



**What did you enjoy the most at the science expo? (Participant survey responses)**

"Everything!!"

"Making our own electricity ... solar power."

"Animals, touching lizards and stick insects, echidna and black cockatoos."

"All the science hands-on interactive activities for children of different ages."

"Seeing families enjoying learning about the environment and sharing in their enthusiasm."

# Feast of Science Sense-ations

By Elaine Lewis, Hayley Bullimore, Amy Krupa, Katherine Gaschk and Jennifer Pearson

Science expositions at the Canning River Eco Education Centre (CREEC), Perth, Western Australia, have been conducted over the last five years (2009–2013) during National Science Week. These expos aimed to enhance science understanding in the community, foster partnerships for science and promote science careers by providing a scientific feast for the senses. This paper focuses on the outcomes of the five expos. Key findings include constantly high participation satisfaction rates and increased overall attendance each year. The expos also consistently attracted people who had not previously attended National Science Week events, while partnerships for science steadily grew.

## INTRODUCTION

Promotion of science understanding amongst the general public is a vital strategy for developing a scientifically literate society (Department of Innovation, Industry, Science and Research, 2009; 2010). Community science expos at CREEC (City of Canning, 2010) in Perth, Western Australia, aimed to contribute to this outcome by providing a feast for the senses. These expos have been conducted over the last five years during National Science Week, starting in 2009 with Taste of Science (Pearson & Lewis, 2009). This event was followed by Dance of Science in 2010 (Lewis & Pearson, 2011), Sound of Science in 2011 (Lewis, Gaschk & Pearson, 2011), Colour of Science in



2012 (Lewis, Bullimore, Pearson, Krupa & Gaschk, 2013) and the successful Scent of Science in 2013.

Like the previous expos, Scent of Science was a one-day science expo held on a Sunday in August during National Science Week. The event engaged over two and a half thousand people in learning about different aspects of the sense of smell. Planning, implementation and evaluation of the expo was achieved through a successful partnership between CREEC, City of Canning, South East Regional Centre for Urban Landcare (SERCUL), National Science Week, the Australian Association for Environmental Education—WA Chapter (AAEE—WA), Little Green Steps, SGIO, Swan River Trust and Great Gardens.



**Image 1:** Five expo banners (2009–2013) showcasing student artworks.

AAEE—WA received National Science Week funding for the 2009–2012 expos and in 2013 SERCUL was awarded a National Science Week seed grant to promote an early childhood sustainability initiative called Little Green Steps, at the expo. National Science Week funding was supplemented by funds and in-kind support from other major partners. Numerous smaller sponsors also supported the events.

## EXPO PURPOSE

The overarching aim of the science expo was to showcase science in an innovative, holistic context. This incorporated the following.

- Providing an opportunity for the general public to engage in hands-on activities that showcase science and sustainability in interesting and innovative ways that are of direct relevance to daily life.
- Raising awareness and promoting behaviour change in relation to the wellbeing of society and environmental sustainability.
- Fostering awareness of Indigenous science knowledge.
- Promoting science careers.
- Involving primary and secondary school students before, during, and after the event in a variety of ways.
- Fostering partnerships between the community, education/research organisations, local and state government, business and industry.

## EXPO ACTION

Planning, implementation and evaluation of Scent of Science was built on the experience and outcomes of the previous four science expos. Volunteers and presenters involved in the Scent of Science attended a briefing before the event to reinforce understanding of the aims of the expo and organisation of the event. Prior to the event, children were invited to design artworks related to the expo theme through a competition designed to promote the event and focus learning and creativity on the expo theme at school and home. Three hundred and eighty-five entries were received and the winning entry was featured on the 2013 expo banner.

During the expo, participants had many opportunities to engage in a wide range of hands-on, interactive experiences which were designed to enhance science understandings related to the sense of smell. Education for Sustainability (EFS) was also an important focus throughout the day.





Activities included: science shows and experiments; exploration of microscopic biological specimens; flower and smell identification stalls; solar power displays and kits; Aboriginal technology and storytelling; animal encounters; bush crafts and clay creations.

## POST-EXPO ACTION AND OUTCOMES

Numerous approaches were employed to evaluate the expos: attendance tallies, surveys, measurement of waste generated during the event, sustainability assessment rubrics, photographic evidence and anecdotal feedback. The surveys were administered during the expo, whereas the assessment rubrics were employed at a 'Thank You Afternoon Tea' for volunteers and presenters two weeks after the events. Evaluation findings are presented below.

### 1. Attendance Tallies

An attendance tally taken by volunteers at the expo 'welcome and information' tables indicated that at least 2,500 people attended the 2013 event. This result means there were 16% more attendees compared to 2012 and 88% more compared with the 2009 event. For attendance figures over the five years refer to Figure 1.

