

Science without walls: Inspiring stewardship through citizen science



Session outline

Theme one:

Citizen science is a successful, practical tool to engage adults and youth in conservation, PA management and can act as a catalyst for behaviour change

1. Bruce Paton, *Earthwatch Australia*, *Teachwild*: national marine debris study
2. Phillip Roetman, *Barbra Hardy Institute*, Discovery Circle
3. Andrew Robinson, *QuestaGame*, Questabird online adventure gaming
4. Kenichi Ueda, iNaturalist, community bioblitzes and online applications

Theme two:

For maximum effect, behaviour change needs to be actively designed into citizen science projects

1. Keynote: Nancy Longnecker, University of Otago
2. Practical exercise- 'ideas bank' for protected area management

Session outcomes

1. Citizen science incorporated into the *Promise of Sydney*
2. 'Ideas bank' summarised and emailed to participants
3. Establish special interest group for IUCN CEC





Inspiring a new generation: behavioural change through citizen science

setting the scene * social science * the Ikea effect

New information Improved productivity Engagement Empowerment New skills Behaviour change

‘citizen science’ is structured research undertaken as an active partnership between scientists and the wider community.

COMMUNICATION

PARTICIPATION

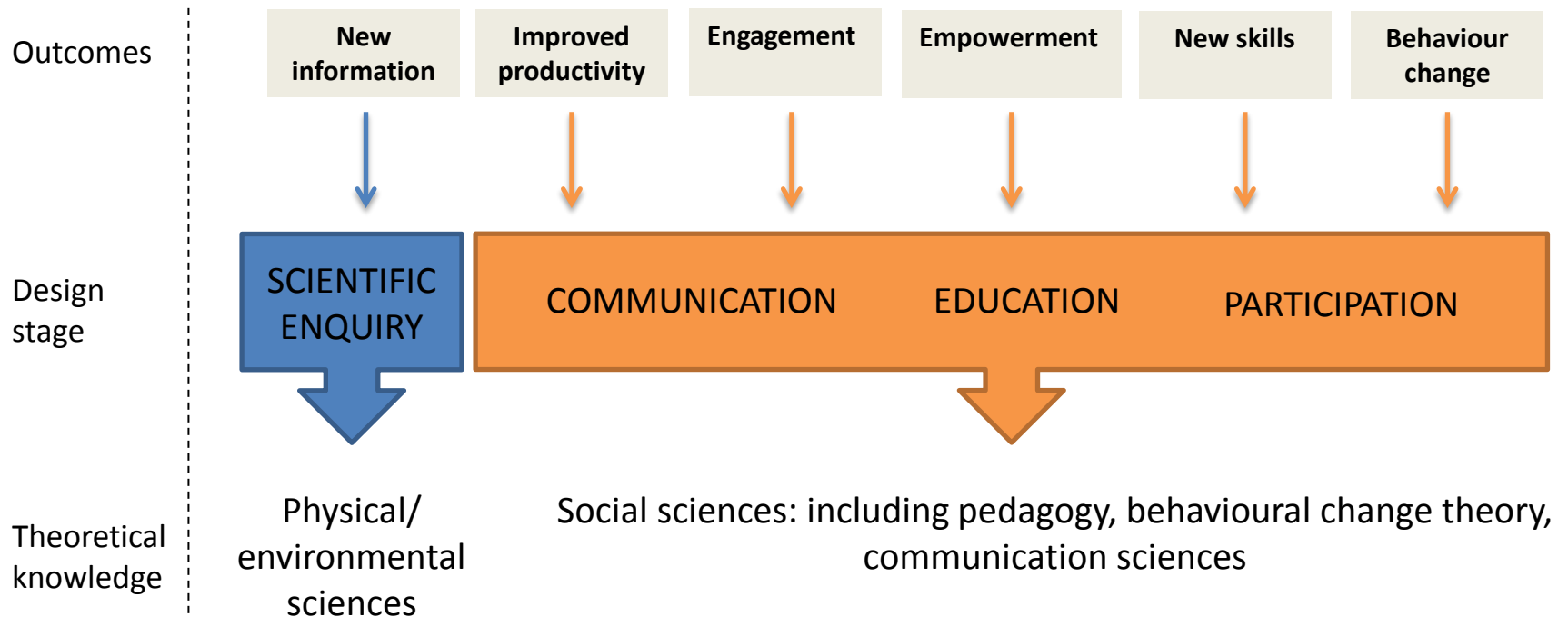
SCIENTIFIC ENQUIRY

EDUCATION

Questions Methodologies Messages Mediums Activities Feedback Purpose Experience



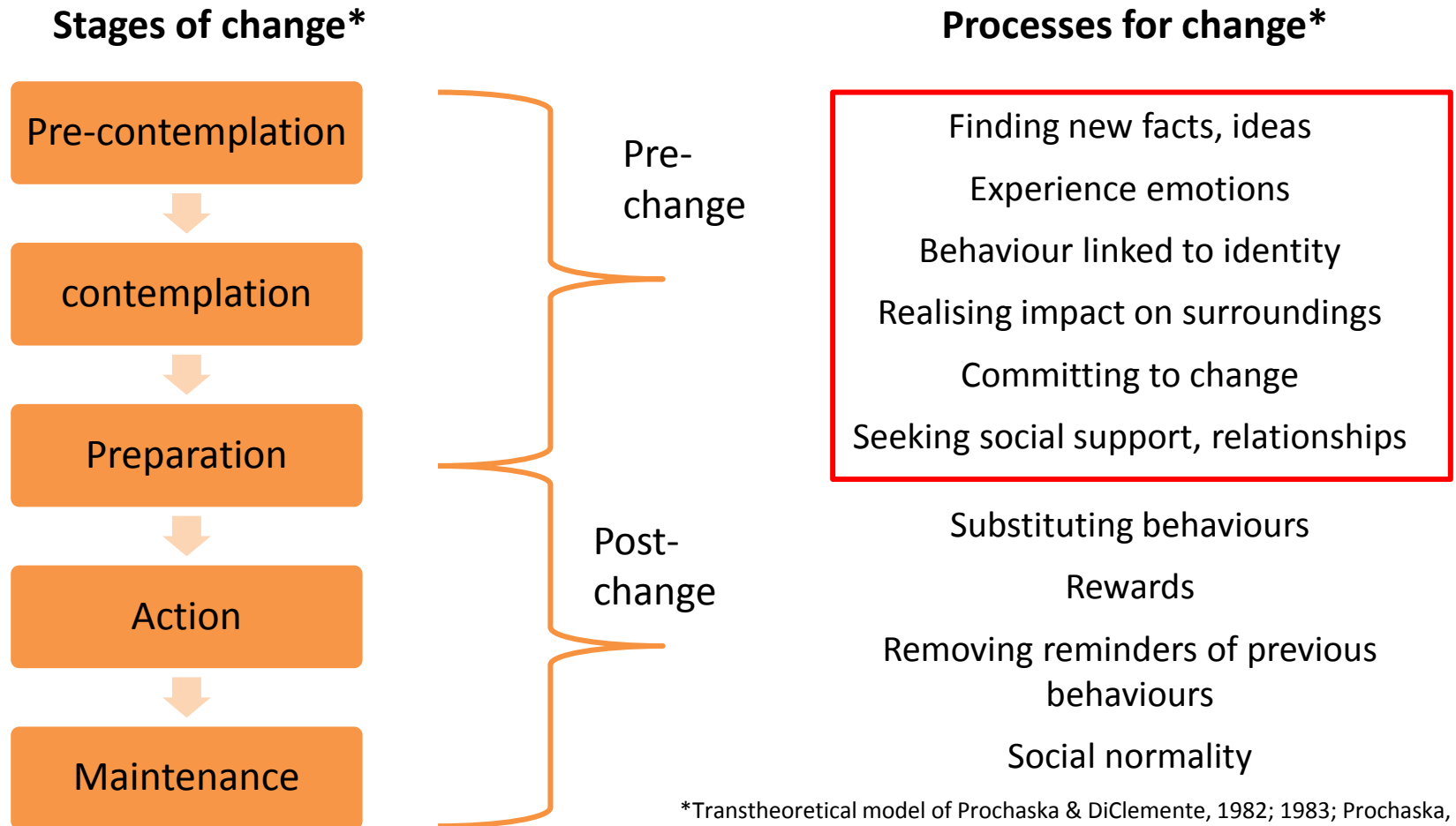
Designing for success (working backwards):



Imbalance in the literature for the science behind citizen science



Many theories suggest there are discrete steps relating to behavioural change:



*Transtheoretical model of Prochaska & DiClemente, 1982; 1983; Prochaska, DiClemente & Norcross 1992; Prochaska & Velicer 1997

Citizen science can have all the precursor ingredients needed for behavioural change



Finding new facts, ideas
Experience emotions
Behaviour linked to identify
Realising impact on surroundings
Committing to change
Seeking social support, relationships

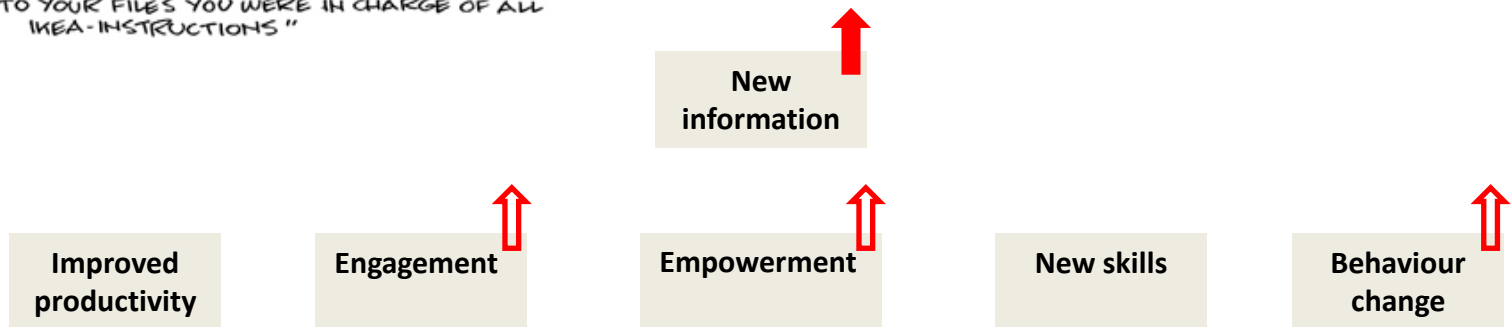


+

Value?



"Increase in valuation of self made products"



Does an increase in the value of the end 'product' also have knock on effects?

Earthwatch Citizen Science Programs: TeachWild case study



Earthwatch and citizen science

Our mission:

To engage people, worldwide, in scientific research and education to promote the understanding and action necessary for a sustainable environment.



What is TeachWild?

TeachWild brings scientists together with teachers, students and employees to address the issue of marine debris



TeachWild – inspiring students

- 60 School visits by CSIRO scientists and Earthwatch staff
- Over 5,700 students surveyed their local beach, logging marine debris and the animals impacted by it



TeachWild – inspiring teachers

Teachers participated in research expeditions, working with scientists to understand marine debris and its impacts

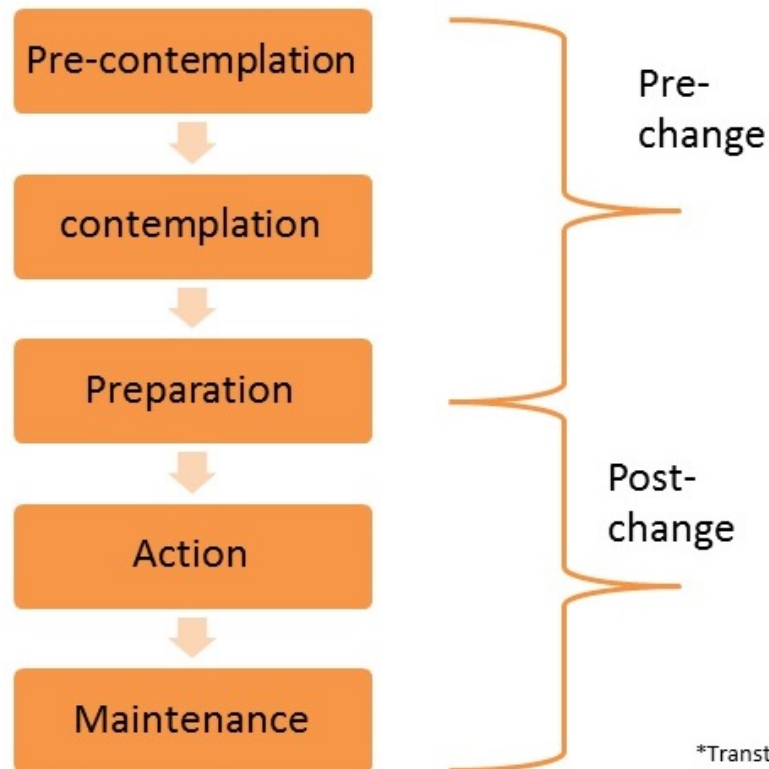


© CSIRO



Behaviour change and TeachWild

Stages of change*



Processes for change*

Finding new facts, ideas
Experience emotions
Behaviour linked to identity
Realising impact on surroundings
Committing to change
Seeking social support, relationships

