw *et al.* 2003).

The public becomes a potentially huge work force that can support ecological studies (Whitelaw *et al.* 2003, Conrad & Daoust 2008). There are ever-increasing numbers of completed projects that would have been too ambitious, costly and time-consuming to be undertaken without volunteer assistance, examples include the RSPB's Big Garden Bird Watch and the Marine Conservation Societies Beach Clean Up. Terrestrial biodiversity surveillance in the UK involves at least 30 organisations, including the regional administrations and their agencies, non-governmental organisations, societies and research bodies, often in partnership. Many schemes rely on volunteer observers to some extent; with an estimated value of over £20 million during 2007–08, supported by approximately £7 million of government funding (JNCC 2010). Environmental monitoring in the UK has to adapt to the current era of austerity and the political driver of 'Big Society'

(Mackechnie *et al.* 2011). The Big Society is the coalition government's movement to try to place responsibility for the running of communities back in the hands of the people who live there. The Secretary of State for the Department for the Environment and Rural Affairs (DEFRA) when launching the consultation on the Natural Environment White Paper, described it as a "new opportunity to hand over control to local people" (Mackechnie *et al.* 2011).

The interaction between scientists and members of local communities has been welcomed by some researchers and practitioners. Fletcher & McKinley (2010) in a wide ranging survey found that marine practitioners in the UK see value in public involvement in marine governance and that it can be instrumental in delivering successful decision making providing short term decisions are avoided. In recent years there have been more opportunities for individuals to become involved in marine governance as seen in the shift from centralised governance to more inclusive approaches advocated by Integrated Coastal Zone Management (ICZM) and Marine Spatial Planning (MSP). Examples of this can be seen in the UK's Marine and Coastal Access Act (2009), the EU Marine Strategy Framework Directive (2009) and the identification of Marine Conservation Zones in England.

The idea of 'marine citizenship' to empower community members of all ages to participate and contribute to marine environmental planning processes and governance was the main concept that was developed in this thesis.

10.2 Marine Citizenship

Earle (2011) has described the greatest threat facing the oceans as 'ignorance' and asserted that "you need to know about it to care about it". McKinley & Fletcher (2012) suggest that the key influences that shape individual behaviour and attitudes towards the environment are awareness and knowledge. Public perception studies by Steel *et al.* (2000), Fletcher *et al.* (2009) and Williams (2008) worryingly suggest that public awareness and knowledge of the marine environment is poor. Although there is a high degree of public concern for the marine environment there are low levels of awareness of issues and limited understanding of the relationships between our lives and the health of the marine environment. The oceans and coastal strip are important to everyone, in the UK nobody is more than 60 miles from the coast and many of the country's estuaries

permeate much further inland. Promotion of schemes that work alongside environmental managers such as the ones outlined in chapters 2, 3, and 4 provide opportunities and provision for all members of society to actively take part in marine citizenship projects. Matti (2006) argues that the challenge is to provide small actions that people can take each day to heighten a sense of responsibility. Projects that start at a local level are the most convenient and effective way of achieving this aim, especially when people can contribute to management decisions (Berkowitz *et al* 2004). Participation can help citizens understand the role that the marine environment has in everybody's daily lives and realise the full range of beneficial services provided by the seas (Austen *et al.* 2011).

Arguably though, only people with an existing interest in marine issues might be inspired to take part in projects. The demographic of people who participated in the studies in this thesis was not formally recorded but the adults were overwhelmingly white and middle class. (The school children came from more diverse backgrounds). Studies by Barr (2003), Tytler (2001), and Jenkins (2003) found that age, gender and social background all played a part in defining whether a person would change their individual behaviour. Ehrlich *et al.* (1999) surmise that just because a person gains more environmental knowledge it does not follow that they will put the knowledge into practice. This has important implications to marine environmental health, as it suggests that knowledge and awareness are not enough to change personal behaviours, a personal value shift must also take place.

