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CHAPTER 10

Environmental education in natural play spaces

Coral Campbell and Amy Cutter-Mackenzie

OBJECTIVES

At the end of this chapter you will be able to:

• recognise the imperative of incorporating environmental experiences into early years education
• consider how adult–child interactions promote biophilia and/or biophobia
• relate how environmental education and science complement each other in early childhood settings
• describe ways in which adults can scaffold children’s explorations through play pedagogies
• appreciate how settings and activities can enhance children’s understanding of the world.

Overview

This chapter discusses a growing worldwide concern for the sustainability of the environment and ways in which young children can engage with meaningful environmental experiences. It embraces the notion that young children have a natural sense of wonder about and care for the environment. This chapter discusses how early years educators can enhance children’s affinity with the environment through play pedagogy.
Environmental sustainability

Concern about the sustainability of the planet has never been so paramount. Many scientists and commentators are now referring to the current state of the Earth as the 'Anthropocene', which is considered a new geologic era marking the significant impact of human activities on the environment. This has brought the concept of sustainability, and indeed environmental education, into heightened focus. The term ‘sustainability’ has become a catchcry of educators and politicians alike. What does this actually mean? Julie Davis (2010) observed that ‘sustainability emphasises the linkages and interdependencies of the social, political, environmental and economic dimensions of human capabilities’ (p. 2).

There is a real and compelling necessity for humans to change the ways in which they do things if they expect the resources of the world to continue to sustain life into the future. Lindemann-Matthies (2002) commented: “To safeguard the global richness of life forms, it is essential to raise public awareness about the need to preserve biological diversity’ (p. 22).

Currently, humans are, in general, living beyond their means when it comes to the resources of the world (McMichael, 2008). In fact, 20 per cent of the world’s population (living in rich westernised minority countries) consumes 80 per cent of the world’s resources. This effectively means that the other 80 per cent of the world’s population is living on just 20 per cent of the world’s resources, revealing the serious inequities between developed and developing countries. Moreover, current research suggests that humans are using resources such as oil, coal, timber and water at such rates that the resources cannot be re-generated for future generations. According to McMichael (2008, p. 5), since 1990 there has been increased exploitation of many of our basic resources:

- 16-fold increase in energy use
- 40-fold increase in industrial production
- 9-fold increase in water use
- 35-fold increase in fish catch
- 17-fold increase in carbon dioxide emissions
- 13-fold increase in sulphur emissions
- increase in deforestation and desertification
- 3–4-fold increase in world population (past 100 years).

In particular, it is incumbent upon the human race to take action to reduce the quantity of materials we consume, to try to slow down the degradation of the natural ecosystems and to provide a sustainable future for the multiples of future generations yet to inhabit the Earth. This message is not new. Since the 1970s environmental education has been identified ‘as one of the most critical elements of an all-out attack on the world’s environmental crisis’ (UNESCO-UNEP, 1976, p. 2). Further, in 2008 UNESCO identified ‘Early childhood ... as a natural starting point for education for sustainable development in order to promote educational access for all people within a process of life-long learning’ (p. 4).
Modelling environmental attitudes

Research by Chawla (1998) and then later by Hyun (2005) found that modelling of environmental attitudes and behaviours by adults, and experiences in the natural environment, were both important in young children's development of an environmental ethic of care. This ethic of care resembles what Wilson refers to as 'biophilia', children's love of and affinity with nature (Wilson, 1984, 1992). According to Hyun (2005, p. 200), 'biophilia is a theoretical notion that there is a fundamental, genetically based human need and propensity to affiliate with nature and life'. Orr (1992, 1994) argues that if biophilia is not encouraged and nurtured in the early years of life, the opposite occurs - 'biophobia', a fear of nature. In 2005 Hyun undertook a study of young children's perception of nature compared to that of adults. He found that 'young children's intellectual perception of nature seems to be different from adults. These young children explored nature by doing more touching, smelling, playing, drawing and pretending in a direct and descriptive manner than the adults in the same context, who did not actively participate' (Hyun, 2005, p. 205). Hyun also found gender differences in how boys and girls constructed knowledge about their natural world, with girls being more linguistically expressive while boys were more physically expressive. He noted: 'Similar to Bucker and Fivush's (1998) study, girls' perceptions of the world of nature seems to be more narrative, linguistically longer, coherent and detailed than are boys' expressions' (Hyun, 2005, p. 205). These findings have many implications for early years educators. The most important of these is modelling a biophila disposition to children, especially in a natural environment.