*Transtheoretical model of Prochaska & DiClemente, 1982; 1983; Prochaska, DiClemente & Norcross 1992; Prochaska & Velicer 1997

Behaviour change: intellectual factors

1. Finding new facts and ideas
2. Realising your impact on your surroundings



Behaviour change: emotional factors

- Experiencing emotions
- Linking behaviour to identity



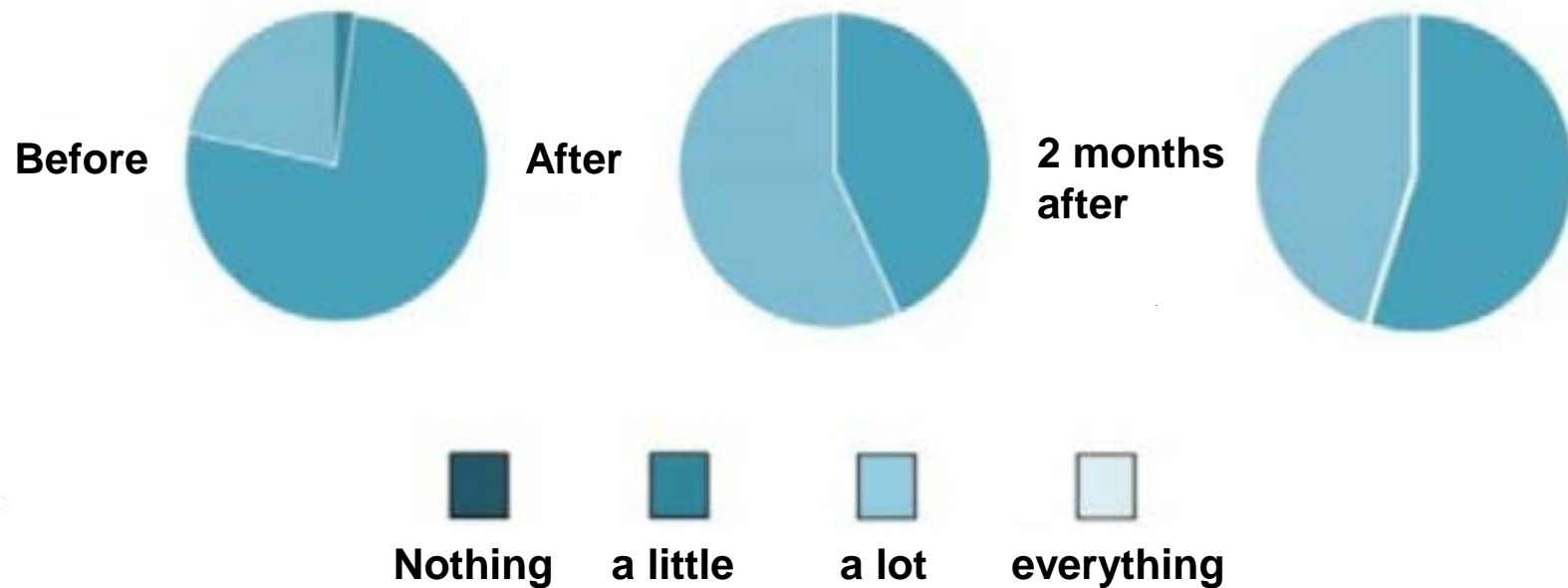
Behaviour change: social factors

- Committing to change
- Seeking social support and relationships





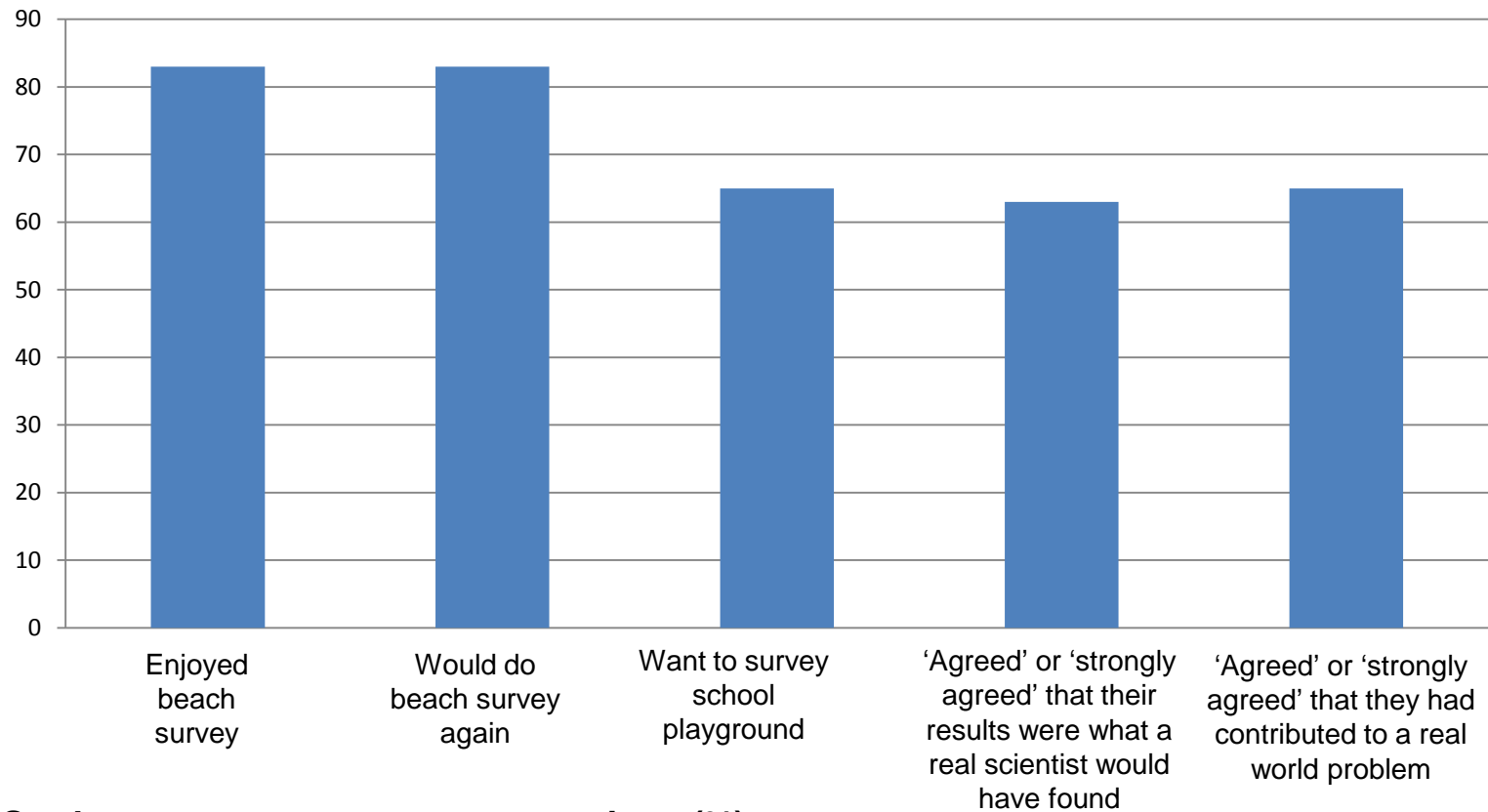
Did it work?



River's Edge Primary School students' self-reported knowledge of marine debris
[Source: Fletcher et al (2014) *TeachWild Evaluation Report*]



Did it work?

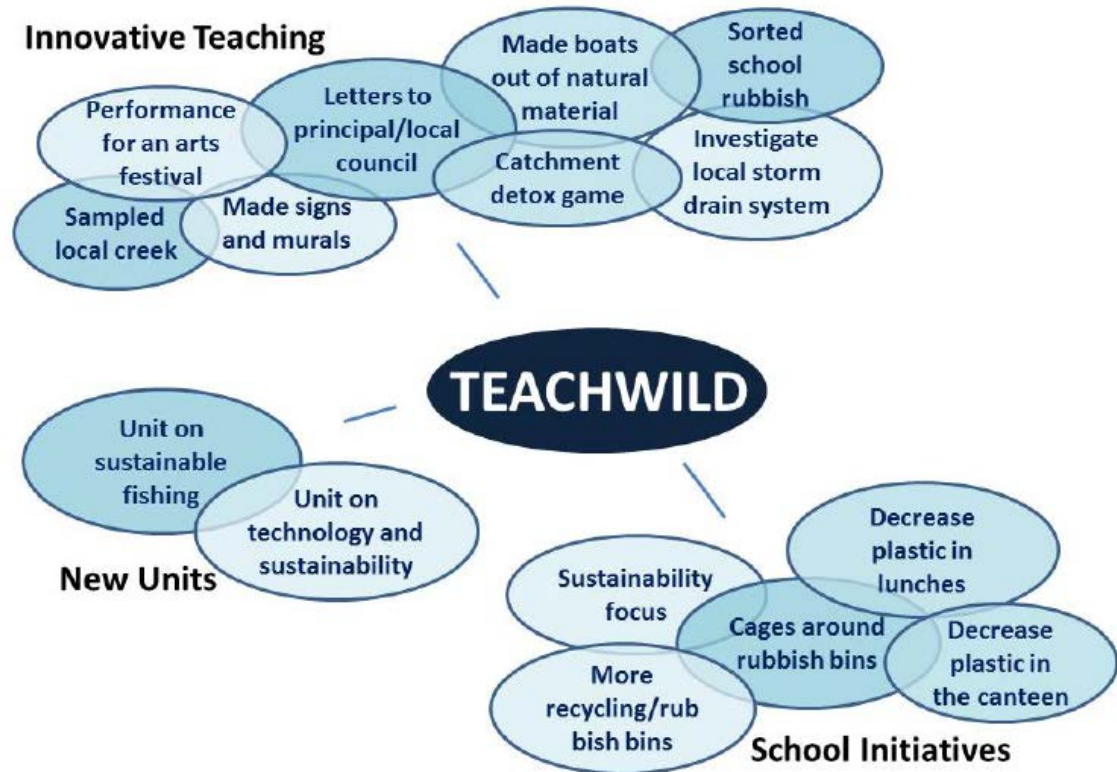


Student responses to survey questions (%)

[Source: Fletcher et al (2014) *TeachWild Evaluation Report*]



Yes, but *did it work?*



Related lessons, projects and programs schools have done since TeachWild program
[Source: Fletcher et al (2014) *TeachWild Evaluation Report*]



Yes, but *did it work?*

Actions undertaken by students following TeachWild:

- Not buying bottled water
- Picking up rubbish at the beach
- Picking up rubbish in the playground
- Family taking reusable shopping bags
- Lunch not wrapped in plastic
- Telling family and friends what they can do to look after the environment



For more information:

Bruce Paton

Earthwatch Institute Australia

Ph: +61 3 8102 1208

Email: bpaton@earthwatch.org.au

www.earthwatch.org.au

www.teachwild.org.au



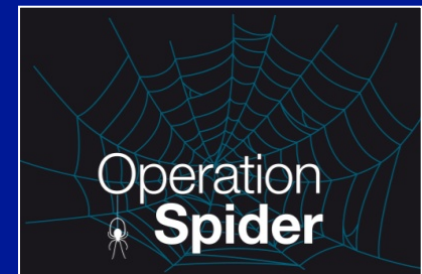
Creating Biophilic Cities through Citizen Science