Chapter 6 dealt specifically with the concept of sense of place and its role in promoting healthy communities and environments (Fettes & Judson 2011), feelings of pride, ownership and responsibility (Rogan *et al.* 2005) and if being part of a community fosters a sense of accountability for that place (Davenport 1998). It has also been suggested that a strong sense of place enhances the responsibility and ownership of young people toward the environment and their commitment to act (Alkaher & Tal 2011). The concept of sense of place therefore underlies much of the rationale behind all the chapters in this thesis, by connecting with its main aim to promote marine citizenship through inspiring a sense of ownership and responsibility towards the marine environment. Further work in this area of research should examine if pro-environmental behaviour is linked to sense of place as suggested by Kudrayavtsev *et al. (*2012) and Halpenny (2006). It should also examine

ways to affect a shift in values, measurements of shifts and how to ensure action after the value shift.

Throughout the thesis three models have been investigated which promote the concept of marine citizenship:

- Tailored projects that work with young people and schools
- Tailored projects that work with the adult public
- Projects that promote partnerships
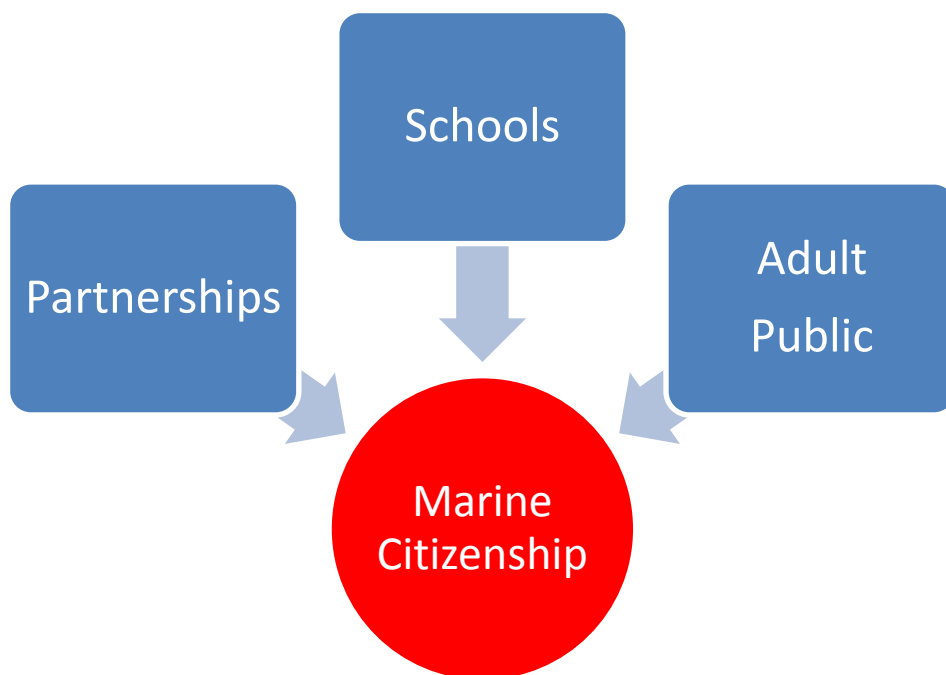
Figure 10.1 Models used in the thesis to promote marine citizenship with a variety of audiences.

The concepts can be explained further by expanding key sections of figure 10.1 to show more details of the individual projects and to show the overlapping themes which run through many of the models.

Figure 10.2 The main concepts and strategies explored within different chapters of the thesis to promote marine citizenship to pupils from primary and secondary schools. Some of the themes are interwoven between several of the chapters.

10.3 The Citizens' Days

Citizenship is now taught in the National Curriculum in England and Wales (Crick 2001). Initially it posed challenges for teachers to incorporate it into an already full timetable (Toakley & Aroni 1998, Chatzifoiou 2002, Summers *et al*. 2003). The thesis used the Citizens' Days to promote marine citizenship by using two approaches; The Courtroom Day and The Environmental Citizens' Day. They have both shown to be an effective and creative means of allowing primary school pupils a platform on which they can debate environmental concerns and develop a set of personal values towards the environment. The Citizens' Days are also an effective method of allowing pupils and environmental

managers to work together to suggest, develop and implement sensible and affordable management recommendations that can highlight key biological species and local, environmental issues to the public. This helps overcome the concerns highlighted by Uzzell (1994), Heater (2001) and Macnaghten & Jacobs (1997) that abstract citizenship lessons are resulting in a feeling powerlessness and action paralysis.

