



Transformative Processes in Environmental Education: A Case Study

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Abstract

This paper presents a case study on the severely degraded Boksburg Lake's (Gauteng, South Africa) social-ecological system, and on an environmental-education initiative that aimed to support the lake's transformation with a view to its improved social and ecological well-being. In this case study, three key characteristics of the initiative which appeared to support the transformative process are discussed, namely:

- 1. Learning was aligned with the local social-ecological context;*
- 2. Human-to-human and human-to-ecological connections were encouraged; and*
- 3. The youth played a key role in initiating and effecting transformation.*

Apparent consequences of this particular environmental-education approach include: local people becoming involved and invested in an environmental-education process that was highly meaningful to them; a deeper connection being nurtured among participating stakeholders, as well as between the youth and Boksburg Lake; a collective identity being adopted to bring about change; knowledge of Boksburg Lake's social-ecological system being strengthened; acknowledgement of personal culpability in the lake's degradation; many of the youths changing their negative environmental practices; and local stakeholders, including the youth, engaging in collective action to reclaim Boksburg Lake. Furthermore, a range of new practices emerged from the Schools for a Sustainable Environment (SSE) initiative. The literature is drawn on to explain the possible consequences of this initiative. Through this paper, it is hoped that environmental-education practitioners will be provided with useful conceptual tools to support their work.

Introduction

Boksburg Lake is a severely degraded dam situated in the central business district of Boksburg city, a mining and industrial city in the economic heartland of South Africa. The city lies about 25 kilometres from Johannesburg. The 'lake' used to have high recreational and aesthetic value and was closely linked to the city's identity. However, decades of industrial-development processes have resulted in a heavily built-up catchment with a diminished ecological function and extensive point and non-point source pollution. The catchment is a microcosm of the more generalised, global social-ecological system that is on a trajectory of increasing ecological degradation and social risk (Beck, 1992).

From 2008 to 2012, an environmental-education initiative was developed in order to mobilise local people to engage in actions to reclaim Boksburg Lake. The initiative became

known as Schools for a Sustainable Environment (SSE) and was built on the assumption that schools could be used as vehicles for transformation. It had two main aims:

1. To inspire Boksburg's youth to value, care for and connect with the natural environment to the greatest extent possible; and
2. To generate a groundswell of support for, and action around, the improvement of Boksburg Lake.

The initiative was designed for the youth to impact the broader community by providing them with systemic knowledge of the social–ecological complexities of Boksburg Lake and by creating opportunities for them to become agents of change. The structure of the initiative had the following two main components:

1. A resource pack that explored the characteristics of a complex, urban water–catchment system, with such resource pack being specifically tailored to the Boksburg Lake social–ecological system; and
2. An annual Boksburg Lake Day in which 250 to 300 Grade 6 or 7 learners from participating schools took part.

In this case study, three key characteristics that appeared to support the transformative process are discussed, namely:

1. How learning was aligned with the local social–ecological context;
2. Human-to-human and human-to-ecological connections were encouraged; and
3. The youth played a key role in initiating and effecting transformation.

The aim of this discussion is to provide environmental-education practitioners with conceptual tools to support their work.

Methodology

Two methodologies supported insights shared in this paper: a contextual profile and action research, and these are described in turn.

Contextual profile

A contextual profile of the Boksburg Lake catchment area was developed to inform the design of a contextually appropriate environmental-education project. The particular objectives of this profile were:

- To identify the main social–ecological problems and their causes affecting Boksburg Lake from social, economic, political and biophysical perspectives (This was informed by O'Donoghue (1986), who foregrounded social, economic, political and biophysical aspects to guide a holistic exploration of the causes of a particular social–ecological problem.);
- To identify and develop a profile of relevant stakeholders;
- To document the local vision for Boksburg Lake and the challenges in realising this; and

- To map out possibilities and resources available for a school-based environmental-education initiative focusing on the Boksburg Lake social-ecological system.