Philip Roetman, Research Fellow
University of South Australia

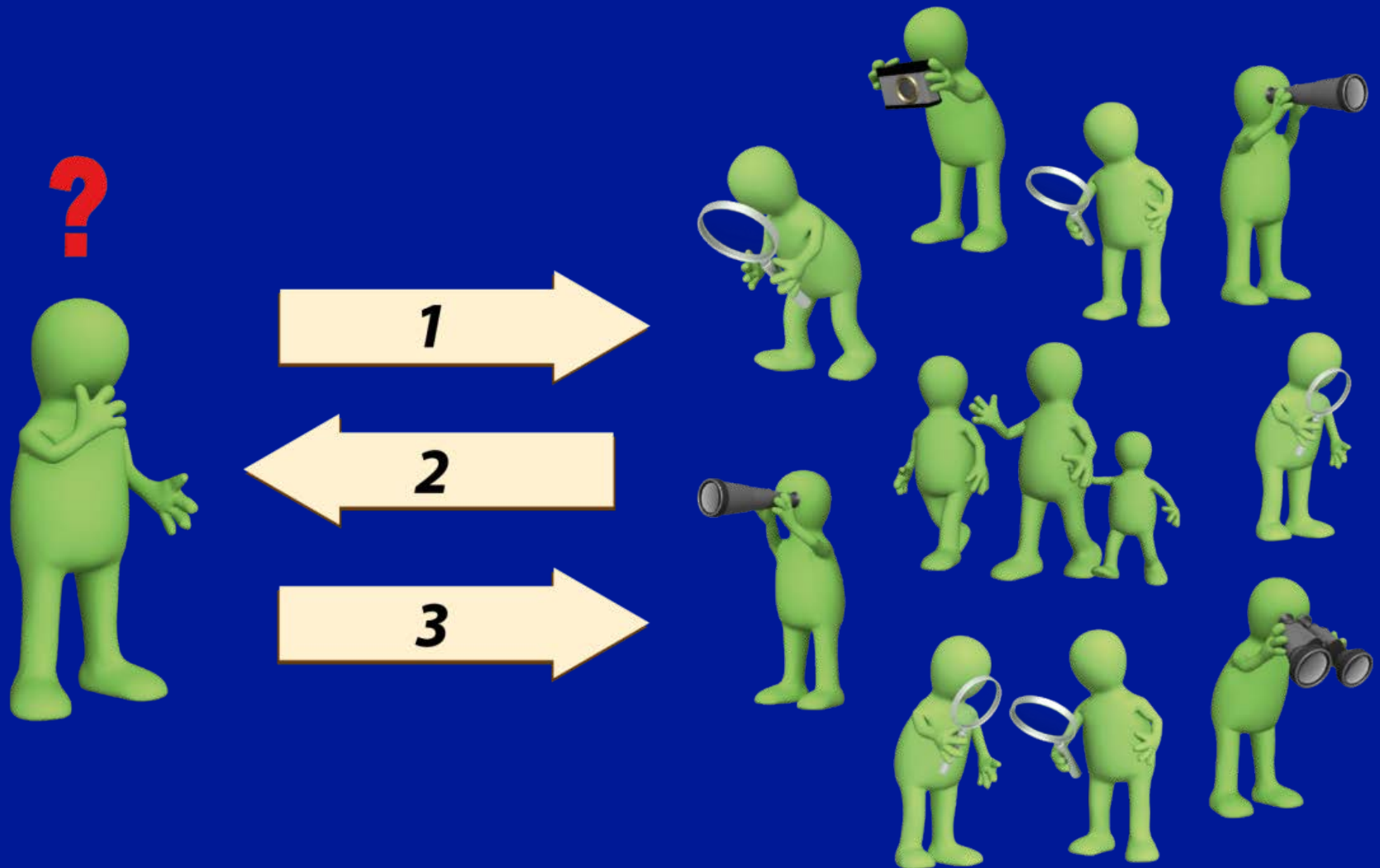
Inspiring stewardship through citizen science

- Exchanging information
- Inspiring who?
 - All ages?
 - In schools?
 - Attitudinal baggage?
- Impact on participants (& onlookers)
- Giving it back

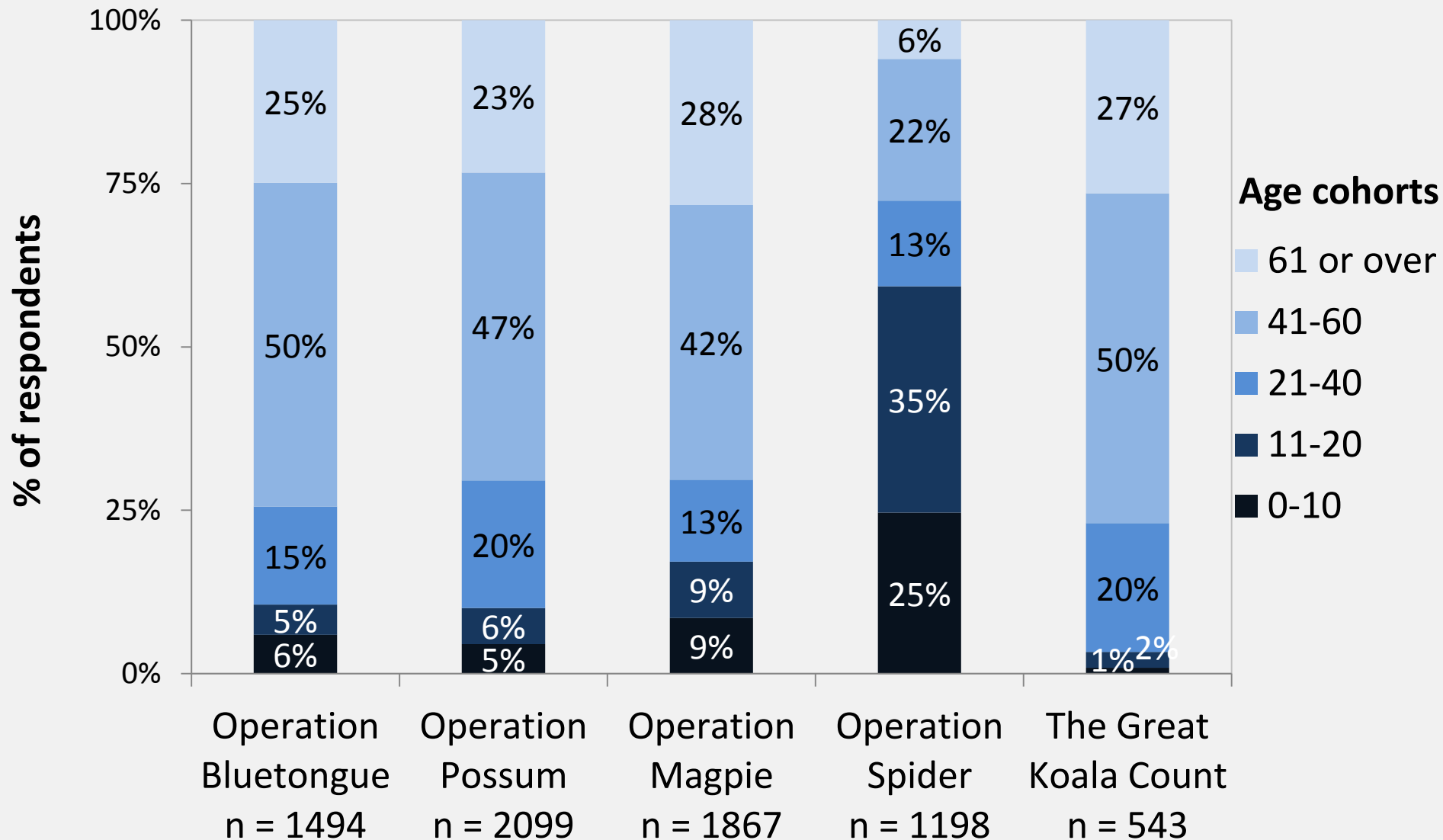


Citizen Science:

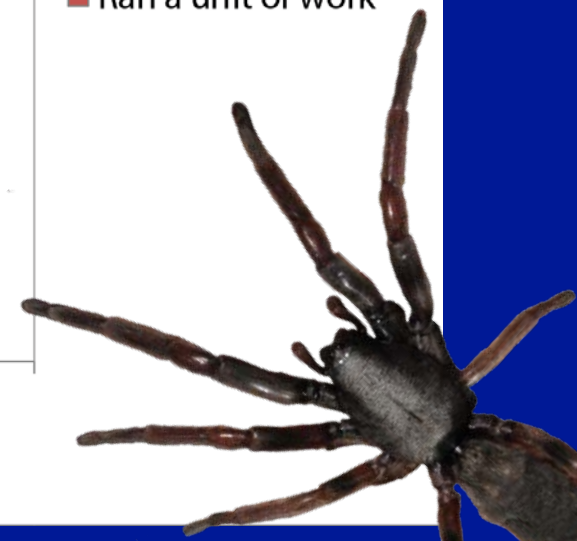
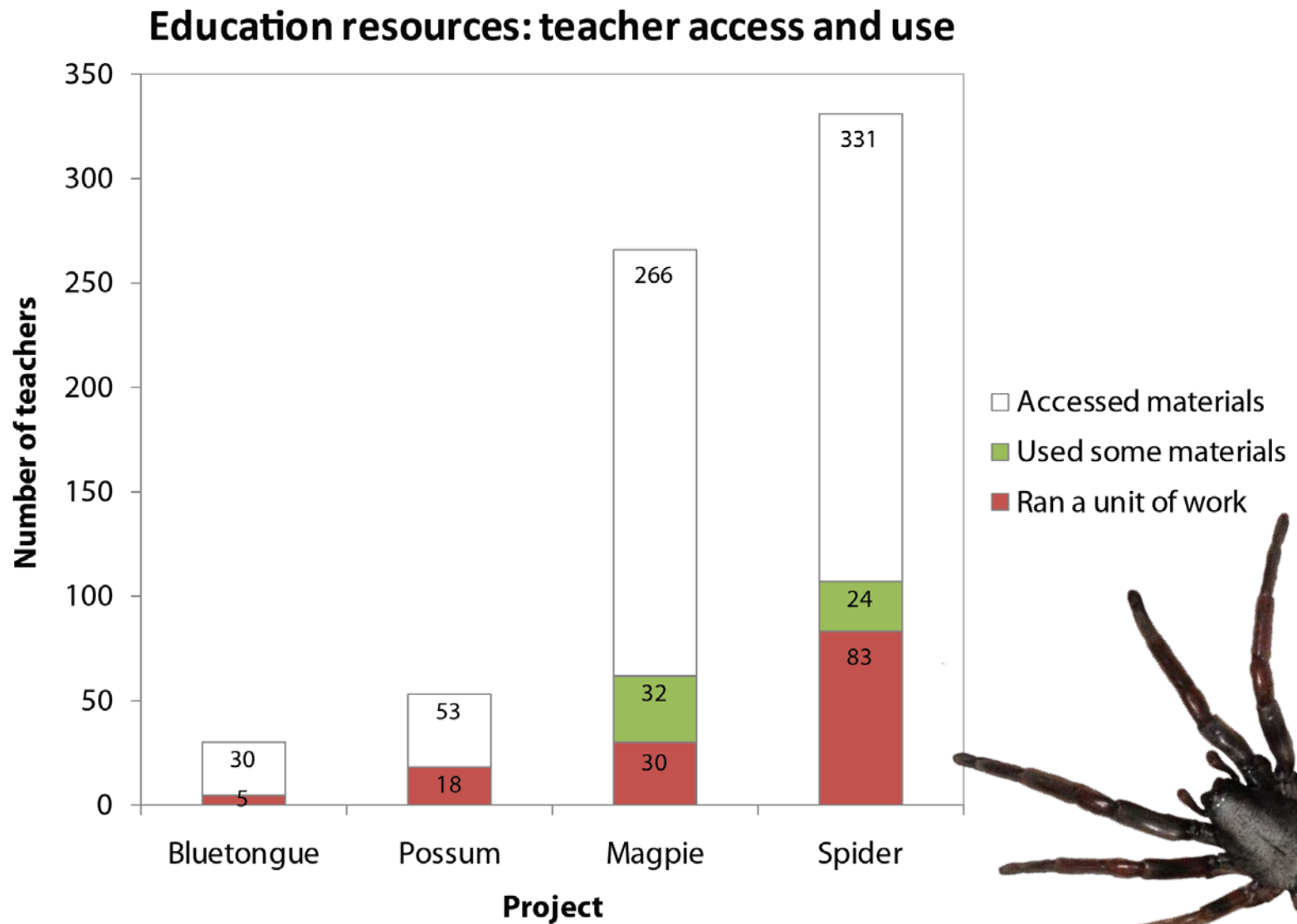
The information exchange



Inspiring **who?**



In schools?



In schools?

- Attitudes and Childhood

(Chawla & Cushing 2007)

- Knowledge and experience

- Realm of experience (the topic!)