10.3.1 Global Citizenship

Global citizenship is a relatively new concept in schools, (Brownlie 2001). One way in which it can be brought into the classroom is through an International Schools Partnership. Keating *et al*. (2009) recommended that the best citizenship projects are those that put theoretical knowledge into practice and transfer skills outside of the school context. The Global Citizenship Days were very effective in allowing the pupils to see the interconnectedness of the world's marine habitats and raising awareness of the difficulties that the marine environment is facing on both local and global scales. The discussion section in each chapter suggests that regardless of a person's educational and academic ability, they can have an active role in marine citizenship.

10.3.2 Limitations/Strengths of the Citizens' Day

An obstacle for Citizens' Day type projects is that, it is difficult for teachers to find the time to employ creative and enterprising approaches to teaching citizenship. A strength of both the UK Citizens' Day and the global one is that they were facilitated by a university researcher who had both the specialist knowledge and the contacts to promote and run the projects. The Courtroom Citizens' Day has the advantage of being relatively easy for the class teacher to organise and they can be staged in a classroom setting. The International Schools Partnership developed in the thesis is still flourishing and the model could be modified and used by other schools as a practical and effective way of introducing global marine citizenship into the classroom.

10.4 Intergenerational learning.

This thesis has shown that there are a range of methods that can promote bilateral intergenerational learning between adults and children and that the methods have the potential to promote marine citizenship. It has been suggested by several authors (Evans *et al.* 1996, Ballantyne *et al.* 2001b, Vaughan *et al.* 2003) that young people have the potential to act as catalysts of environmental change, community empowerment, and social learning among their parents and other members of the community.

Intergenerational learning was a component of chapter 9, when Ghanaian school children disseminated their messages about climate change to their peers, parents and teachers. It was also an element of chapter 4, were a partnership between industry, scientists and young people collaborated to carryout environmental surveys of marine habitats.

Chapter 6 explored whether children could disseminate their learning about maritime heritage and biodiversity to adults within their locality. Each of the three adult groups involved in the study claimed to have gained some knowledge and an increased desire to learn more. The author noticed during the course of the two year project that many older people within Cullercoats and the surrounding villages talked about the areas maritime heritage and reminisced about their own personal experiences. These dialogues often led to debate about how the coastline and village had changed since they were young and made comparisons between themselves and how the young people of the village used the beach and surrounding locality today. The conversations often included references to how the area was much cleaner, safer and more community orientated when they were children and what could be done to promote and protect the area for future generations - sentiments that are at the heart of marine citizenship. Although the results suggested that only modest amounts of learning had taken place, it is valuable to note that by providing a forum where all members of the community could come together to discuss their maritime heritage the residents were encouraged to question how it could be preserved. The results of the study also suggested that the children did not talk extensively to their parents about the project but they were enthusiastic in taking them to some of the places they had explored and learnt about. Eaton (2000) found that outdoor learning experiences have a greater chance of capturing children's imagination and interest in their immediate surroundings and, as a result, they are more likely to share this interest with their parents.

10.4.1 Limitations of Intergenerational Learning
The results from the projects suggested that the amount of intergenerational learning that took place was variable. One of the difficulties about measuring the success of intergenerational projects is that it is difficult to measure and quantify free choice learning (Falk & Dierking 2000). Some researchers have investigated the effectiveness of introducing intergenerational learning programmes into formal school programmes and wider community settings to promote sense of community and place and to enhance

211

environmental understanding: (Sutherland & Ham 1992, Uzzel 1994, Ballantyne *et al.* 1998a, Ballantyne *et al.* 2001c, Vaughan *et al.* 2003). These studies have shown mixed results as to the effectiveness of intergenerational learning. Duvell & Zint (2007) reviewed the programs mentioned above and concluded that they had only a modest potential to influence parental knowledge, attitudes and behaviour. The author suggests that further work is needed to look at methods in which children can act as catalysts for promoting environmental knowledge and changed behaviours in their parents and throughout their communities. Methods to assess these changes also need to be better defined and understood.