CASE STUDY 10.1

SNAKE CONVERSATIONS

The following two conversations between an educator and a child (adapted from Hyun, 2005) highlight biophobic and biophilia dispositions.

Biophobic

Child: I saw a snake in my backyard yesterday.

Educator: Did your parents kill it?

Child: No, we took a photo of it.

Educator: Did you tell your neighbours? You know, snakes are very dangerous. They're poisonous and they bite. It could kill you.

Child: Dad said they're beautiful.

Educator: Yeah, beautiful when they're dead.
Chapter 10: Environmental education in natural play spaces

Biophilic

Child: I saw a snake in my backyard yesterday.

Educator: Aren't they so beautiful, how they move?

Child: My dad said I was very lucky to see a large python. So we took a photo. I asked Dad if I could keep him. I said he could sleep in my room. Dad said I couldn't because his home is the bush.

Educator: I know a great book called The Salamander Room [Mazer & Johnston, 1994] that's about a little boy who tries to keep a salamander but found he couldn't unless he turned his house into a forest.

Child: Can I read that now?

Educator: Sure. Then let's tell all the other children about the snake you saw. I'm sure we could find out more information on pythons, such as what they eat and where they sleep.

REFLECTION

- Which of these conversations most closely resembles your disposition to nature? Where has your view come from?
- Note the differences between these two conversations. The first is a very 'anthropocentric' view, with the adult viewing and interpreting everything in terms of human experience and values. In contrast, the second presents a more 'ecocentric' perspective whereby living things are valued regardless of their perceived usefulness or importance to humans.
- Notice the language and pedagogy employed by the educator in the second conversation. She reflects positive dispositions by talking about how beautiful snakes are. She then suggests the child read a related book and share the experience with the rest of the class. This pedagogy also reflects positive dispositions as it informs the child that his experiences with the snake are valued.

Connecting science and environmental education

Littledyke (1997) commented: 'There is a need for an understanding of the relationship between science and environmental education which draws on
science to support knowledge of the causes of environmental problems, as well as the complexity of ecological systems' (p. 641). Science is, in general:

- seen as a particular way of defining our world
- about the gathering of evidence, involving methods of investigation
- made up of socially negotiated explanations
- involved with the use and production of technologies.

Environmental education is, in general:

- seen as fostering a care and ethic of the environment
- encouraging environmentally responsible behaviour
- about making informed and sustainable decisions
- deeply entrenched in cultural, social, political and economic aspects.

It should be noted that these are not seen as mutually exclusive aspects of either domain.

In this chapter, we have deliberately and purposefully set out to highlight that in many cases the divide often suggested by environmentalists and scientists is arbitrary, at least at the level of young children. In fact, a knowledge of science can increase children's sensitivity towards and their understanding and appreciation of the interconnectedness of all living and non-living things. This sensitivity then plays out in an environmental awareness that can be linked successfully to environmental sustainability through further education about the social, political and cultural aspects of a situation.

A review of the literature reveals that there is little research in the area of young children's environmental understandings linked with science. However, there have been some studies undertaken in primary schools with young children (Birdsall, 2007; Lindemann-Matthies, 2002). In her study of 8-year-olds, Birdsall (2007) set up an investigation into children's understandings of concepts of environmental sustainability. She conducted interviews to determine the children's understanding of the related science concepts and, using the environment of a local park, set up explorations for children to develop the relevant science understandings in an environmental setting. She also provided opportunities through discussion and role play for the children to form understandings of environmental sustainability. These activities took place after they returned from visits to the local park. At the end of the unit of learning, Birdsall (2007) conducted an interview with the children and found that:

- Initially, children exhibited simple understandings, recognising that animals would die without fresh air. Their understandings eventually became more sophisticated and they were able to make connections between different aspects of the ecological systems.
- Increased complexity in the children's understandings was demonstrated as well in their submission to the local council where they indicated the need for specific environmental requirements of living things (such as shade and breeding sites), linked directly to the lakeside development.
Birdsall (2007) concluded that it is important that children have a strong understanding of the environment and environmental issues and that science can provide deeper understanding of issues when taught in conjunction with the environmental understandings. Environmental education can provide a ‘real-life’ situation or vehicle through which to teach science.