- Resource Connectivity

- Interactive Teaching Sequence (Faire & Cosgrove 1993)
- Curriculum
- Other frameworks (e.g. 5Es)

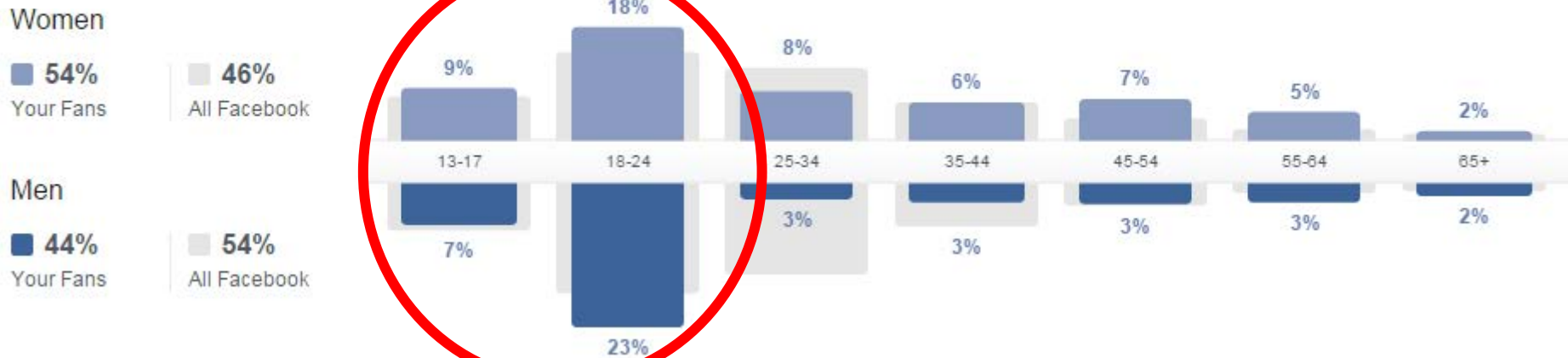
- Availability of resources + people

- Partnership approach (e.g. Paige *et al.* 2010, 2012, 2014)

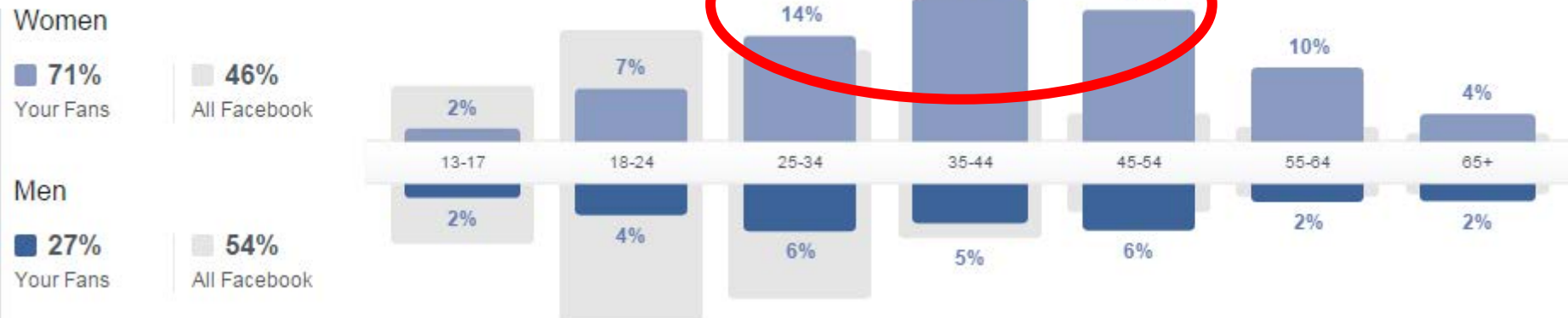


Inspiring **who?**

Spider (385 likes)



Koala (957 likes)



Attitudinal baggage?

Possum management... The GOOD



“We had possums in our roof when we bought this house...They were urinating and defecating in the roof and fighting for territory and upsetting our dogs ... We found out ... that if we could entice the possums out of the roof and into the box we could then close off the holes in the roof and keep them outside. In fact this worked a charm...One possum in a box outside keeps other possums from coming into his territory”

Attitudinal baggage?

Possum management... The BAD



“My eldest son blocked off the entrance to the roof at midnight a couple of nights ago, but unfortunately the possum was still in the roof. At about 1:30 this morning there was a noise from our bathroom. Upon opening the bathroom door a possum fell through the shower vent after it had pushed it out. As the other two members of the household were too terrified to open their bedroom doors, it was left up to me to rescue the animal. This I did by utilising a couple of crab nets... Throughout the ordeal both of us remained relatively calm!!!.....or both terrified of each other!”

Attitudinal baggage?

Possum management... The UGLY



*“This is no favourite story - its a horror story called **The Possums**. We have lived at our house for about 25 years. In that time I have trapped more than 100 possums- I’ve given up counting. In one 18 month period in the early-mid 1980s, I trapped 30 possums. I’ve caught two by hand - one in the bathroom, and one outside on the trunk of a tree.*

*Last night there were 4 of the P***** outside - two demolishing what’s left of an apricot tree, another nearby digesting the apricot leaves, and another that I only heard scrambling up a tree when I came out with a cricket bat.”*

Impact of the Operations...

Project	observed more	learnt new things	More interested	changed behaviour
Operation Magpie (n=173)	39%	41%	42%	21%

Impact of the Great Koala Count...

(Hollow et al. 2014)

	learnt new things	changed opinions
Participants (n = 454)	65%	19%
Onlookers (n = 82)	63%	38%

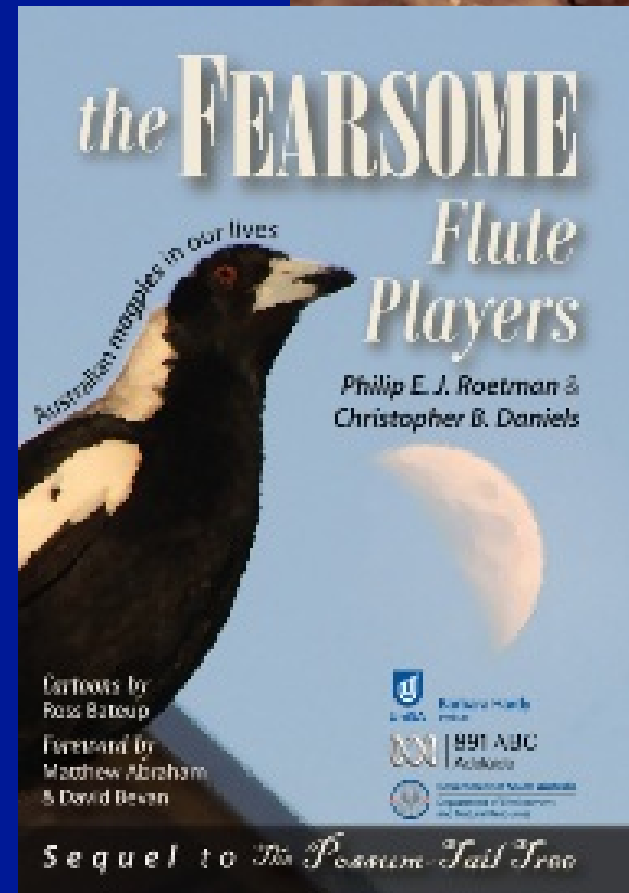
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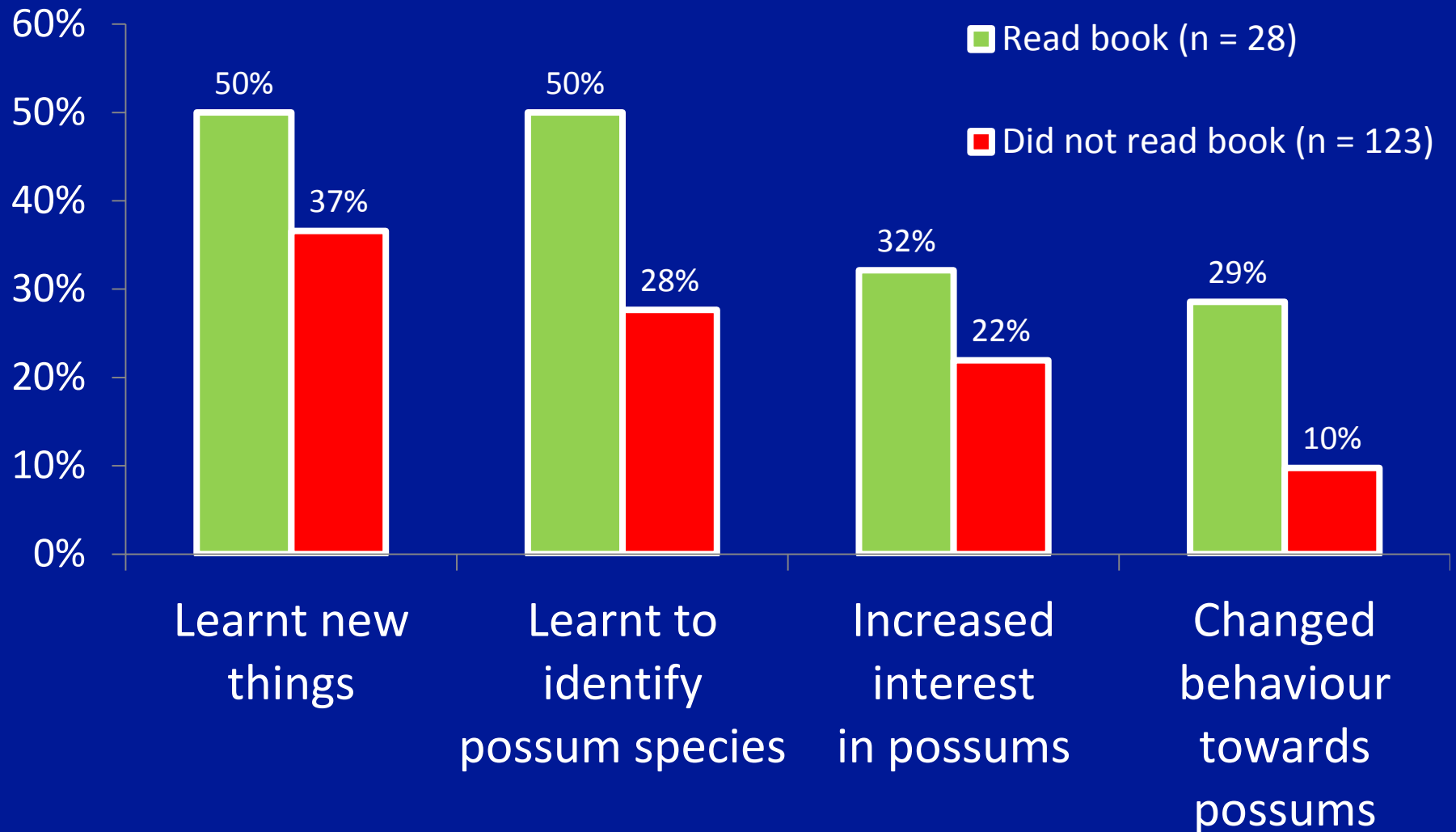
reach
472
26,000+

Impact on the community

- Hands-on activities
- Contributing to research
- Fun
- **Giving it back**
 - Voice of the community
 - Social science literature
 - Braided narrative



Changing attitudes and behaviours...



Improving the model

- Deliberate design
 - Topics
 - Resources
 - Activities
- Converting onlookers
- Giving it back
 - Web-based
 - Further analysis
 - More participant-generated material



**BioBlitz
Events**



**Fluker
posts**



**Cat
tracker**



**Little
corellas**



**Birding
the 'burbs**

The **sound** of Australia...

“When we lived in England for ten years in the 80s, the TV was on in another room. It was an Australian programme and I could hear a magpie in the background. I burst into tears, realising that magpie song is for me the sound of Australia and I would have to return home!”