10.5 Art and Science.

Using the arts to promote marine citizenship and explain environmental and scientific concepts is a theme that has run through several of the studies in the thesis. Many authors have championed this approach; Watts (2001), Osbourn (2006), Kempton (2004), Francis (2007) and Tobin & Elmesky, (2005). Science is frequently communicated and taught using rather dry uninteresting methods (Bauner *et al.* 2007, Olson 2009) it is therefore important to explore methods that engage children with the subject. In the Citizens' Day, drama and role play were effectively used in The Courtroom Session. The pupils were required to take on roles and help with the sentencing of the person on trial. Being 'in character' not only added a fun element to the session but also allowed the children to explore environmental concepts from an angle they might not have considered before. It also enabled them to speak out through the safety of their character and helped some of the quieter pupils find a voice. Poetry writing was a feature of chapters 3 and 9, this method was used as it is a means of communication that the students could relate to and utilised skills that they already had.

During the intergenerational project in Cullercoats the children used their artwork as a way of disseminating their knowledge. The booklet that they produced was illustrated exclusively by their drawings, their work was a key feature of the newsletters and several of the displays in the exhibitions were composed of the children's sketches and paintings. One of the topics that the children researched during the project was the changes in species composition along the NE coastline over the past 100 years. The author used some of the original drawings of local species of nudibranchs by the naturalist Hancock to

illustrate the point. The author also used several paintings by Winslow Homer, the acclaimed artist, to show the children how the area had changed over a 100 year period. The arts have always been used as a means of conveying messages in the African context (Edite 2002). The Ghanaian children used paintings to convey their feelings towards problems of pollution and climate change in Ghana and the use of the seas. The children from Epinay Business and Enterprise School had a wide range of art and music based topics incorporated into their marine themed lesson plans. The Tale of the Herring project used a very practical set of activities to assist the children's learning about maritime heritage.

The author suggests that the use of art/science interactions is a powerful way of disseminating messages to society about the problems that the marine environment is facing. It is also a method which can be used to help children's understanding of difficult ideas or to reinforce key messages. Science/art interactions can provide children with creative ways of looking at concepts, allow them to express their ideas in novel ways and strengthen observational skills (Watts 2001). During many of the practical sessions the children had time to talk to their neighbour and the researcher and ask questions that arose from the task at hand promoting dialogue that expanded their understanding of the subject. Art is an engaging way to teach and has the power to involve most young people, it has been suggested that it is also a form of play and a way of exploring our environment (Francis 2007). Earlier in the discussion it was suggested that knowledge and awareness were two of the key concepts that were needed to promote marine citizenship. The author proposes that art and science interactions are valuable techniques for achieving these ideals.
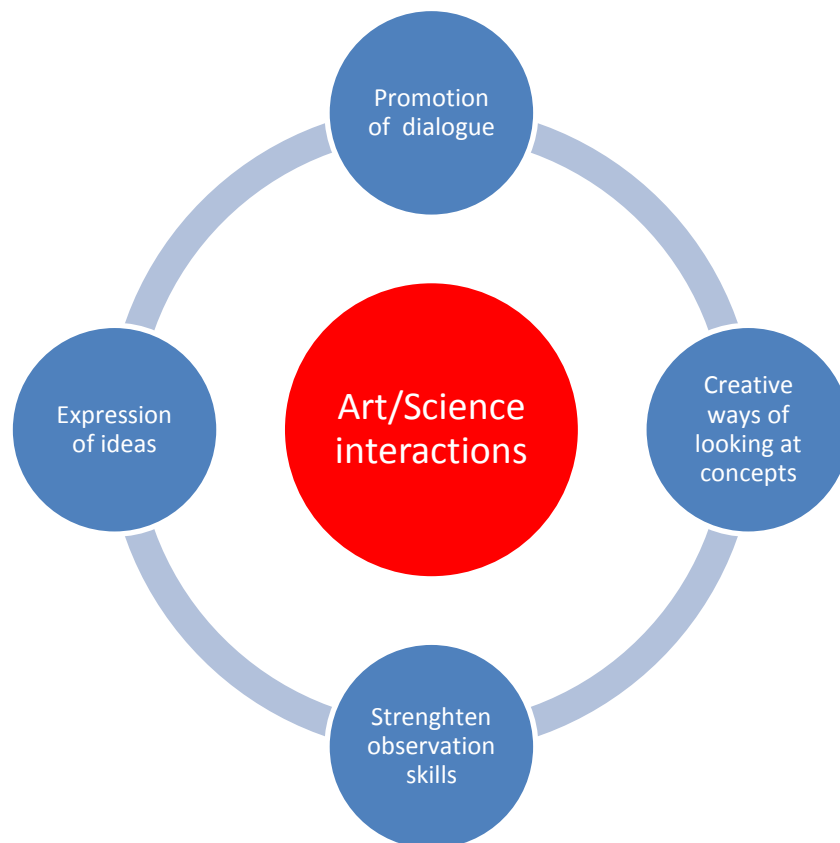
Figure 10.3 Art/Science interactions can be a useful way of extending children's learning and act as an effective tool for presenting concepts.