**Early years environmental education**

Creating a sustainable community requires that individuals and organisations have the knowledge, skills, values, capacity and motivation to respond to the complex sustainability issues they encounter in their personal and working lives ... Education for sustainability aims to tackle the underlying causes of unsustainable trends (Department of the Environment, Water Heritage and the Arts, 2009, p. 8).

Environmental education has been incorporated into both school and community education internationally for more than four decades (Campbell & Robottom, 2008) and in early childhood education for more than two decades (Elliott & Emmett, 1991). Initially, the overall theme was one of nature study; however, with the realisation that there are some life forms and ecosystems that have been irrevocably changed through human intervention, there has been a shift towards the theme of understanding and developing sustainable patterns of living. For young children, environmental education should provide them with knowledge about the Earth on which they live; experiences within a range of environments, including natural environments; and a sense of being empowered to make positive substantial changes within their world. But most importantly, environmental education should aim to promote children’s sense of wonder about their natural world and a sense of joy about being a part of that world.

**Education using natural spaces**

In environmental education, the environment is considered a site for learning. The local community and environment are used as a starting point to teach a range of ideas, both socially and conceptually, in language, arts, mathematics, social studies, science and other content areas (Sobel, 2004). Environmental education programs should be run simultaneously with contact with nature – providing contextual inspiration for learning about sustainability and developing a relationship of respect for the environment. With an emphasis on hands-on experiences with a real-world focus, children’s understandings can be enhanced (Sobel, 2004). However, one of the main purposes of education within the environment is to provide circumstances that invite children to construct knowledge about their natural environments and to develop an awareness of their roles in relation to the environment. For these reasons, the early childhood educator must provide opportunities for children to participate actively in the natural environment.
When children are learning about the environment, they are constructing understandings about a number of key ecological principles and concepts. These include, but are not limited to:

- sunlight – the basis for all life on Earth (air, soil, water)
- cycles – life revolves around cycles (live, die, decompose, evaporate, precipitate)
- diversity – the range of differences between species, habitats and genetics and their balance
- inter-relationships – species interact and depend on each other
- change – all natural places are slowly changing (invisible evolution)
- adaptation – species develop new ways of succeeding (adapted from The Institute for Earth Education, <www.eartheducation.org>).

As young children interact with their natural environments through scaffolding by adults, their appreciation of these elements may be heightened. In particular, we suggest this is how science fits best into environmental education. If we accept that science is no longer considered to be just a presentation of facts, as in the past, but is socially entwined with communities and people, we can see the potential for children to explore the science underpinning ecosystems, life and living things. An environmental education program in pre-schools or schools therefore should build children’s understandings about the environment, through play in the natural environment and/or teacher- or child-instigated explorations. Knowing how living things are interrelated allows children to make informed judgements about the environment and also develop an ethic of care about interactions within the environment.

As we have already stated, environmental education should also foster a sense of ‘wonderment’ about the environment. For example, snails should not be seen as pests that eat the plants in the garden, but as exquisite living creatures with a life cycle that children can observe. Worms should not be seen as wriggly, cold wet things, but as animals that have a positive influence on our soil and gardens.

Photograph 10.1: This young child is already exhibiting an ethic of care for animals, as shown in her careful handling of the snail.
and that also have an interesting life cycle. Through environmental experiences educators can develop children’s motivation to maintain the environment and build their sense of empowerment, skills and confidence to make a difference.