Operation Magpie participant





Creating Biophilic Cities through Citizen Science



www.discoverycircle.org.au
philip.roetman@unisa.edu.au

QuestaGame



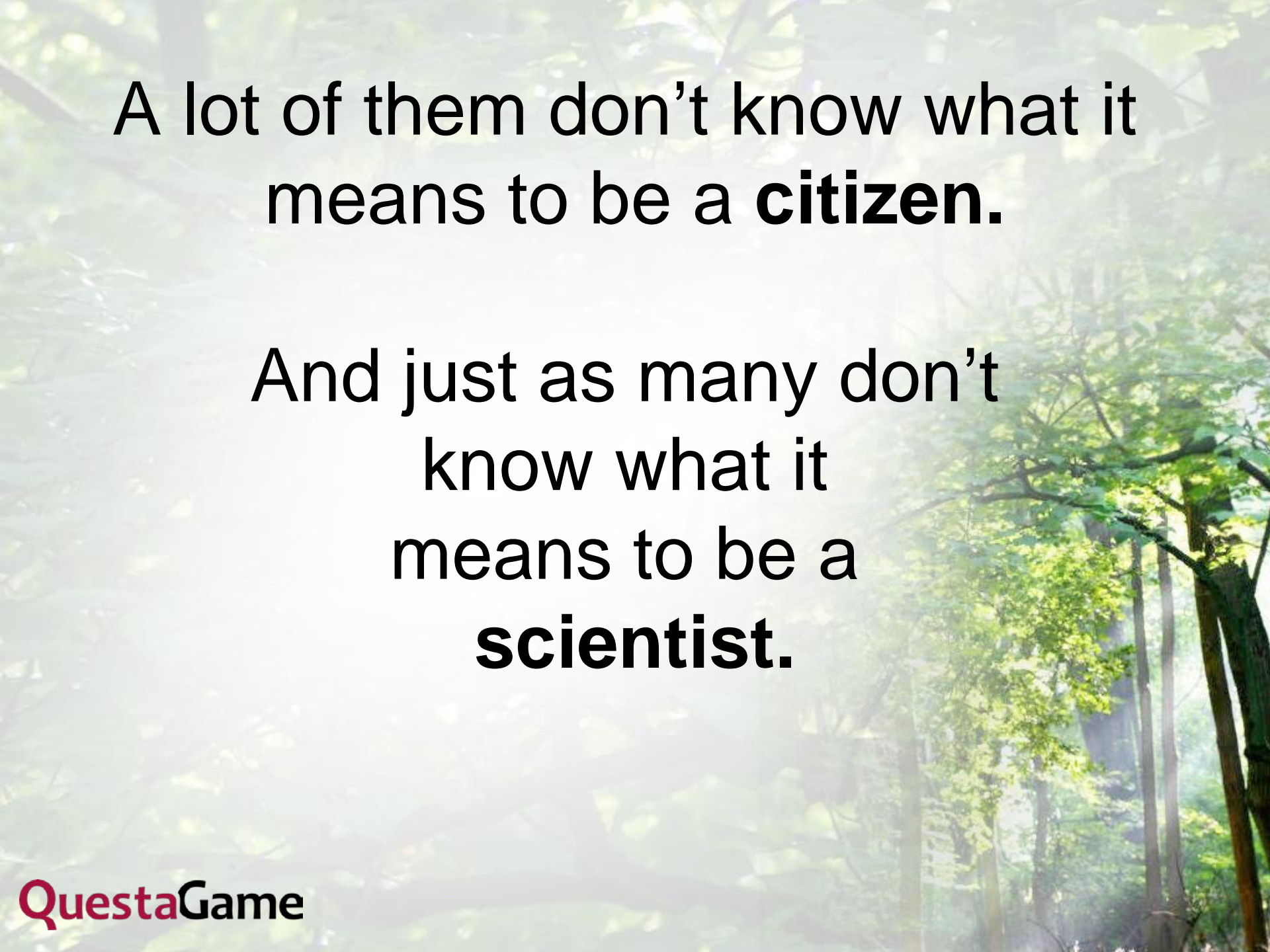
Available on the
App Store



ANDROID APP ON
Google play

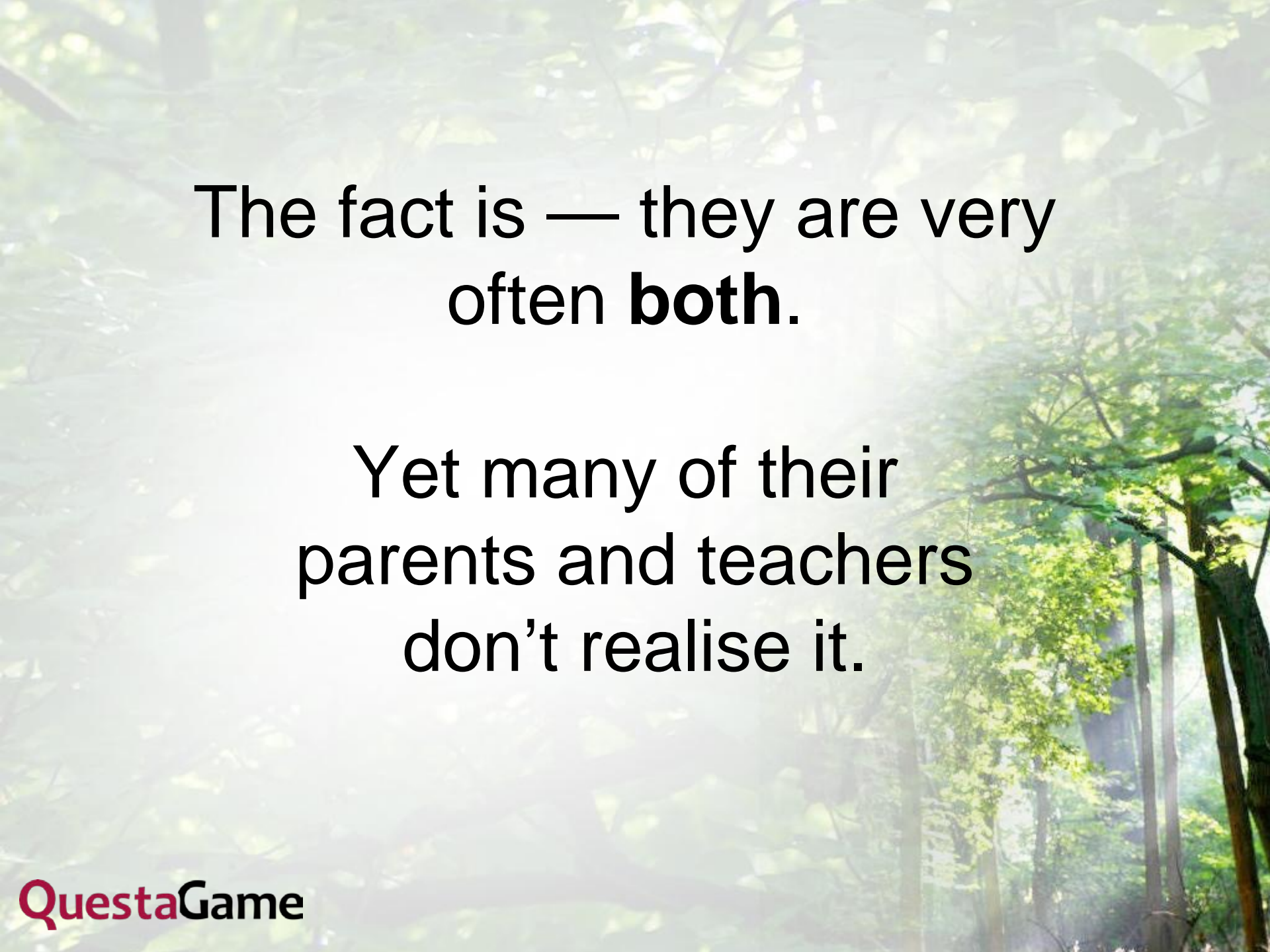
Youth

**The citizen scientists
of the very near future.**



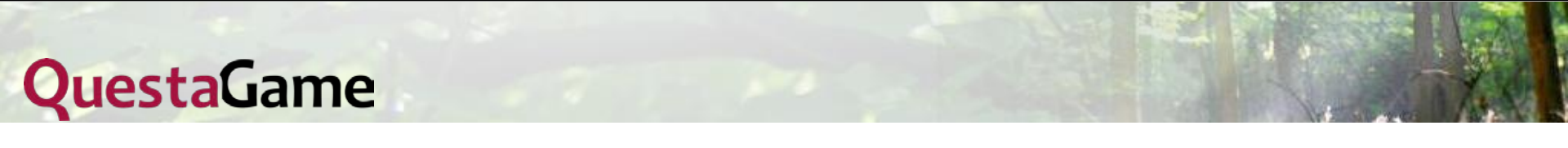
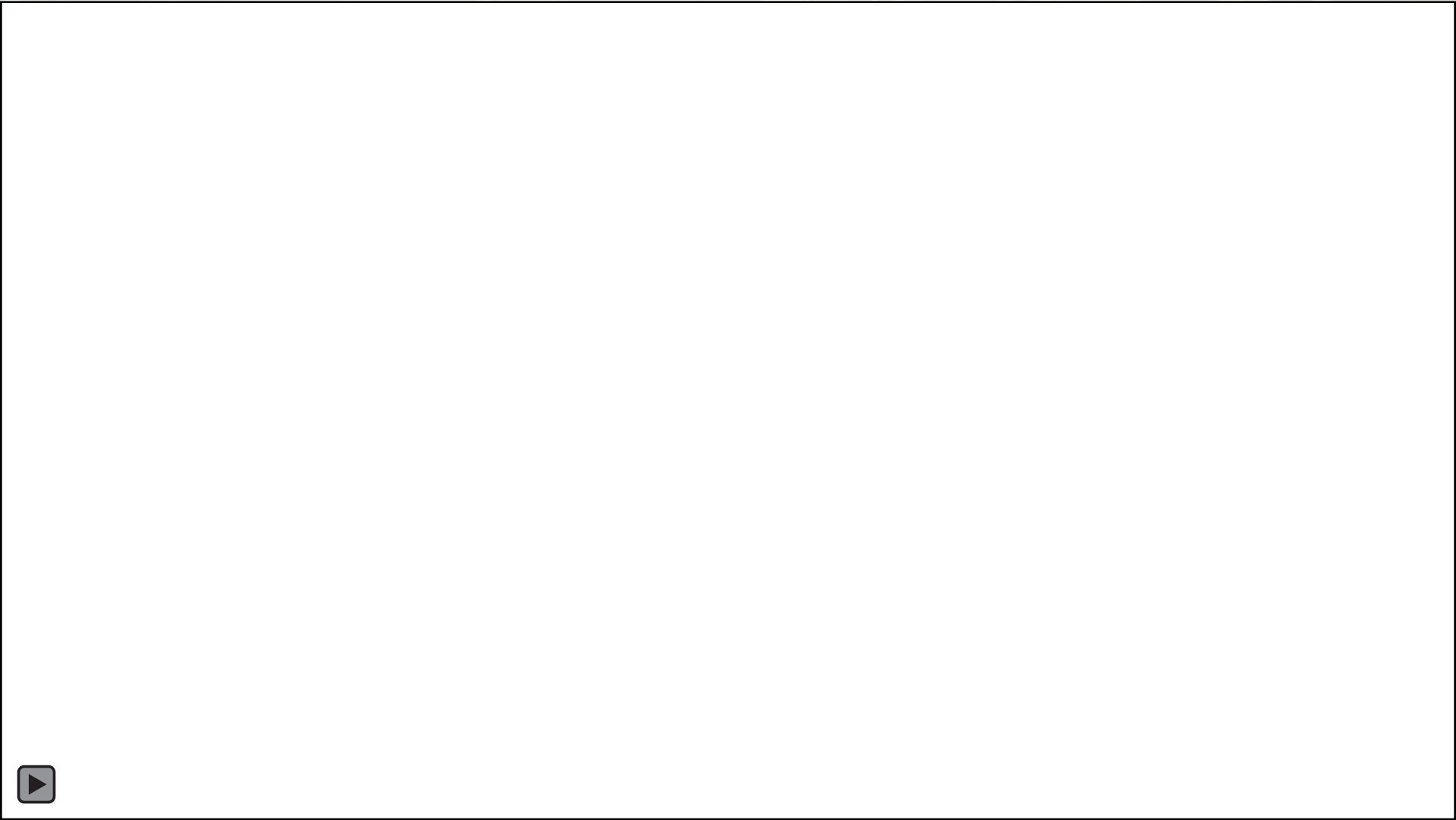
A lot of them don't know what it
means to be a **citizen.**

And just as many don't
know what it
means to be a
scientist.



The fact is — they are very
often **both**.

Yet many of their
parents and teachers
don't realise it.



**So the behaviour changes
we're creating: Getting kids...**

- Away from virtual game environments into real ones.**
- Learn about their environment.**
- Collecting data that's useful to scientists.**



The method:

Replicate the gaming experience outdoors in a way that's engaging for kids and which collects useful, verifiable data.



What's making it work:

- Partnerships - Atlas of Living Australia for species data.
- Over a year's worth of game development, algorithms, testing, cheat-proofing, etc.
- Over 20 years research in collective intelligence systems.



Results so far...(early days still)

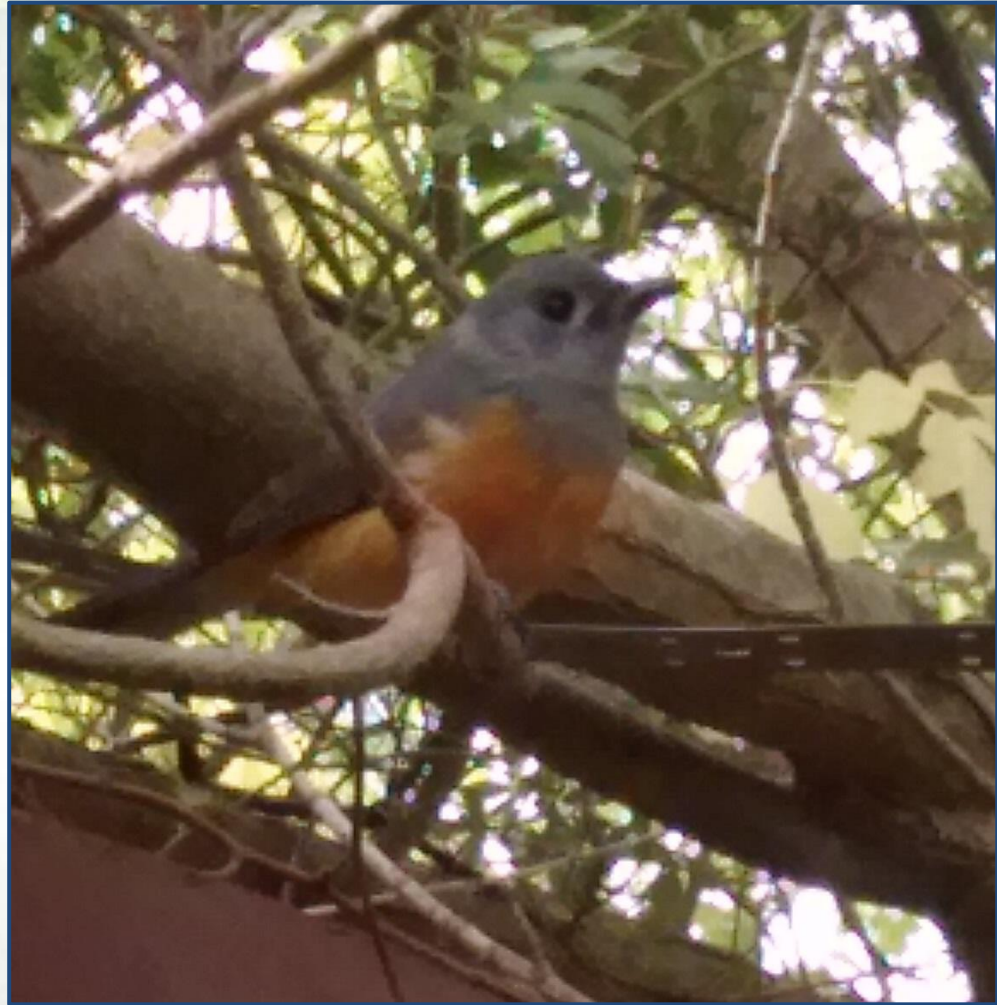
- “Gamification” appears to be working.**
- Data is cheat-proofed.**
- Competition is fierce.**