10.6 Fieldwork and Outdoor Learning

Every chapter in this thesis used outdoor learning to promote marine citizenship. Outdoor learning can address real issues with which young people can identify (Slingsby & Barker 2003). The author has a strong conviction that fieldwork is an important aspect of each child's education and that it should have a predominant place in schools from a child's earliest years. Bentley (1998) suggested that outdoor learning can support indoor classroom based sessions and a combination of the two can be greater than a sum of their parts. This is supported by studies by Bogner (1999) and Nundy (1999) who found that a mix of teaching and learning approaches, including hands-on and differentiated learning, which characterises much of outdoor teaching, does help meet the needs of the whole class. In addition to academic learning there is a growing body of evidence that suggests that outdoor learning is beneficial to other aspects of a child's emotional, spiritual and moral well-being. These include an increase in: social skills (Milton 1995), teamwork

(Nundy 1999), self confidence and self-esteem (National Forest Schools 2004) and favourable shifts in an individual's behaviour (Bogner 1998).

Fieldwork has however declined in schools' curriculums over the past two decades (Harris 1999, Slingbsy & Barker 2002), there are several reasons for this demise. Larger class sizes mean that it is difficult to take students outside as teachers have to ensure that the staff to pupil ratio is adhered to (Fisher 2001), restrictions to timetabling, especially in the secondary school setting mean that there are time and curriculum constraints in taking pupils away from schools (Rickinson *et al.* 2004). The cost of hiring a coach can be prohibitive (Tilling 2004) as can hiring a venue or specialist instructor if the class teacher does not have the skills or confidence to teach the class (Teacher Training Agency 2002). Additional barriers include the lack of flexibility within syllabuses to take the pupils outside and often the requirements of the national curriculum for practical work are too complicated for fieldwork (QCA 2000). Many pupils do not see the need for outdoor learning (Smith 2004), there is some evidence that the training teachers receive at teaching training college is not adequate (Kendall *et al.* 2006) and teachers' career progressions do not include fieldwork. Many teachers that the author works with are concerned about the health and safety aspect of taking children outside. Teachers cite that they do not have the confidence to take a class outside themselves (Tal & Morag 2009, Nundy *et al.* 2009). A review into the new 'Curriculum for Excellence' in Scotland surmised that improving the frequency and quality of outdoor learning in schools was adversely influenced by the patchwork nature of support at national and local authority levels (Thorburn & Allison 2012). With the difficulties that are outlined above it is not surprising that children often do not have opportunities for outdoor learning.

Several authors support the idea that outdoor learning can facilitate environmental learning. Nali & Lorenzini (2007) and Au *et al.* (2000) both suggest that school children should be involved in environmental education projects to complement their studies. Bourn (2005) proposes that strategies for promoting outdoor education and citizenship should be linked to people's active engagement in society. Hungerford & Volk (1990) believe that there are needs for new approaches to environmental education that will take instruction beyond environmental awareness, giving students the opportunity to develop a sense of environmental ownership and empowerment. Huckle (1986) argues that environmental citizenship can only be learnt by practicing it and suggests that students should become

215

involved in issues that are affecting their communities. Lim & Barton (2010) reported that outdoor learning allowed pupils to perceive, engage and make meaning of their place. The outdoor element to the pupils learning in chapters 3 and 7 enabled them to discover information about marine habitats in a relevant and meaningful way.