The contextual profile consisted of a desktop study and a five-day field trip to Boksburg. During this field trip, three relevant meetings were attended: the Klip River Catchment Management Forum (CMF); a Gauteng Department of Agriculture, Conservation and Environment (GDACE) MEC Stakeholder Engagement meeting; and the Gauteng Wetland Forum. Sixteen stakeholders were interviewed, including users of Boksburg Lake and local residents, a municipal water-quality manager, a local activist and member of the Wildlife and Environment Society of South Africa (WESSA), the regional director of WESSA, and a leader of a local Christian church located next to the lake. Contacts with local councillors, officials, developers, managers and researchers were established and were followed up telephonically and via email. Data obtained from this profile informed the design of the SSE initiative.

Action research

'Action research' is defined by Carr and Kemmis (1986:162) as 'a form of self-reflective enquiry undertaken by participants in social situations in order to improve the rationality and justice of their own practices, their understanding of these practices, and the situations in which the practices are carried out'. It is research that participates in solving real-world, locally relevant problems and aims at transformation through improved choices and action (McKernan, 2008). The researcher, who takes up the position of an involved participant, adopts both action and research roles (Malone, 2006). Importantly, research is not done 'on' or 'for' people, but rather 'with' people and addresses locally relevant issues, questions and concerns (Reason & Bradbury, 2007). In many cases, local people are invited to become co-researchers in a process of collective inquiry (Reason & Bradbury, 2007). It is thus a reflexive form of practice that aims at developing contextual knowledge and understanding so as to guide action and choices for positive transformation (McKernan, 2008).

From the outset of the research process, the lead author's responsibility was to initiate and manage an environmental-education process that would contribute to the transformation of the Boksburg Lake system with a view to increased social-ecological resilience. The lead author consequently adopted the role of a reflexive practitioner, as is customary in action research. Regular reflection on the initiative provided opportunities for its improvement. The research process was designed to deepen understanding of the local context, gain insight into the impact of the initiative and obtain feedback for improved practice. Rather than a detached research position, this was a particular role adopted within the community, of which the lead author became a part. The action research process was a collaborative one together with local people in order to realise locally desired actions. For example, two workshops were held with a range of stakeholders, including teachers, non-governmental organisation (NGO) representatives, municipal employees, activists, journalists and business representatives. The aim was to establish networks, to receive input regarding the general initiative and content of the resource pack, to encourage a sense of local responsibility for seeing Boksburg Lake reclaimed, and to facilitate community understanding and ownership of the initiative. Useful

local and expert input was given, and this was an important step in stakeholders beginning to own the initiative.

- Methods adopted to support the action-research process included the following:
- Twenty-eight semi-structured interviews with teachers, members of the Boksburg Lake Forum, a municipal employee, and NGO representatives;
- Nineteen semi-structured focus groups with learners;
- Document analysis of learners' work, including 209 solitaire sheets, nine vision statements, 72 essays, and six statements handed to the municipality; and
- Participant observation, where the researcher adopted a role in the social setting being observed and participated in social activities (Atkinson & Hammersley, 1998).

A rich, qualitative data set on the social-ecological system of Boksburg Lake was generated. This included local people's experiences, perceptions, and intentions for Boksburg Lake, as well as the impact of the environmental-education initiative in terms of patterns of identifying with Boksburg Lake, knowledge about Boksburg Lake, and action with regard to Boksburg Lake.

Results

Local social-ecological context

(Learning was aligned with the local social-ecological context.)

The design of the SSE initiative, which included a resource pack on a complex, urban water-catchment system and the annual Boksburg Lake Day, was informed by, and adapted to, the local social-ecological as well as the national curriculum context. O'Donoghue's (2001) active-learning framework was used to inform this process. This framework synthesised approaches in environmental education that had developed from having a purely information-sharing and experience emphasis to include more participatory, hands-on, enquiry-based and practice-centred approaches (O'Donoghue & Lotz-Sisitka, 2006; O'Donoghue, 2007). It includes informative, investigative, action and reflection learning opportunities around a local environmental concern and thus promotes social-ecological and contextually relevant environmental education.