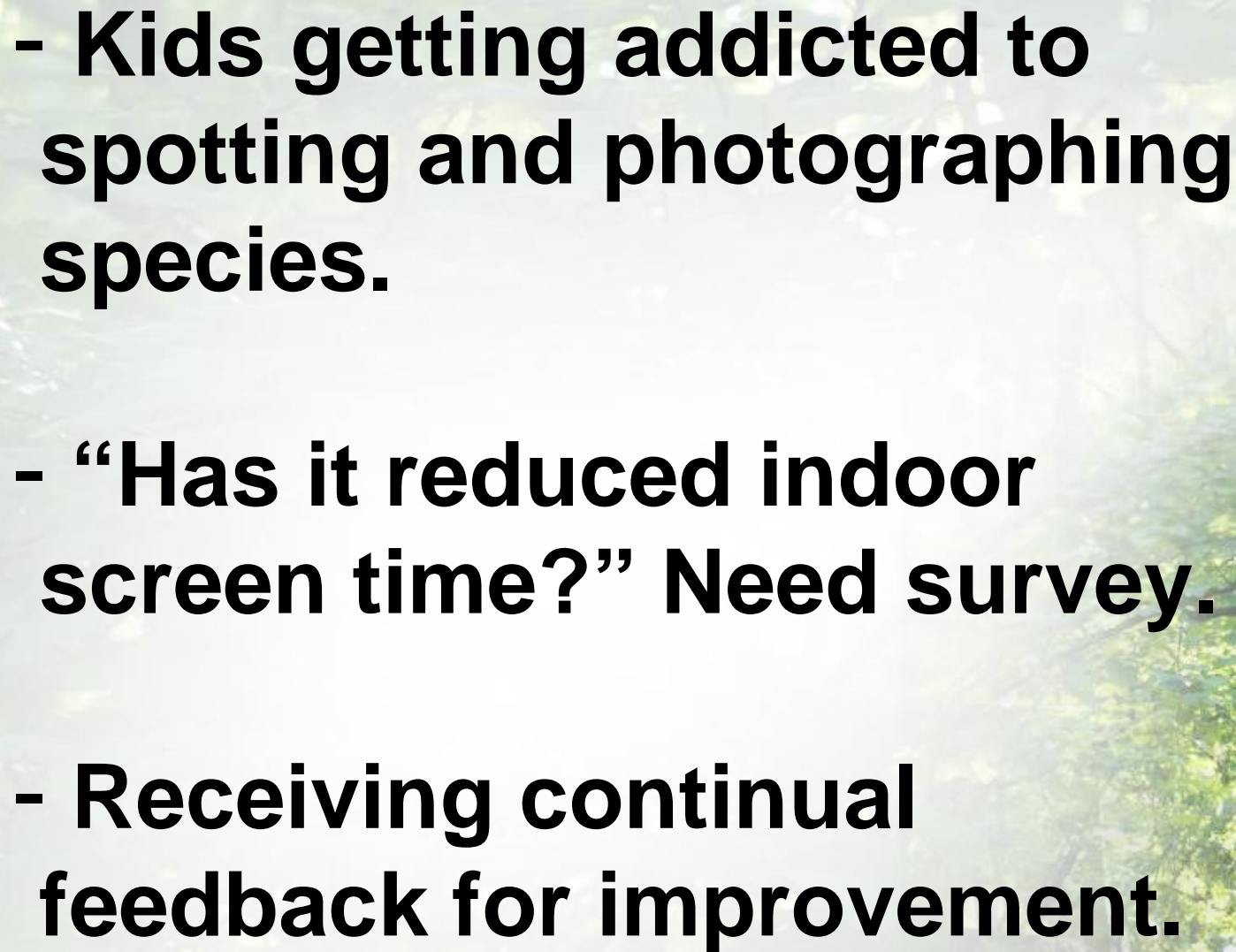
Data is useful to science

Black-Faced Monarch

Bungendore NSW
2621, Australia
March 14, 2014

User name: Gereon
Gold Earned: **15049**



- 
- Kids getting addicted to spotting and photographing species.
 - “Has it reduced indoor screen time?” Need survey.
 - Receiving continual feedback for improvement.

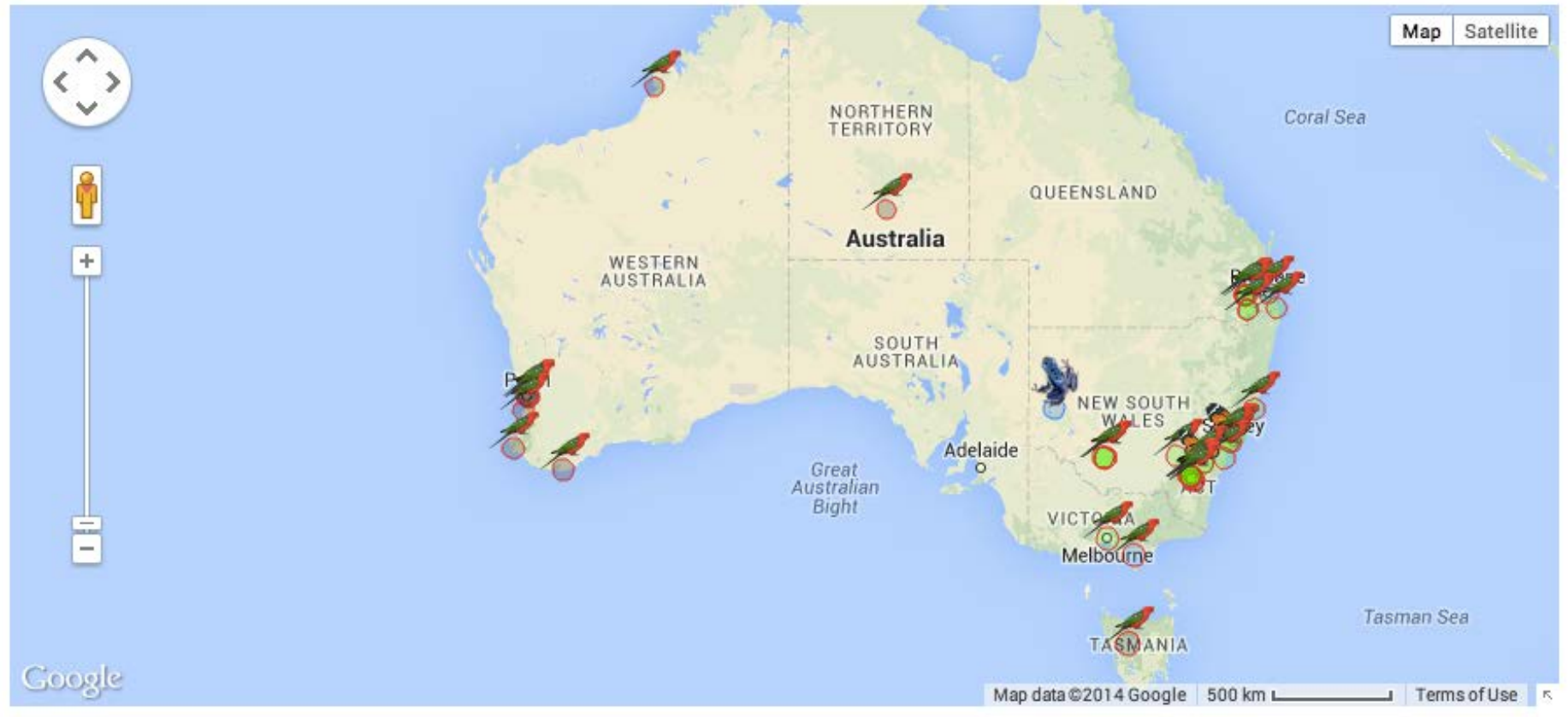
Interest from parks, gardens, university campuses...

- Ability to focus behaviour:
 - Weed control
 - Flora / fauna surveys
 - Target dark spots
 - Public engagement

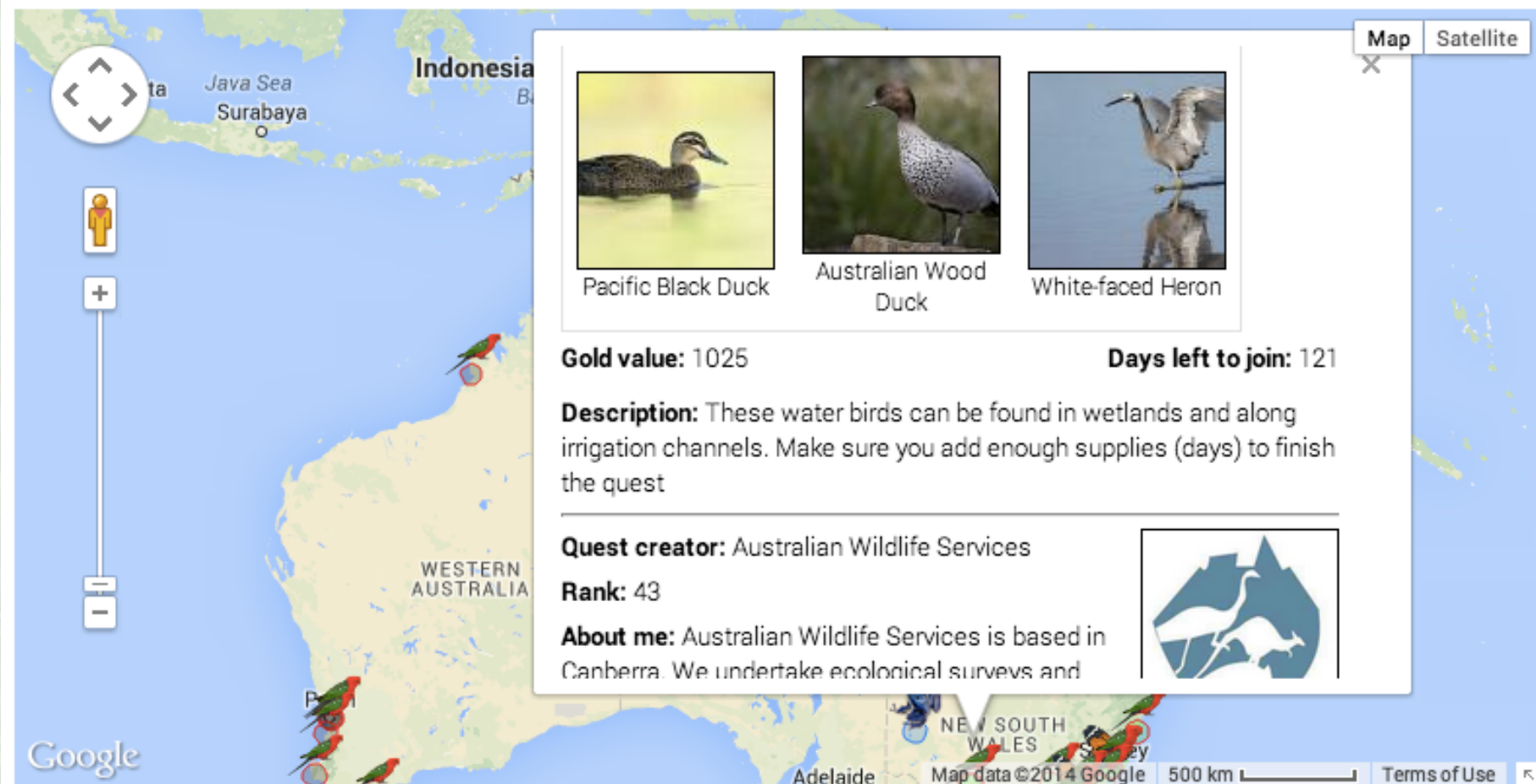


Office of
Environment
& Heritage

Live map of quests in progress...