Children exploring the natural world

Natural experiences in early childhood are often portrayed as critical to child development and integral to environmental education. However, as Kellert (2002) aptly asks: ‘Does modern society provide sufficient quantity and quality of opportunities for youthful experience of the natural world?’ (p. 141). Since the early 1990s various environmental philosophers have argued that children’s experiences of nature are diminished. Pyle (1993) called it an ‘extinction of experience’ (p. 145) and more recently Louv (2005) has referred to ‘nature-deficit disorder’ (p. 36). Louv’s (2005) starting point is the medical/behavioural condition of attention deficit hyperactivity disorder (ADHD), which he extends to the nature setting. He says of nature-deficit disorder:

I am not suggesting that this term represents an existing medical condition. Nature-deficit disorder describes the human costs of alienation from nature, among them: diminished use of the senses, attention difficulties, and higher rates of physical and emotional illnesses (p. 36).

Louv (2005) argues that childhood for many children is sedentary and highly technologised. He further states that such lifestyles are driven by fear, adult fear. He explains:

Fear is the most potent force that prevents parents from allowing their children the freedom they themselves enjoyed when they were young. Fear is the emotion that separates a developing child from the full, essential benefits of nature. Fear of traffic, of crime, of stranger-danger – and of nature itself (p. 123).

Limited interaction with nature can result in children having limited empathy for and little understanding of the natural world.

Other authors have offered insights on the inclusion of contemporary environmental issues in educational settings such as pre-school and school. Many questions have been asked, such as: How can a young child learn about climate change? Should they even be learning about climate change at such a young age? There are widely differing perspectives on these matters. On the one hand, Sobel (1996, 2008) argues that climate change education is developmentally inappropriate for children. On the other hand, Davis (2007) argues from a rights-based perspective that young children can and should ‘be agents of change’. She states that ‘in the context of early childhood education, empowerment provides greater opportunities for children to participate, make decisions and have choices’ (Davis, 2010, p. 32). If environmental activism is the answer, though, what would this look like in early childhood education? The work of Cutter-Mackenzie and Edwards (2006, 2013), Cutter-Mackenzie et al. (2014), Edwards and Cutter-Mackenzie (2011)
and Elliott et al. (2013) provide insight on play-based learning in early childhood environmental education and indeed on the role of the early years teacher in this process.

In the more formal setting of a school, the area of sustainability is integrated across all discipline areas. Teachers can introduce elements of sustainable education within other topics and themes. ‘Sustainability education is futures-oriented, focusing on protecting environments and creating a more ecologically和社会 just world through informed action’ (ACARA, 2014).

In the Australian Curriculum, the idea of sustainability is informed by a set of organising ideas that deal with systems (e.g. ecological), world views (values and experiences) and future living (actions into the future). In the Australian Curriculum: Science, the sub-strands of biological sciences, chemical sciences, earth and space sciences, and physical sciences are guided by the idea that a knowledge of science can be used to develop and promote environmental sustainability (ACARA, 2014). With a focus on environmental education, how can educators assist children in schools to become more aware of their environment and develop biophilia or biophilic attitudes? Many teachers use the school’s outside environment to conduct small animal hunts, locating and identifying habitats of common small creatures. Observing trees and collecting discarded plant material are activities that help young children identify the natural flora of the school playground. An educator intent on engaging children with natural spaces can focus children’s attention on many living things and their interactions, even in more urbanised settings.

**CASE STUDY 10.2**

**DEVELOPING EMPATHY FOR TREES**

In a Year 2 class the educator decided to integrate aspects of science, mathematics and observation skills in a simple outdoor/indoor activity. She explained to the children that they were heading out to hug some trees. Apart from the hugging, children had to see how tall the tree was, and observe the type of bark and leaves it had. They could collect parts of the tree if these had fallen to the ground. Before hugging a tree, the children had to make sure there were no small animals on the part of the trunk they were going to hug – just so they didn’t squash or harm them. Children were allowed to hug half a dozen trees. Then they had to choose their favourite tree. When they had chosen their favourite, they had to run a piece of string around the tree to measure the circumference. Children then placed the string on the ground, roughly into a circular shape and compared the trees’ circumferences. There were many comparisons and exclamations about the sizes. Inside the classroom, the children looked at the different leaves and bark they had collected and were able to describe their tree in detail. They then used their tree parts to create a collage of their tree. There was much pride and ‘ownership’ demonstrated over their chosen tree.
Even months later, the children would tell the educator that their tree was flourishing or losing leaves.