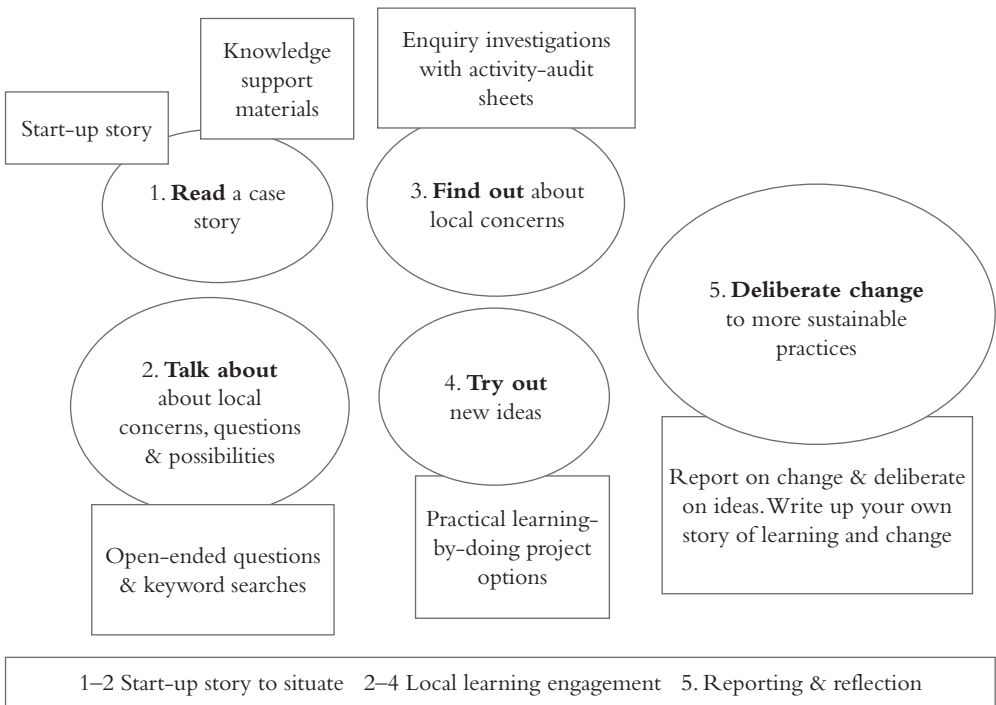
The resource pack represented the Boksburg Lake catchment as a social-ecological system and linked action to consequences in order to increase a sense of local responsibility within it. Based on findings from the contextual profile, the main social-ecological problems and their causes affecting Boksburg Lake from social, economic, political and biophysical perspectives were reflected in the pack. In addition, people were framed as part of, rather than separate from, the system; the consequences of their practices for Boksburg Lake and its catchment were emphasised; and they were encouraged to become agents within it.

Figure 1 represents a revised version of O'Donoghue's (2001) active-learning framework that underpinned the structure of the resource pack. It included:

- A start-up authentic story about environmental learning and action regarding Boksburg Lake that mirrored the possibilities of learning contained in the initiative;

- Locally relevant knowledge-support materials that explained and expanded on the themes expressed in the story (These knowledge-support materials were developed for use within the different learning areas of the Revised National Curriculum Statement and were thus aligned with the participants’ educational context, while the story could be used in a language lesson.);
- Questions to guide discussion on local concerns and possibilities;
- Investigation activities to find out about local issues and practices, including auditing water sources, historical investigation, and water-quality testing;
- Guidance for learners in engaging in an action project and critically reflexive activities;
- A Boksburg catchment activity to facilitate: (a) a better comprehension of the Boksburg Lake sub-catchment; (b) the spatial relationships of the different factors influencing the lake; and (c) creative solutions that could inform a school action project (The activity consisted of: an A1-size map of the Boksburg Lake sub-catchment; photographs depicting different issues to be geographically located on the map; a model of Boksburg’s sub-catchment made from a Coke bottle; cards depicting the main factors (sewage leaks, industrial effluent, mine dumps, littering, and wetland dumping) negatively impacting Boksburg Lake, to be placed on the model of Boksburg’s catchment; and knowledge resources to deepen understanding of the different issues and their possible solutions.