Live map of quests in progress...



The screenshot displays a Google Map of Australia with several red bird icons indicating quest locations. A detailed quest information panel is overlaid on the right side of the map. The panel includes three bird images: a Pacific Black Duck, an Australian Wood Duck, and a White-faced Heron. Below these images, the quest details are listed: Gold value: 1025, Days left to join: 121, Description: These water birds can be found in wetlands and along irrigation channels. Make sure you add enough supplies (days) to finish the quest, Quest creator: Australian Wildlife Services, Rank: 43, and About me: Australian Wildlife Services is based in Canberra. We undertake ecological surveys and. A small logo of Australia with a white bird silhouette is also present.

Map Satellite

Pacific Black Duck Australian Wood Duck White-faced Heron

Gold value: 1025 Days left to join: 121

Description: These water birds can be found in wetlands and along irrigation channels. Make sure you add enough supplies (days) to finish the quest

Quest creator: Australian Wildlife Services

Rank: 43

About me: Australian Wildlife Services is based in Canberra. We undertake ecological surveys and

Google

Adelaide Map data ©2014 Google 500 km Terms of Use



ANDROID APP ON
Google play



Available on the
App Store

Global Spread



Targets – October, 2015



400,000 people participating in species awareness and biodiversity issues.



50,000 unique species submitted and correctly identified* against GPS coordinates (out of 300,000 submissions)**



8,000 unique species from “average” or “lower” Bio-Knowledge territories in Australia.



10,000 trained and qualified taxonomy assistants.

* Data verified by qualified verifiers (every piece of data tagged)

**Data formatted to Darwin Core specifications

QuestaGame

Thank you!



iNaturalist, Bioblitzes, and Behavioral Change



iNaturalist.org

Explore Learn Record



Explore!

Your World!



Learn!

About Life!



Record!

Add Observations!

Welcome!

to **iNaturalist.org**, where
you can **record** what you see
in nature, **meet** other nature
lovers, and **learn** about the
natural world.

[Learn More »](#)[Add Observations!](#)

Recent additions

A small bird with long beak

Observer: johngcramer

Observed: Apr. 6, 2011

Added: Apr. 6, 2011

2 IDs | [View »](#)



3 photos »

B silver bush lupine

Observer: loarie

Observed: Apr. 6, 2011

Added: Apr. 6, 2011

[View »](#)



C royal larkspur

Observer: loarie

Observed: Apr. 6, 2011

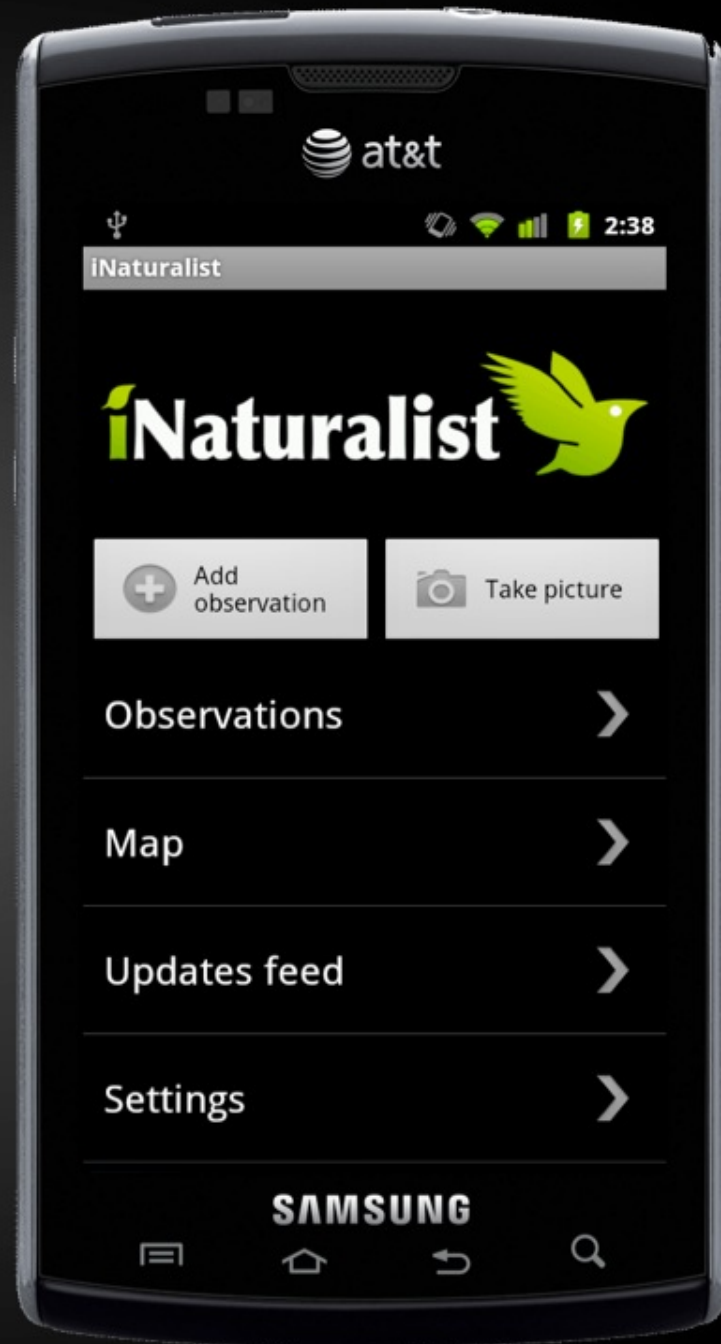
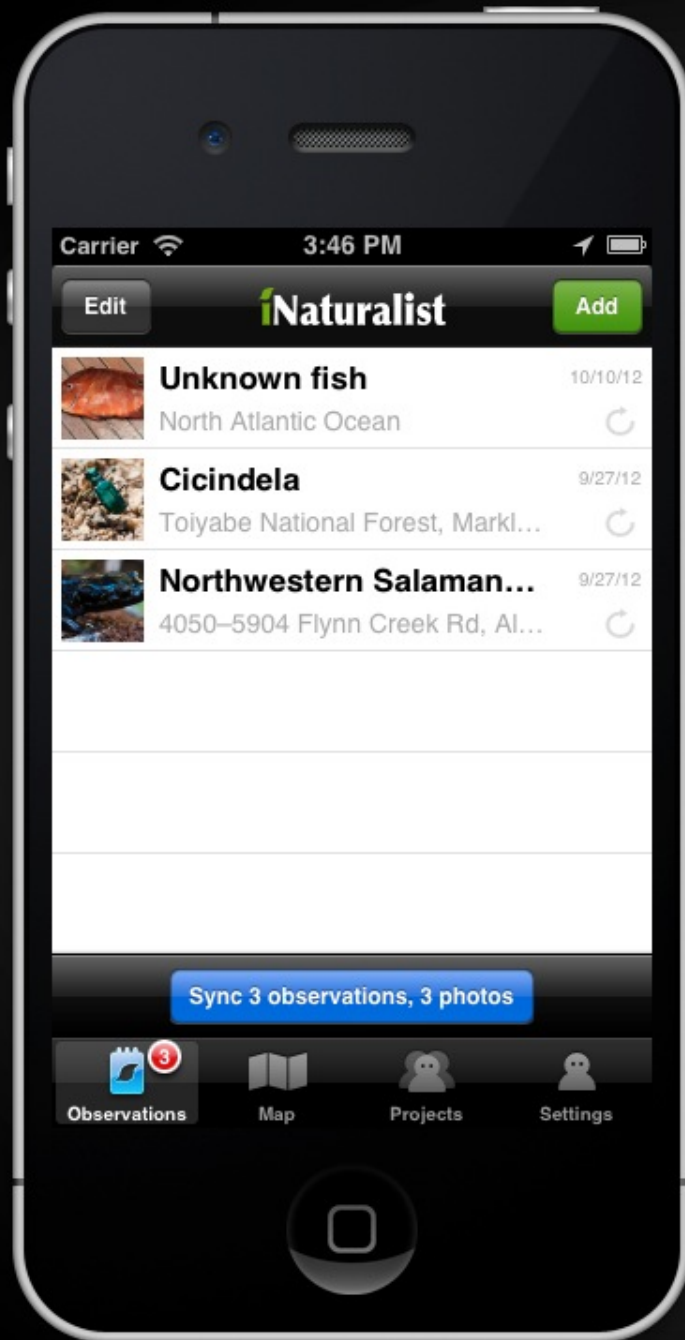
Added: Apr. 6, 2011

[View »](#)



D Lesser Goldfinch

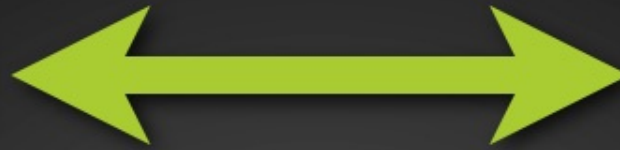








Connect
people



to
nature



through technology

And bioblitzes are...?



bio blitz

March 2
Golden Gate

Event Stats

Totals
11517
observations
1577
species
376
people

Most observations
 **goga-bio blitz-mahe**
881 observations
 **gogabioblitzdm**
745 observations



BIOBLITZ

MCLAREN PARK
SAN FRANCISCO, CA
Saturday May 11, 2013

Join Nerds for Nature, Bay Nature
and iNaturalist.org as we explore

Event Stats

Totals
1312
observations
234
species
43
people

Most observations



loarie
112 observations



greenrosettas
83 observations

Photos © Ed Brownson, CC BY-NC-ND, Nerds for Nature CC BY-SA

So whenever someone tells me they can't see nature where they are [...] I can show them that just about anywhere you can find a ton of neat stuff.

“Bio-blitzes have also made me fall in love with moths and moth lamps. From the perspective of my mother, that may be the single biggest change in my behavior, since, **when I was a child, I hated all insects**, but, for inexplicable reasons, moths most of all - a peccadillo that followed me into young adulthood. She says that **my newfound love of spiders and moths is quite puzzling, but I just can't get enough of them!**”

Jennifer Rycenga



“One of my coworkers found a neat moth in the stairwell to our parking structure, so I started looking for moths there. One day I found 15 different kinds! I'm an ecologist, but when it comes to moths I am a clear amateur... most of these species were identified by other people for me, though I since have learned some of the more common ones. So whenever someone tells me they can't see nature where they are [...] I can show them that just about anywhere you can find a ton of neat stuff. I won't deny that I still prefer to be in the field, but **considering all the time I spent in that stairwell before starting to see the moths... doing so has added a lot to my life.**”

Charlie Hohn



“BioBlitzes have definitely made our being out in nature more purposeful. We feel we are contributing, learning and having fun at the same time. Not only are we learning so much every time but meeting like-minded people feels great. [My son's] peer group in school isn't nearly as connected with nature as he would like them to be, so BioBlitzes are when he can connect with people who have a passion for bugs and other organisms like he does.

Not only have we gone out bug hunting more often, our family travels are like mini BioBlitzes now. Our interests have expanded to different kinds of organisms and continue to do so.”

Prerna Jain



iNat as awakened my love for bugs and being out in nature! **As a child I was constantly outside searching for bugs and other creatures.** My mom would be terrified every time I'd come home with a shoebox of new friends! I even made a bug hospital complete with tiny handmade hospital beds. I know, not very helpful, but at the time I thought I was doing something amazing.

Unfortunately that need to explore faded away as I became older. I was so busy with work, school, trying to figure out how to make a career in theatre. Now that I've been hiking more often, **iNat has helped bring back that side of myself. I don't just look at a plant and see a plant. I get close enough to see what could be crawling on that plant, and I want to know everything about it.** Even when I'm not hiking, I'm finding that I'm so much more aware of the life that's surrounding me. I could be walking home from the train station, and I'll notice a bird sitting in a tree, and I'll want to know what kind of bird it is, and try to take photos whenever I can.

Danielle Doyle



“iNaturalist has replaced facebook for me. I know -- monumental! :)”
Sam Kieschnick

“iNat made me buy and add a camera to my gear bag!”
Dave Barry



“Normally I wouldn't photograph the same species so frequently, but with Sea Star Wasting Syndrome, I now post an Ochre or Blood Sea Star whenever I find one.”

Wendy Feltham

“I am [...] simultaneously more interested and lazier about identifying unknown species I grab a photo of. I want to see what they are, but I will often let the community do the hard work. :/ (BAD NATURALIST.)”



Captain Fantastika Malone



“iNat has [...] made me more attuned to the environment when I go out into the field or even when I'm walking to the grocery.”

joelferree

Broader interests

Deeper focus

Access to a community

**Slower walking / chagrined life
partners**



What do **you** think?

Sign up!

<http://inaturalist.org>

Got skills?