The children had clearly developed a level of empathy (biophilia) for the tree as a living thing. The educator was pleased with the impact of this activity, feeling that the children had used close observation when studying the trees. The hugging aspect, coupled with the measurement, provided the children with concrete experiences to assist with developing an understanding of size (girth). Most children made the link between the size of the girth and the height of the tree, and some were able to talk about the size of the canopy in relation to the height and girth.

**REFLECTION**

- What environmental science understandings did the children gain from this set of activities?
- What specific attitudes are being promoted within this case study?
- How could the educator build on this experience in subsequent indoor or outdoor lessons?

**Pedagogical approaches in the early years**

As an early childhood educator, how can you cater for children’s needs in terms of developing their environmental understandings and an ethic of care? Some suggestions include:

- playing with natural materials
- playing in natural places – the Bush Kinder approach
- incursions and excursions
- educator-led explorations
- play-based learning.

**Playing with natural materials**

Early childhood settings have used the nature table as part of their indoor learning environment for many years. It can be a static display where children can stop, look, touch, smell and sometimes taste an object. Children may gain an appreciation of the size, weight, texture and shape of an object through these sensory interactions. However, another approach would be to provide children with a range of natural materials they can use in various play scenarios. This invites a more open-ended approach to the use of the item. Children’s imaginations allow them to see the
materials in different ways and with different purposes. For example, grass can become hair, or a stick a small boat. Other examples of materials that can be used for imaginative play include seed pods, leaves, small branches, twigs, shells, sand, gravel/soil, clay and small rocks. The opportunities for creative use of natural materials are endless and only limited by the individual’s imagination. Elliott (2010) suggested that play with natural materials ‘supports cultural inclusion’ (p. 64) as the value of the items being played with is created by the play participants, rather than any predetermined contexts or inherent features.

School settings often have an area of land for play in open spaces. Most schools have areas of plants, trees and grassed areas that can be used for biological/ecological explorations. Further, many schools have developed their own vegetable gardens or have linked in with the Stephanie Alexander Program (<www.kitchengardenfoundation.org.au>), which promotes food education and connects to science and environmental sustainability. The opportunities for learning are broad and varied.

**Play in natural places – the Bush Kinder Approach**

Playing in natural places creates greater challenges for children as these outside spaces are not ergonomically ‘safe’ environments. Overhanging branches need to be avoided. Kneeling on rocks requires care. Even climbing low tree branches requires effective use of motor skills, hand–eye coordination, and an awareness of branch texture and strength. The natural environment requires greater concentration skills and risk management for children to be able to move about freely. In addition to physical movement in natural spaces, children can interact with a diverse range of living and non-living natural materials. They can smell the earth after a rain shower, or watch how water pools in indentations in the landscape. Children might observe that snails move about after rain or that ant activity increases before it rains. Natural surfaces may become more slippery and require greater care and concentration to navigate.

When children play in the natural environment they are able to observe the small animals that are part of that environment. Holding snails, worms or slaters often fascinates children and supports an empathetic approach to handling other living things. They can construct understandings about habitats when observing where they find these animals. With scaffolding, they can be guided to closer observation of the animal, noting physical characteristics and linking these with living requirements. For example, they can be shown that a slater rolls up into a ball to protect itself. There are many opportunities for an educator to employ children’s explorations for guided discovery and scaffold children to greater levels of understanding, care and empathy for the natural world.

Since the mid-1950s, there has been an international movement supporting forest kindergartens, resulting in many hundreds of forest kindergartens around the world. Forest schools are situated in natural environments and outdoor play in these environments promotes children’s learning. In practice, the natural or forest setting is located within walking distance of the pre-school/school and regular
contact with the same setting occurs over an extended period of time. Forest kindergarten programs often occur as weekly or fortnightly visits to the same natural environment all year round, in almost all weathers.

The benefits of taking children to these natural settings are multiple (Borradaile, 2006; Thomas & Harding, 2011). Children have the freedom to explore the natural settings with adult support and engage in risk management, while also developing an appreciation of and care for the natural environment. Other benefits include children being involved in more imaginative play, and becoming more confident in risk-taking and independent in play. Children exhibit increased motivation and concentration and improved language and communication skills, as well as improved motor skills such as balance and coordination (Borradaile, 2006; Thomas & Harding, 2011).