Figure 1: Revised active-learning framework (O’Donoghue & Fox, 2009) underpinning the structure of the resource pack and the annual Boksburg Lake Day



The annual Boksburg Lake Day (held from 2009 to 2012) gave participants an opportunity to experience the lake's condition first-hand, and both learners and teachers indicated the value of such learning opportunities. About 250 learners from ten participating schools would spend a day at the lake engaging in a variety of informative (e.g. Boksburg Lake's history), investigative (e.g. water-quality testing) and action (e.g. making banners, clean-ups, tree-planting) activities, based on the structure of the active-learning framework. On the day, learners would also give a presentation that reflected their passion for Boksburg Lake; would hand out statements to the municipality expressing their commitment to seeing the lake restored; would plant indigenous trees in the lake grounds; and would make banners that they waved during a march around the lake. During this march, they had the opportunity to pick up litter. The event would be given a high profile through the attendance of, for example, Miss Earth South Africa (in 2009), municipal representatives and the media. This event solidified learning in the local social-ecological context around an emotionally charged symbol that was highly meaningful to local people, as the following quote indicates:

As [children] we used to go to Boksburg Lake for picnics, [and] we had Christmas there. My children grew up swimming around the lake, [and] feeding the ducks. So, to see it in the state that it is in now, ... is almost as if a piece of your past ... is being destroyed. I think it really impacts on you. (Teacher in an interview in 2009)

A consequence of designing an environmental-education initiative firmly rooted in this locally meaningful context was the involvement and investment of a wide variety of role players in the learning and transformative process, including the youth, teachers, the local municipality, local industry and NGOs. A few representative quotes expressing local commitment to Boksburg Lake have been selected and appear below:

Question: What motivated you to be a part of this initiative?

Answer: I think it was the whole drive to save the lake ... considering that it is beautiful, we should actually take care of it. (Teacher in an interview in 2009)

I'm still involved because I would like it [the lake] to be a success, and, on a more personal level, ... I would like to take my children to Boksburg Lake to relax and have fun. So I want it to be a success – not just for me and my family but for all the people of Boksburg ... so I'm [in] all the way ... until it becomes a success. (Teacher in an interview in 2009)

I feel that we as people of Boksburg [should] stand together and improve our town and lake in order to sustain the state of our natural resources and [the] lake. (Learner in a solitaire activity in 2009)

God the Father knows how desperate I am for this lake to [improve] and how ... my friends [and I] care about Boksburg Lake. (Learner in an essay in 2010)

Relationalism

(Human-to-human and human-to-ecological connections were encouraged.)

The development and nurturing of relationships were key to the SSE initiative – relationships between local people and the research practitioner; between different role players and between local people and their environment, particularly Boksburg Lake.

Principles of stakeholder collaboration, participation, and shared responsibility for water resource health informed the design of the SSE initiative, which was developed through a community/municipal-driven partnership. Stakeholder collaboration underpinned the development and continual refinement of the initiative and of the content of the resource pack, as indicated in the discussion on methods. Through this process of stakeholder engagement and input, a community of practice developed around reclaiming Boksburg Lake and participants could identify more closely with the initiative. In particular, this was facilitated through the annual Boksburg Lake Day, the organisation and implementation of which required a considerable team effort involving sponsorship and participation by Unilever, the municipality, participating schools and NGOs.