10.6.1 Further work

Some authors (Healey *et al*. 2001, Humberstone *et al.* 2003, Stokes & Boyle 2009, Scott *et al.* 2011) have looked at the effectiveness of outdoor learning and fieldwork and have published results that clearly show that outdoor learning is a valuable and effective method of connecting young people with the environment and helping them to recognise plants and animals. The results from several of the chapters in this thesis agree with this statement. Further work is needed to look at several key areas: what is it about learning outside that makes it effective, is it a combination of learning with all the senses in a practical, physical way as suggested by Eiss & Harbeck (1969)? What facilitates good learning opportunities, what pedagogical approaches work and why? How can teachers use the school grounds and local community to maximum effect and how can the curriculum be eased to allow outdoor learning to be incorporated in a holistic and meaningful way? This thesis used quantitative questionnaires to assess the effectiveness of the different studies. A wider range of strategies would have enabled the author to gain greater insights into the learning process that were taking place. The author's recent work uses a different set of assessment tools, she has also benefited from liaising closely with colleagues from a more varied range of disciplines.

10.7 The way forwards: using a Regional Curriculum to promote outdoor learning and marine citizenship.

Ideally an appreciation for and an awareness of, the marine environment should start at a young age which might in turn effect a shift in value throughout society. Castle *et al.* (2010) have called for greater marine based education in the curriculum. Schools have an important part to play in fostering and nurturing young peoples' sense of responsibly towards the natural world and environmental and marine citizenship could be effectively taught by incorporating it into the ethos of each school in a holistic way. The movement towards a regional curriculum is to be welcomed. The case for a curriculum designed by individual schools which reflects and focuses on an area's cultural and environmental heritage is a compelling one as it engages young people with the neighbourhood around

them. As we are an island nation, the local resources in many incidences could be marine based. The idea is reinforced in the Cambridge Primary Review (2011) which recommends we allocate approximately 30% of course time to a local curriculum. Evidence for the value of this approach comes from 11 Californian schools that use an environmentally focused curriculum. The students scored higher in 72% of the academic assessments than students from traditional schools (SEER, 2000). One difficulty towards this ideal is that often teachers (who are a product of the past education system) do not have the confidence or training necessary to provide high quality imaginative lessons that use local outdoor resources (Hood *et al.* 2010). The thesis has shown that outreach officers from higher education establishments can successfully work alongside schools by helping to give confidence, inspire and motivate pupils and teachers alike. Partnership working is a key part of a regional curriculum as it allows different organisations within a community to learn more about how each other work and can have mutual benefits.

10.7.1 Ocean Literacy - Global education about the Marine Environment

This is a movement that is becoming more prominent throughout the world. In each state of America, every child of school age studies 'The seven principles of the marine environment' (Steel *et al.* 2000). These themes are revisited throughout a child's education ensuring that by the time they leave school each person is aware how important the marine environment is to our weather, food security, economy, the diversity of life on earth and our air quality. The movement has now spread to Europe where Portugal is leading the way. There is a body of scientists, educationists and environmentalist who are working towards implementing the approach in UK schools (EMSEA, European Marine Science Educators Association). This is to be welcomed as it is one more step closer to ensuring that ocean literacy is a fundamental part of people's lives.

10.8 Benefits of partnerships in the marine environment

This thesis has attempted to show that partnerships are an effective way to raise awareness of the importance of the marine environment and the role that it has in everyone's lives. Partnerships have the potential to promote 'marine aware' communities through their engagement work by allowing community groups to participate in scientific projects, environmental planning, management processes and educational campaigns. Partnerships can also provide access to additional funding streams which could enable

greater security, long term planning and achievement of a wider range of more diverse interdisciplinary projects. Throughout the thesis there are examples of successful partnership work between numerous user groups in a variety of projects, the next section of the discussion examines these in turn.