### 2. Participant Feedback Surveys

Figures 1–3 present feedback from attendees who completed the survey.



**Image 2:** Children experimenting with floating and sinking at the Little Green Steps stall.

Clearly, respondents enjoyed the expos and were keen to attend future National Science Week expo events. Furthermore, the expos attracted members of the general public who did not usually attend National Science Week events.

The activities that attendees enjoyed most over the five years included the wide range of hands-on science activities, interacting with live animals and participating in Aboriginal workshops. When invited to comment

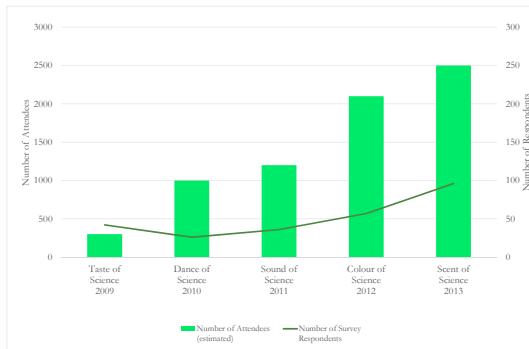


**Image 3:** Children participating in the Scitech show 'Beyond the Beaker'.

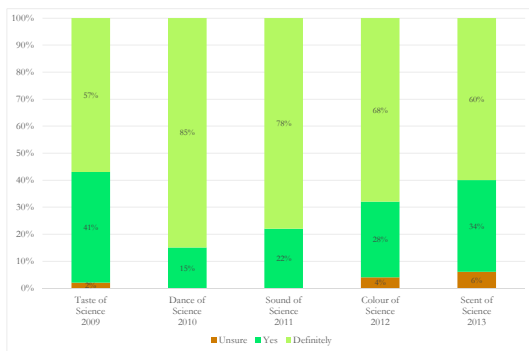
**Image 4:** Aboriginal knowledge showcased by Noongar education officers.

**Image 5:** Sand art designs of local fauna using natural sands.

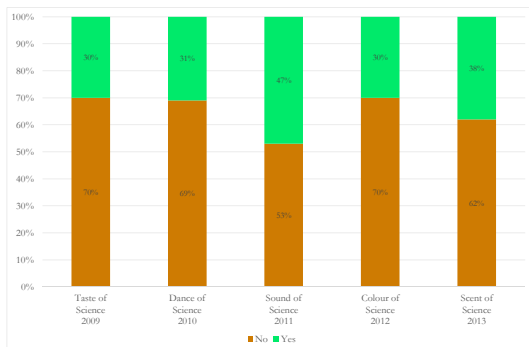
**Figure 1 (top):** Expo attendance and survey participation.



**Figure 2:** Intention to attend a future expo event.



**Figure 3:** Attendance at a previous National Science Week event.



on activities least enjoyed, participants typically stated, "nothing".

### 3. Native Plant Survey

A native plant survey was conducted at the native plant free giveaway stall where the community was provided with information and advice on soil

types and native planting techniques, as well as free garden plants. Of the one hundred and three people surveyed in 2013, 23% indicated they were planting natives for the first time. It is likely that the information provided on what and how to plant, in addition to providing the native plant at no cost, would be a strong incentive for people to plant it in their garden when they returned home, and possibly consider native plants as an alternative to exotic species in the future (see results in Table 1 below).

### 4. Waste Audits

The science expos have always been promoted as 'low waste' events because effective waste management was considered a critical community science issue. Signage was placed on bins indicating how to dispose of waste correctly. A waste audit was conducted at the end of each event to assess the effectiveness of the signs. All waste was weighed and examined to determine levels of contamination. Waste from both the green and yellow (recyclable material) bins was weighed in the biodegradable bin bags, sorted and the level of contamination between recycled and non-recyclables determined. Table 2 presents the cumulative waste results for the last five years.

Results show that despite increases in the number of attendees, there has been a steady decline in the amount of waste generated at the events since 2009 from 0.024 kg/person to 0.005 kg/person in 2013. It is likely that the 'low waste' initiatives to raise awareness about the importance of waste minimisation, as well as how to correctly separate waste, were effective. In brief, it is clear that waste generated is decreasing over time, despite increasing attendance.