The final content of the resource pack also emphasised the importance of relationality by reflecting the integrated and systemic nature of water resources. The intention was that learners gain a better grasp of the system as a whole and of the connections within it. The benefit of this approach is reflected in a number of participants' responses where they indicate an understanding of the relational aspects of the system. For example, during a focus group in 2009, a learner showed insight into the system dynamics of littering – both how litter moves through the system as well as its many impacts:

The one thing I think we should actually start with that is really important is actually [to] stop littering, because all the litter that is on the ground lands in the storm drain and this ends up in Boksburg Lake, and that is how it [the lake] ends up with all sorts of pollution.

Results indicate that the initiative impacted on how local people related to Boksburg Lake, particularly the youth. A notable way in which participants deepened their relationship with the lake was recognising personal responsibility for its degradation. As a learner expressed in an essay (in 2010):

We have used our precious lake as a junkyard – dumping papers, waste material and everything that we can find to destroy the lake and its ecology. But, in the end, [we as] Homo sapiens are going to be suffering [the consequences of] the actions we are taking, which [are] destroying the lake.

Participants also began to relate to the lake through a sense of their oneness with, and belongingness to, it – as the following three representative quotes indicate:

By naming the earth we are naming ourselves. (Learner in an essay in 2010)

I feel at ease here at the lake. [It is as though] I form part of ... nature. (Learner in a solitaire activity in 2010)

[The breeze and coloured leaves] bring back a sense of belonging and [of] nature. It makes you feel as if you're at home and it's where you're supposed to be. (Learner in a solitaire activity in 2009)

Many participants expressed how they wanted to relate to the lake as change agents – through cleaning, saving, improving, helping and serving the lake, making a difference, and educating/influencing others to care for the lake.

A significant number of participants adopted a collective identity in improving Boksburg Lake:

We as Boksburg should join hands and come *together* as one to fight for the health of the lake in order to ensure the survival of the small ecosystems that live in and around it. So let's come *together* and be part of a team so that we can help save the environment ... *Together* everyone achieves more. (Learner in an essay in 2010 – our emphasis)

This is a useful quote that sums up many of the sentiments expressed: that change happens when people work together; the importance of working as a team; and the power of unity in affecting positive change. It is evident that the youth involved in the initiative placed a high value on *working together* to achieve social and ecological change.

The role of the youth

(The youth played a key role in initiating and effecting transformation.)

The youth were given a central role in the initiative and were regarded as catalysts for change in the transformative process. They were invited to be part of a growing community of practice aimed at bringing about real-world action. Through both the resource pack and the Boksburg Lake Day, the youth were given opportunities to participate in action to improve the lake. In the resource pack, one of the key learning activities was action in a real-world context, and suggestions were offered as to what the youth might do. During the Boksburg Lake Day, the youth participated in actions such as tree-planting, protest marches, handing environmental statements over to the municipality, and picking up litter. The youth were also given room to lead and initiate action, as well as share decision-making, through an open invitation to attend the Boksburg Lake Forum. A number of youths involved in the initiative responded eagerly to these opportunities for high levels of participation.

Data indicate the enthusiasm, initiative and meaningful action on the part of Boksburg's youths when invited to contribute to this positive change in a real-world context. Youths who participated expressed optimism that things could change for the better, as well as the conviction that they (the learners) could be part of the solution of transforming Boksburg Lake. The response to opportunities of being involved in real-world change was enthusiastic, and the youth displayed considerable leadership, passion, initiative and action in relation to transforming

Boksburg Lake. These attitudes may have provided the foundation for the substantial change that occurred in individual and collective behaviour and in school practices. This was particularly the case in relation to littering habits and recycling practices. Many youths spontaneously changed their deeply entrenched habits of littering when they realised its negative impact on Boksburg Lake and on the animals dependent on the lake. These are practices that learners can feasibly engage in, and they provided a realistic space to effect change.