Figure 10.4 The main concepts and strategies explored within the thesis to promote marine citizenship to adults through partnership working. Some of the themes overlap between several of the chapters.

Table 10.1 Advantages and disadvantages of partnership working to promote a healthy marine environment.

Facilitation / Engagement	Information collection and dissemination	Awareness / Education	Disadvantages
Integrated approach to management	Membership and contact databases	Provide advice	Loss of control
Enabling co-operation between different organisations	Publicise events widely	Work with schools via education officers	Slow, top heavy decision making
Reach a wide range of user groups	Disseminate results/findings from projects	Enable conflict resolution	Potential for poor partnership management
Expert groups with specific knowledge	Raise awareness of legislation	Share best practise	Possible lack of flexibility
Identify funding opportunities	Distribute signs and leaflets	Public events	Different partners can have alternative agendas
Collaborative work that covers a range of interests		Increase the awareness and understanding of coastal issues amongst coastal stakeholders	Confusion over distribution of work effort
Lobby local and regional governments		Insights into the problems different organisations have.	Competition between partners

10.9 Partnerships with Universities.

All the projects in the thesis have been facilitated through a link with Newcastle University. Ducrotoy (2003) has argued that Higher Education Institutes are in strong positions to engage other groups in society in environmental issues through their outreach programmes. An emerging role for universities is one of active community involvement, in which they are engaged in projects with local populations. These projects include providing assistance to local firms, policy advice to local and regional government, partnership working with environmental groups and getting involved in community outreach. In these roles universities are engaging in a wide range of topics with local communities, using these communities as labs to test new ideas and find better ways to achieve social and economic goals (Breznitz & Feldman 2012). Universities can provide a neutral base for participants in a project, a dedicated building for discussions, and a place to hold resources. They also have access to a wide range of expertise, including staff, to advise on funding issues (Savan *et al.* 2003). The thesis examined the effectiveness of a university, industry, school partnership. The chapter achieved its main aim by showing that a model which fostered this type of partnership could gather and implement effective management recommendations for an area. Two universities worked together to facilitate an International Schools Partnership that promoted marine citizenship. This collaborative approach enabled learning and discussion between the young people involved as well as between the staff members. Harkavy (2006) suggests that the goal for universities should be to contribute significantly to developing and sustaining schools. He argues that academics can help schools return to their core mission, to effectively educate students to be democratic, environmentally aware and constructive citizens.

10.10 Partnerships with Industry

Industry is targeting much of its environmental citizenship efforts through programmes of Corporate Social Responsibility (CSR), which encourages new businesses paradigm in which companies have broader responsibilities than simply making profits for their shareholders but become contributors to the welfare of society and the environment (Carolle 1997). This is to be welcomed; two of the projects in this thesis (chapters 3 and 4) were funded by CSR initiatives. The project in chapter 4 proved successful in providing opportunities for partnership working but also the results suggest that projects of this kind are valuable in motivating people (young and old) to take part in further conservation projects. Successful projects also have the allure to attract additional partners. During the

course of the study in chapter 4, a fourth partner, Northumberland Wildlife Trust, became involved providing additional skills, labour and expertise.

Universities have a role to play in leading CSR actions, not just in the teachings in their business courses, but the theory could be integrated throughout all aspects of university life. University stakeholders such as students could contribute to developing social responsibility so universities become institutions that help with and are partially involved in; shaping a new society that is more ethical and is engaged with its community and surroundings (Mehta 2011). Goossen (2009) suggests that universities are, in fact, platforms for leadership activities and that they can either choose to be followers in the initiatives of corporations or "seize the opportunity to be leaders and adopt CSR as a vital aspect of their mission statements". This in turn links in with many universities' ambition to be a 'Civic University' at the heart of the regions that they represent. If modern universities are to fulfil their roles in society as leaders in social change, citizenship and communication it is important that strategies and methods are investigated into how they can effectively achieve these goals. They are ideally placed to help society with the value shift that is needed to inspire people to choose marine pro-environmental behaviour and make it a common goal of society.