IS THIS THE FIRST TIME YOU ARE PLANTING NATIVE PLANTS IN YOUR GARDEN?		IF NOT, HOW LONG HAVE YOU USED NATIVE PLANTS IN YOUR GARDEN?	
No	79 (77%)	1 year	10
Yes	24 (23%)	2-4 years	17
		5+ years	47
		No response	5

**Table 1:** Native Plant Survey.





YEAR	2009	2010	2011	2012	2013
Number of Attendees	~300	~1000	~1200	~2100	~2500
Compostable (kg)	2.8	11.6	6.8	11.01	6.25
Recyclable (kg)	4.3	3.9	4.8	8.07	5.98
Total Waste Generated (kg)	7.1	15.5	11.6	19.08	12.23
Total Waste to Landfill (kg) based on contamination levels	2.8	1.0	3.6	1.14	1.43
Total Waste Generated (kg/person)	0.024	0.016	0.010	0.009	0.005

**Table 2:** Waste outcomes at Science Expos.

### 5. Sustainability Assessment Rubric

The sustainability assessment rubric was adapted from the *National Action Plan for Education for Sustainability* (Department of the Environment Water Heritage and the Arts, 2009). This *National Action Plan* rubric was completed by organisers, presenters, partners and volunteers after the event. It has been shown to be an effective tool for collaborative assessment. A more detailed explanation of the sustainability assessment rubric may be found at [www.aceewa.org.au/events.html#ede0](http://www.aceewa.org.au/events.html#ede0)

The results presented in Table 3 show the majority of stakeholders considered the 2013 expo had achieved most of the principles of EFS, with 'participation' and 'partnerships' being strengths. 'Envisioning a better future' and 'critical thinking and reflection' were identified as focus areas for improvement for the 2014 expo, Touch of Science.

### 6. Photographic Evidence and Anecdotal Feedback

Images included in this article reflect high levels of engagement, from young children to primary and secondary



**Image 6 (top):** Costumes to promote environmental messages— recycling and care of turtles.



**Image 7:** Industry partner demonstrates colour changes at lower pH values.

PRINCIPLES OF EDUCATION FOR SUSTAINABILITY N = 17 RESPONSES	ESTABLISHING	ACHIEVING	EXCELLING
Transformation & change		14	3
Education for all & life-long learning	1	9	7
Systems thinking	4	13	
Envisioning a better future	7	10	
Critical thinking & reflection	8	9	
Participation		4	13
Partnerships for change		7	10

**Table 3:** Education for Sustainability Assessment Rubric Results (2013).

aged students, as well as adults. Clearly, the science and sustainability activities engaged members of the general public across all age groups and backgrounds.

Anecdotal feedback reported to organisers provided another useful source of information about expo outcomes. Comments included the following:

*"I really enjoyed all the activities for kids plus information for us adults."*

*"I liked the educational aspects of the day."*

*"It was interesting learning about the local Canning River wildlife and what groups are about to support it."*

*"Nice community family atmosphere."*

*"It was perfect, a fantastic event!"*

*This feedback supports the positive comments reported in the survey.*

## LONG-TERM OUTCOMES

The science expos have produced a wide range of long-term and ongoing outcomes, as summarised in Table 4.

## CONCLUSION

In conclusion, the science expos conducted at CREEC during National Science Week over the last five years have produced and will continue to provide long-term benefits in terms of science engagement and awareness of sustainability issues. The innovative and holistic approach to the expos has been shown to be highly effective in promoting science to all age groups in the community. The expos provided engaging hands-on science activities together with opportunities to showcase sustainable action for the environment. Finally, the expo model outlined here is transferable to other contexts, especially in settings that share the same science engagement aims.

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**Table 4:** Key outcomes of Expo aims.

AIMS	KEY OUTCOMES
Engagement in hands-on science activities	<ul style="list-style-type: none"> <li>Annual increase in attendees participating (300 to 2,500), with evidence of participant enthusiasm for the wide range of relevant science activities provided.</li> <li>Flow-on benefits e.g. solar power, 'waterwise', 'wastewise' and native flora promotion.</li> </ul>
Awareness of science & sustainability	<ul style="list-style-type: none"> <li>Publication of expo evaluations in science journals and expo presentations at national education conferences e.g. on event planning enhanced by whole systems thinking.</li> <li>Ongoing use of expo science activities and resources, solar laptop display, solar kits at CREEC and other science events.</li> </ul>
Awareness of Indigenous knowledge	<ul style="list-style-type: none"> <li>Enhanced awareness and appreciation of Aboriginal science and sustainability knowledge.</li> <li>Enriched and ongoing engagement with Noongar education officers and organisations, utilising displays, demonstrations and hands-on activities with science links.</li> </ul>
Promotion of science careers	<ul style="list-style-type: none"> <li>Ongoing participation in Scitech science careers shows.</li> <li>Ongoing career displays, talks and posters.</li> </ul>
Primary and secondary school students	<ul style="list-style-type: none"> <li>Banners promoting science engagement and showcasing student work displayed annually and at conferences and education workshops.</li> <li>Display and utilisation of expo science activities at CREEC and other centres for school excursion/holiday activities and future science/sustainability events.</li> </ul>
Fostering partnerships	<ul style="list-style-type: none"> <li>Partnerships, with ongoing collaboration, have grown in depth and capacity from 15 in 2009 to 36 in 2013.</li> <li>Expo resources continue to be used at other events conducted by partner organisations.</li> </ul>



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