New practices emerged from the initiative. For example, a local teacher at Wit Deep Primary was inspired to create a recycling game involving her whole school; St Michaels started a 'collect a can' campaign; Reiger Park Primary experienced a fundamental shift in littering perspectives and habits, with a positive impact on the cleanliness of the school grounds; and a learner-led clean-up project at Reiger Park High resulted in a '*remarkable improvement*' in the cleanliness of the school grounds and in learners' environmental ethos, as recounted by a teacher. These are examples that highlight the value of inviting youths to participate in real-world actions for positive change. A core group of learners at Reiger Park High were particularly inspirational, showing determination, leadership, enthusiasm and courage in their quest for a cleaner school and a healthier Boksburg Lake. For example, the leader, a Grade 9 learner at the time, was given an opportunity to stand up in assembly and explain the clean-up project, which was the first time that a learner had addressed the school. During a focus-group interview, this moment was recounted as follows: At first, the whole school went 'boo', but she replied, saying, 'Unfortunately, we're not asking you, we're telling you', which led to loud clapping and cheering.

Discussion

The initiative had a number of significant impacts, as highlighted by the results: local people became involved and invested in an environmental-education process that was highly meaningful to them; a deeper connection was nurtured between participating stakeholders, as well as between the youth and Boksburg Lake; a collective identity was adopted to bring about change; knowledge of Boksburg Lake's social-ecological system was strengthened; personal culpability for the lake's degradation was acknowledged; many of the youths indicated that there had been a change in their negative environmental practices; local stakeholders, including the youth, engaged in collective action to reclaim Boksburg Lake; and a range of new practices emerged from the SSE initiative.

The remainder of this discussion draws on the literature in order to provide some explanations as to why the initiative may have had these positive consequences.

A number of authors point to the value and impact of learning in a real-world social-ecological context where abstract concepts can be related to concrete experience (Uzzel, 1994; Rogoff, 1990; Abram, 2010). According to Rogoff (1990), the most important kind of learning is not book learning and propositional knowledge, but rather more experiential learning situated in a real context. This increases learning relevance and, consequently, learners' engagement and attention. This is based on a view of reality that recognises how we are immersed in a relational world, inseparable from others (Ricoeur, 1992), and that all things, including subjects and objects on the social, biological, ethical, political, economic and ecological levels, are

relationally connected and bound to their context (Slife, 2004; Donati, 2011). This is in contrast to conventional education, which Uzzel (1994) describes as a system removed from authentic action.

Vygotsky's theory of mediation (1978) is useful in understanding the value of learning in context. He argued that tools such as language and other symbols derived from one's sociocultural and historical context mediate all human psychological and mental processes (Karpov & Haywood, 1998). In the present case study, Boksburg Lake is a symbol of local identity and has a significant place in the city's collective memory. Learning has therefore occurred around a meaningful local symbol that is tightly linked to Boksburg's sociocultural identity. This has facilitated processes of mediation, knowledge internalisation, and how meaning is made.

The benefit of involving the learners in a community of practice can be understood with reference to participatory-learning theory, which holds that the creation of meaning and understanding is relational. Such theory is being given growing credence in environmental-education literature (Lotz-Sisitka, 2004; O'Donoghue & Lotz-Sisitka, 2006).

Participatory learning is seen as a means to deepen democracy and strengthen meaning-making in order to better address social-ecological risk (Lotz-Sisitka & O'Donoghue, 2008). This is supported by Vygotsky (1987) who stated that children's motivation increases when they have opportunities to learn together with others in meaningful ways. Uzzel (1994:7) explains the value of this approach: 'Long-term change and development will only come about through informed community action in which adults and children work together with the guidance of experts.'