10.11 Partnerships with Environmental Managers/Environmental Groups

Partnerships between the public and environmental managers and scientists are commonly known as citizen science partnerships (Cohn 2008) it is the process were citizens are involved in studies as researchers (Kruger & Shannon 2009) they have also been referred to as community science projects (Carr 2004). They can involve monitoring and responding to issues of common community concern (Whitelaw *et al.* 2003) and/or community based management, where citizens and stakeholders are included in the management of natural resources (Keough & Blahna 2006). Stewart & Sinclair (2007) cite that there are several benefits of having good knowledge about natural surroundings, amongst these are access to local environmental knowledge and broadening community empowerment. Chapter 2 outlined the positive benefits that occurred when members of the public carried out biodiversity surveys alongside specialist environmental groups. Through close partnership working, strong bonds were forged which allowed mutually beneficial advantages to all groups. The public gained support for the work that they did in the area, the environmental groups gained valuable data and the environmental managers

were able to implement policy change that had public support and input. This project was also a valuable way of putting community knowledge to good use; ordinary people with excellent local knowledge were able to contribute to decision making processes and environmental planning. Race *et al.* (1994) and Goss & Leinbach (1996) suggest that it can be empowering for many participants to be valued as experts and to be given the chance to work collaboratively with researchers. (Kitzinger 1995) advocates that if a group works well, trust develops and the group may explore solutions to a particular problem as a unit rather than as individuals. There are examples of this approach in a marine setting, community views were especially sort in the development of management places for Marine Special Areas of Conservation within the Habitats Directive (eg Natura 2000) and the implementation of Marine Protected Zones across the country (Netgain 2010). Evans and Birchenough (2001) report that feelings of ownership can be promoted by encouraging people to participate in community activities in the marine setting which in turn led to increased levels of marine awareness and promotion of a sense of responsibility. It is hoped that the involvement of the public in citizen science projects continues as the evidence offered above suggests that partnerships between the public and environmental managers can be valuable in delivering sustainable meaningful conservation projects and assist raise the profile of the concept of marine citizenship.

10.12 Partnerships with Community Groups.

The thesis also demonstrated the advantages of partnerships between scientists and non-environmental groups. Cullercoats: Past, Present and Future utilised the local knowledge of members of The Watch House Group, The Community Centre and the local RNLI station. The resources from the Northumberland Central Records Office were used in 'The Tale of the Herring. The expertise of the staff at the Lowestoft Maritime Museum, Lydia Eva Historic Vessel and the Time and Tide Museum in Great Yarmouth were also important resources. The travelling exhibition was housed in several community buildings. There are several benefits to these sorts of partnerships, they allow for citizen participation and inclusion in local projects (Conrad & Daoust 2007), society benefits from local historical knowledge and expertise (Carolan 2006) and multi-disciplinary topics can help with ecological research (Robinson & Hull 2001). It has been suggested that public support of community projects can be increased by building social capital (Schwartz 2006), in turn this can lead to increased levels of trust, harmony and cooperation in communities

(Sultana & Abeyasekera 2008). In chapter 5 it was observed that a greater respect and bond developed between of members of The Watch House Group and The Community Centre. These groups now work closely together and realise that they have joint interests in the preservation of Cullercoats' maritime heritage and promoting the importance that this heritage has in shaping the future of the area.

10.13 Final Conclusion

This thesis suggests that there are three main themes important for the continued development of marine citizenship in the UK. They are:

- greater provision for marine education
- a heighten sense of awareness and knowledge about the marine environment by the public
- a sense of responsibility for our oceans and coastal habitats which leads to an action orientated shift in personal behaviour

There is currently insufficient provision of marine related education. I suggest that we require the development of further formal and informal education opportunities that promote ocean literacy and marine citizenship to all members of society. The thesis has outlined some of the strategies that could be utilised to achieve this aim. We need better opportunities for an enhanced level of community involvement in marine related projects that includes partnership working to facilitate citizen driven management. This would enable us to see the relevance of the marine environment in our daily lives and hopefully make us a pro-marine society.

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