In Australia, the forest kindergarten movement has translated into support for bush kindergartens, with examples in many states. Elliott (2013) indicates that versions of the forest school, such as beach (e.g. the beach kinder at Balnarring, Victoria) and bush playgroups, along with pre-school and school programs that use the natural environment, are rapidly being established. Table 10.1 presents a description of three bush kinder programs in Australia. Formal evaluations of a pilot bush kinder program highlighted many positive impacts (Elliott & Chancellor, 2012). As mentioned earlier in this chapter, the opportunities to enhance children's biophilia (love of and affinity with nature) are paramount to children developing positive dispositions to the environment.

### Table 10.1: Description of three bush kindergartens around Australia (this is a small sample of the many wonderful programs being offered across Australia)

<table>
<thead>
<tr>
<th>Name of kindergarten or pre-school</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yarra Warra Pre-school, Victoria <a href="http://www.yarrawarrapreschool.org">www.yarrawarrapreschool.org</a></td>
<td>The bush kinder program utilises land adjoining the centre, which is a fenced area with both hilly and flat terrain. Children discover the natural environment, exploring the plants and the small animals, and learning about natural ecosystems and sustainability.</td>
</tr>
<tr>
<td>Rona Glyn Preschool Alice Springs <a href="http://ronaglynnpreschool1.wix.com/ronaglynnpreschool#about1/c1x1t">http://ronaglynnpreschool1.wix.com/ronaglynnpreschool#about1/c1x1t</a></td>
<td>Modelled on a Victorian program, the bush kinder program in Alice Springs promotes children’s open-ended interactions with nature, allowing risk-taking and a strong connection with the natural environment.</td>
</tr>
</tbody>
</table>
CASE STUDY 10.3

SOMERS BUSH KINDER

Educators in a small coastal town in Victoria set up a bush kinder program whereby the children visit the local bushland park for three hours each week. The educators engaged with the local park rangers to provide support for the program and a local Aboriginal teacher visits regularly. This teacher discusses with the children connections to the land and local Aboriginal culture and heritage. Children learn the Aboriginal words for the local plants and animals as well as simple songs that highlight the first people's connection to the environment (Priscilla Loynes, personal communication, 30 May 2014).

The Parent Handbook states:

Bush kinder will be a special part of your child's total pre-school experience. They will have the opportunity to play in the rain, roll down grassy mounds, balance along fallen logs, get involved in dramatic play, find insects, draw with sticks in the ground, climb trees (Somers Bush Kinder Program Parent Handbook 2013, <http://somerspreschool.org.au/Bush_Kinder.html>).

REFLECTION

• Consider how the bush kinder initiative sits within the Early Years Learning Framework.
• How could you use the formal kindergarten structure to enhance the environmental science learning offered by bush kinders?
• Considering the quote from the Parent Handbook, what additional precautions might you have to put in place to run a bush kinder?

Incursions

There are many opportunities for bringing into the early childhood centre those objects or animals that are not normally part of that environment. At the simplest level, a new baby or a new pet visiting the centre may become the focus of discussions about growth, life cycles and the needs of living things. Commercial groups can be hired to bring in, for example, small farm animals and to provide experiences for children to learn about the needs of these animals and their place in society. Reptile incursions can be used to show children animals they may not have seen, and to develop their awe at the diversity of animals.

One advantage of an incursion is that the early childhood educator can prepare children for the visit by reading stories or instigating discussions prior to the arrival of the incursion. This serves two purposes. First, it provides the educator with
information about the children’s prior knowledge. Second, it allows the children a sharing time during which they can develop concepts and common language. An incursion also creates an ideal opportunity to talk about respecting animals and how the animals might feel if they are crowded and touched by many children, thus adding another dimension to the ethic of care and empathy. This can lead to a conversation on the importance of observing and appreciating animals in nature, as opposed to interfering with them. Empathy can be further encouraged through stating, ‘Don’t get too close as we don’t want to frighten the animals’.