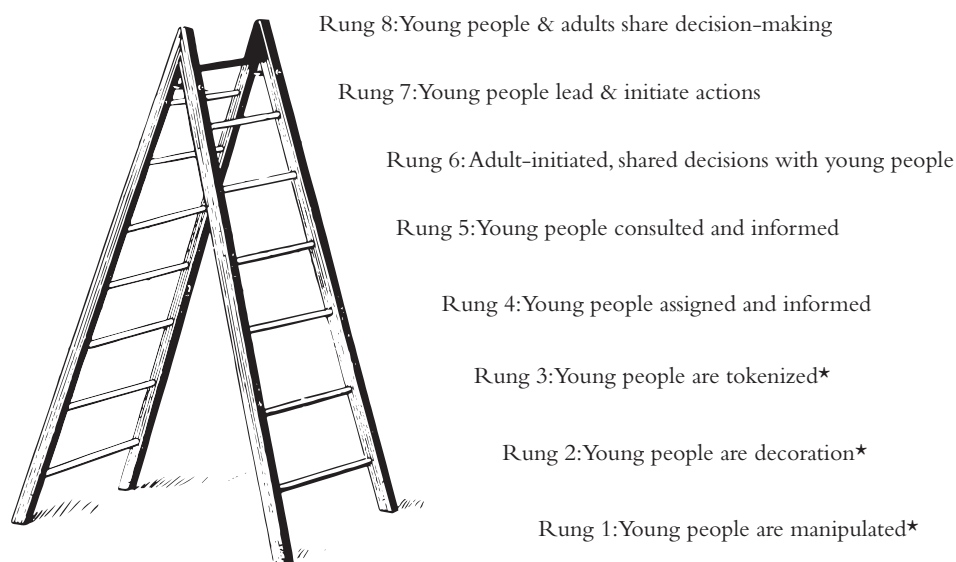
Vygotsky (1978:86) coined the concept 'zone of proximal development', defined as 'the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers'. This highlights how children and the youth learn by interacting with peers and adults in a meaningful space. Rogoff (1990) also highlighted the value of situating school learning in a community context where children learn by engaging with adults.

The approach in the SSE initiative of working closely with the youth to bring about positive change aligns with a growing body of literature that is disproving the modern day assumption that one must be an adult to effect meaningful change. Hart (1992, 1997) is a strong advocate of empowering children to take an active role in society, and of involving them in participatory environmental action, and has documented the variety of ways that children have participated in bringing about real change in their schools, communities and environments. He produced a ladder (Figure 2) of young people's participation that has eight rungs, with the lowest rung representing young people being merely manipulated to the highest rungs where young people lead and initiate action and share in decision-making with adults (1992).

Other authors also recognise the benefit of involving the youth in active citizenry in order to address social-ecological problems (e.g. Uzzel, 1994; Wals, 1996; Schusler, Krasny, Peters & Decker, 2009). Uzzel (1994), for example, wrote a lengthy document detailing the value of engaging the youth in environmental-change practices. He noted that children respond

positively when given a sense of ownership of, and responsibility for, processes of social–ecological change and ‘can act as important catalysts for change in both the home and the community’ (Uzzel, 1994:6). Schuslera *et al.* (2009) highlighted the beneficial feedback loops that can occur as learners engage in environmental action. Two important feedback loops are: the increase in capabilities to engage in further participation in environmental issues, and the potential for ‘community level impacts’ (Schuslera *et al.*, 2009:121) where children’s environmental action has transformative effects on the community.

Figure 2. Ladder of young people’s participation, with the higher rungs reflecting greater participation (Hart, 1992)



Note: Hart explains that the last three rungs represent *non-participation*

Conclusion

The SSE initiative had some positive effects with regard to the Boksburg Lake social–ecological system. Results indicated a positive effect on individuals’ patterns of identifying and knowing about practices relating to the Boksburg Lake system, while there was also evidence of transformative change in some of the participating schools’ practices. These positive impacts have been partly attributed to the three key characteristics of the initiative described in this paper, namely:

- Learning was aligned with the local social–ecological context;
- Human-to-human and human-to-ecological connections were encouraged; and
- The youth played a key role in initiating and effecting transformation.

However, the initiative was not enough to effect transformative change to the system as a whole, which was highly resilient and required a longer, more systemic and extensive intervention. A recommendation is to undertake a systems analysis of the drivers and underlying mechanisms of local social–ecological degradation and thereafter design the environmental–education system as part of a broader intervention to effect transformation.

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