**Excursions**

There are a large variety of excursions available to early childhood centres, allowing for an educator to plan extensively to enhance children’s environmental appreciation and understanding. Local parks and gardens can be used as enrichment environments to complement the natural environment around the centre. Other venues, such as aquaria, beaches and local waterways, can be used to introduce children to aquatic wildlife and birdlife that form part of the ecosystems. Botanical gardens, zoos, wildlife parks, farms and interactive science museums can offer opportunities for enhanced explorations and new investigations and can add to and challenge children’s prior experiences. Often, larger organisations are able to provide a guide or other resources to extend the children’s experiences.

**CASE STUDY 10.4**

**ENVIRONMENTAL IMMERSION**

A class of 4- and 5-year-old children visited the local park with their educator, other centre staff and a number of parents. At the park they were organised into small groups and assigned a ‘helper’. They then participated in several activities, each lasting about 30 minutes. The activities included a small animal hunt, ponding activities using nets and microscopes, bird-spotting, collecting natural debris for an environmental collage, tree-hugging and environmental ‘I Spy’. The children completed three activities before lunch and three activities after lunch. Each activity involved a great deal of discussion with the adult helpers, who had been provided with information about the environment and habitats. The children could examine elements of the environment at close hand, ask questions and seek their own answers. The educator followed up the excursion once back at the centre, by providing opportunities for the children to discuss what they had seen and found. She discussed ways they needed to behave around living things and encouraged a set of values around caring for living things in the environment. Many parents were enthusiastic about the environmental day, indicating that the children had demonstrated a fascination with the environment and a sustained interest in living things.
REFLECTION

- What are the learning opportunities for children undertaking such a day of activities?
- What are the advantages and limitations of this more formal approach to environmental science learning?
- How did the educator in the case study enhance the children’s learning?

Educator-led explorations

An educator-led exploration may arise from a child’s interest or may be used to introduce children to new things that may not be a normal part of their natural environment. An example of this is the planting and maintenance of a vegetable garden. Children can be involved at all stages, from the mixing of the soil with nutrients, planting seeds, watering plants, watching plants grow and harvesting any vegetables through to the preparation of vegetables for eating. Working with a vegetable garden can help children learn about the energy requirements of the plants, the requirement to nurture growth and the purpose of the vegetables as a societal need for food. An early childhood educator can stimulate discussion about the needs and the characteristics of living things.

Other explorations may be around aspects of the environment that would not normally be part of a child’s life, but might arise through events or news items. For example, when severe weather conditions arise and cause devastation in some regions, the educator can set up models to mimic these conditions. Tsunamis, volcanoes, hurricanes, cyclones and floods can be explored using models and can help children understand these phenomena as they occur throughout the world.

CASE STUDY 10.5

EXPLORING SUNFLOWER SEEDS

The children were gathered around the sunflowers growing in the garden and remarked on the fact that the flowers had lost their yellow colour and had gone brown. When the educator asked them why this might have happened, the children replied that the flowers had died. The educator discussed with the children whether they thought the rest of the plant was dead and then proceeded to take off the heads of the sunflowers. The children sat down with a bowl and some tweezers and extracted the seeds from the flower heads. They were completely engrossed in the activity. While they were involved the educator asked another question: ‘What would be the best temperature to grow the seeds?’ Answer: ‘Hot. Very hot.’
The children were talking and sharing their own knowledge of the plant, indicating that the birds liked to eat the sunflower seeds, which gave the educator the opportunity to discuss how the seeds were also used by humans for food. Further sharing also showed that the children were aware that the head of the sunflower follows the path of the morning sun and that it faces east in the morning.

**REFLECTION**

- How could the teacher use these activities or extend them to help children become more aware of environmental science?
- How could looking at art (e.g. Vincent Van Gogh’s painting Sunflowers) be incorporated as a form of extension?

**Play-based early childhood environmental education**

Cutter-Mackenzie and Edwards (2013), Cutter-Mackenzie et al. (2014) and Edwards and Cutter-Mackenzie (2011) identified different types of pedagogical play as providing opportunities for young children and educators to develop knowledge through experiences about environmental education. Three ways of thinking about children’s play-based activity when engaging with environmental education have been described in these authors’ research:

1. open-ended play: play experiences where the educator provides children with materials suggestive of an environmental/sustainability concept, and with minimal engagement and interaction allows them to examine and explore the materials as a basis for learning about the environmental/sustainability concept

2. modelled-play: play experiences where the educator illustrates, explains and/or demonstrates the use of materials suggestive of an environmental/sustainability concept prior to allowing children to use the materials with minimal adult interaction as a basis for learning about the environmental/sustainability concept

3. purposefully framed play: play experiences in which the educator provides children with materials suggestive of an environmental/sustainability concept and provides opportunities for open-ended play, followed by modelled play and then educator-child interaction/engagement.

Their research reveals an orientation towards purposefully framed play, suggesting children require more than open-ended play to experience meaningful learning in early childhood environmental education. This is because experience alone is insufficient for allowing children to access the content knowledge (associated with
environmental education) embedded in this form of play (Fleer, 2010; Hedges & Cullen, 2005; Siraj-Blatchford, 2009). Adult interaction and support are necessary to bridge the gap between experience and the construction of actual knowledge and understanding. In adult–child interactions the relationship between experience, the construction of knowledge and understanding, and the formation of environmental dispositions is unclear (Hyun, 2005). However, early childhood educators should provide young children with play experiences that model positive dispositions towards the environment.

CASE STUDY 10.6

LINKING HOME AND PRE-SCHOOL LEARNING

A Queensland pre-school has a strong environmental sustainability ethos, whereby a number of reduce, re-use and recycle initiatives are promoted. The pre-school has its own water supply (tank water) and recycles its grey water and black water (sewage) on site. An extensive community garden has been established at the pre-school, along with native bee hives, fairy (miniature) gardens and rock and water gardens. Water-wise practices are part of the children's everyday experiences, given not only the strong water education ethos at the pre-school but also the self-sufficiency of the broader community.

All of the children were invited to photograph their water-saving practices at the pre-school. The objects they photographed ranged from rainwater tanks and automatic push taps to drink bottles, dual-flush toilets and drought-tolerant plants. The children were also asked to take photographs in their own homes relating to their everyday lives of sustainable water practices. This revealed a variety of water-saving activities, including water tanks (every household had its own water supply and was not connected to mains), water-saving shower heads and taps, water-efficient washing machines and dishwashers, the heavy mulching of plants and the use of garden stones to prevent the evaporation of water. Practices such as reducing shower times, the sharing of bath water and using all grey water for watering gardens also featured. It was interesting to note in this study that the children's photographs demonstrated a transfer of the knowledge between the pre-school and home through the use of buckets under dripping taps, dual-flush toilets, using refillable water bottles and planting drought-tolerant plants. The following comment of a child demonstrated this transfer of knowledge:

[We] each have our own hand towel [material hand towel]. When we use toilets at the park and shops, Mum now has a hand towel with her so we don't have to use the machine [hand dryer].

The children interviewed family members and drew pictures of what they discovered. The responses indicated that the water education programs implemented at the
pre-school had reinforced the community’s robust water practices. Some parents wrote on the children’s drawings. One parent said:

The children have been learning about filtering water at [pre-school] using sand, rocks, cotton and charcoal. Since then, we have looked at our own filters at home with Jack [child]. We have taught Jack about why we filter our water.

It is clear from the above vignette that the pre-school enabled Jack to understand everyday practices for filtering water. However, the everyday practices of home enabled Jack to make this connection in the first place, reinforcing the importance of the learning exchange between pre-school and home.

**REFLECTION**

- What pedagogy did the educator use to link pre-school learning to the home environment?
- What aspect of the above scenario allowed the educator to expand on children’s environmental science knowledge?
- What environmental science concepts were the children learning through their participation?

**Conclusion**

This chapter set out to discuss the importance of including environmental experiences in early childhood settings, with the aim of enhancing young children’s affinity with the environment and their understandings of environmental sustainability. Through the interrogation of research, the chapter highlighted the nature and purpose of environmental education in early childhood education. Pedagogical approaches to the way young children can be provided with explorations of an environmental nature were discussed, and several practical play-based scenarios were presented. The chapter highlighted how science and environmental education fit together to develop in young children an empathy for living things, a knowledge of ecosystems and an understanding of the inter-relationships between elements of their environment.

**References**