<https://github.com/inaturalist>

Email

kueda@inaturalist.org

Designing Citizen Science for Behaviour Change



TeachWild participant, Australia

*World Parks Congress
15 November, 2014
Nancy Longnecker
Professor of Science Communication*

This Talk

Theoretical frameworks

- Integrated Model of Science Communication
- Theory of Planned Behaviour
- Identity Framework

Program management in theoretical context

Bibliography

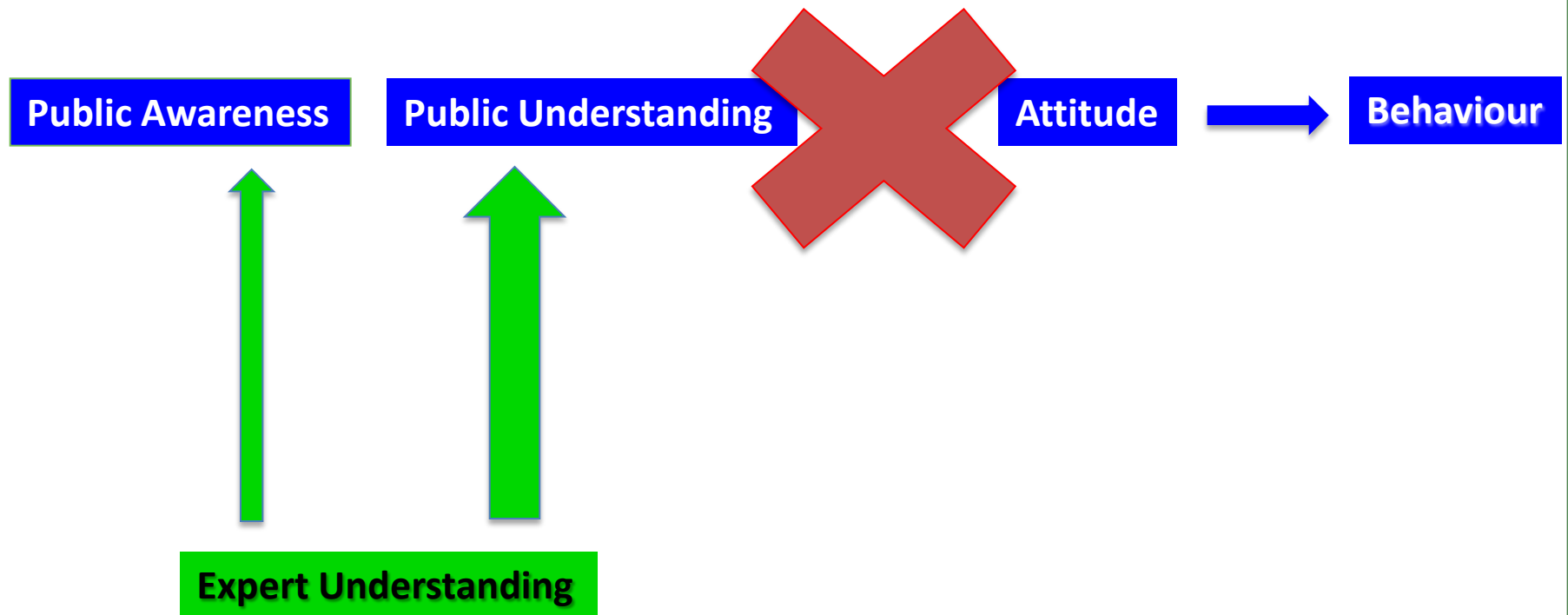
Take home message

To maximise chance of behaviour change,
benefit to participants' sense of identity.



Marine Metre Squared participants, NZ

Deficit Model of Science Communication and Behaviour Change



Knowledge is good!

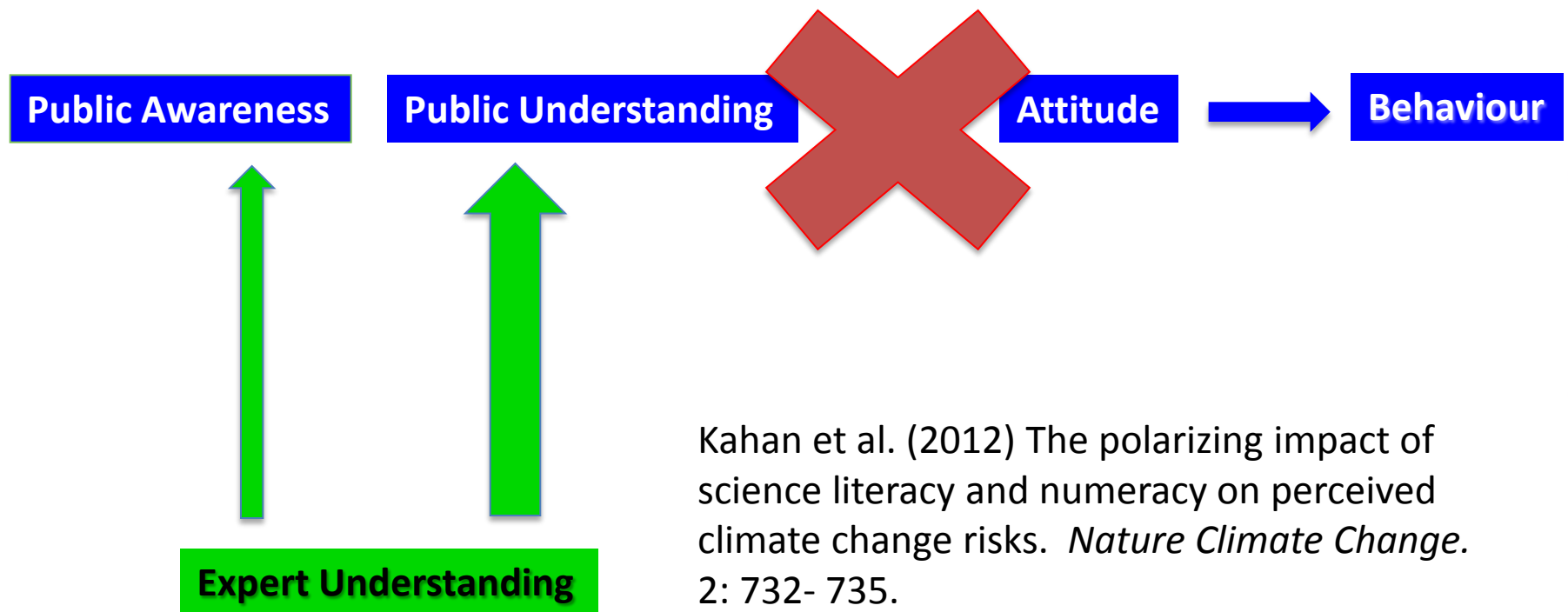
What do you remember about the day?

I remember that Jeridene was talking about marine debris killing animals and how we should try and stop it because it's us that are mainly causing the problem.

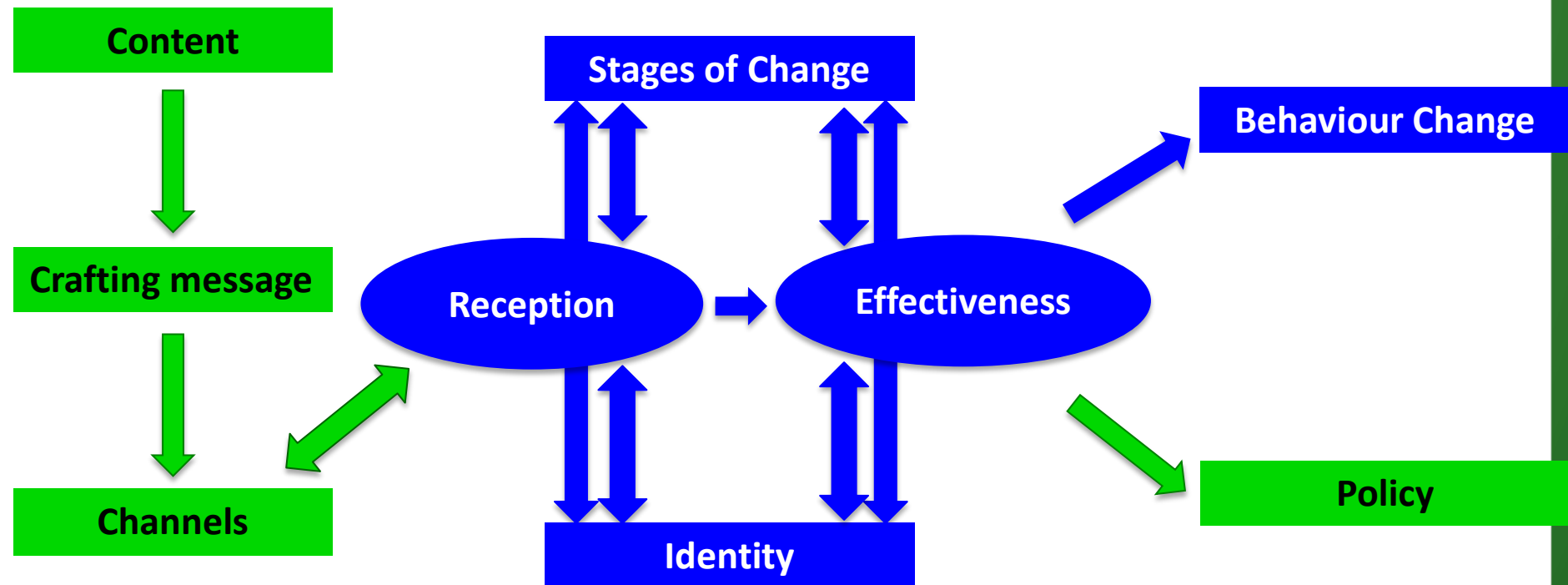
student; follow-up after TeachWild excursion, Australia



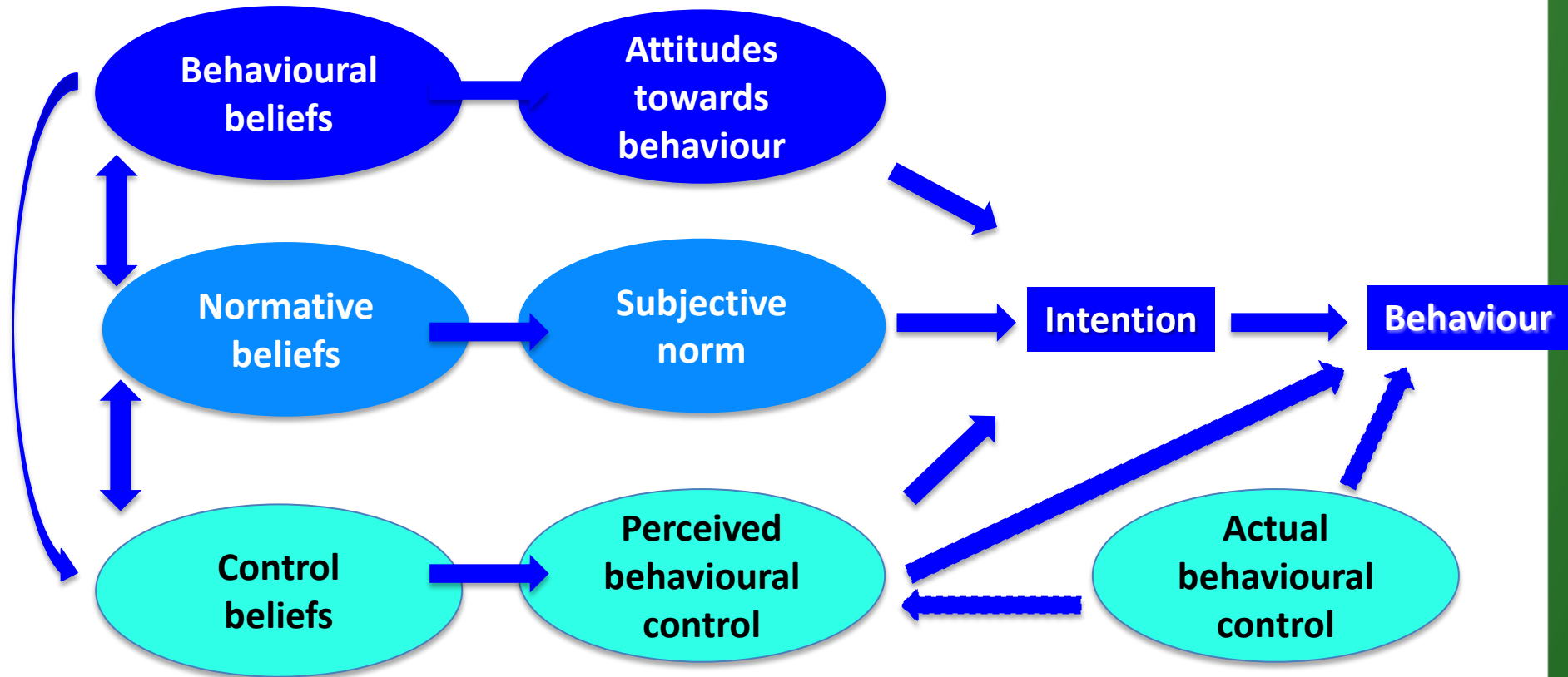
Deficit Model of Science Communication and Behaviour Change



Integrated Model of Science Communication

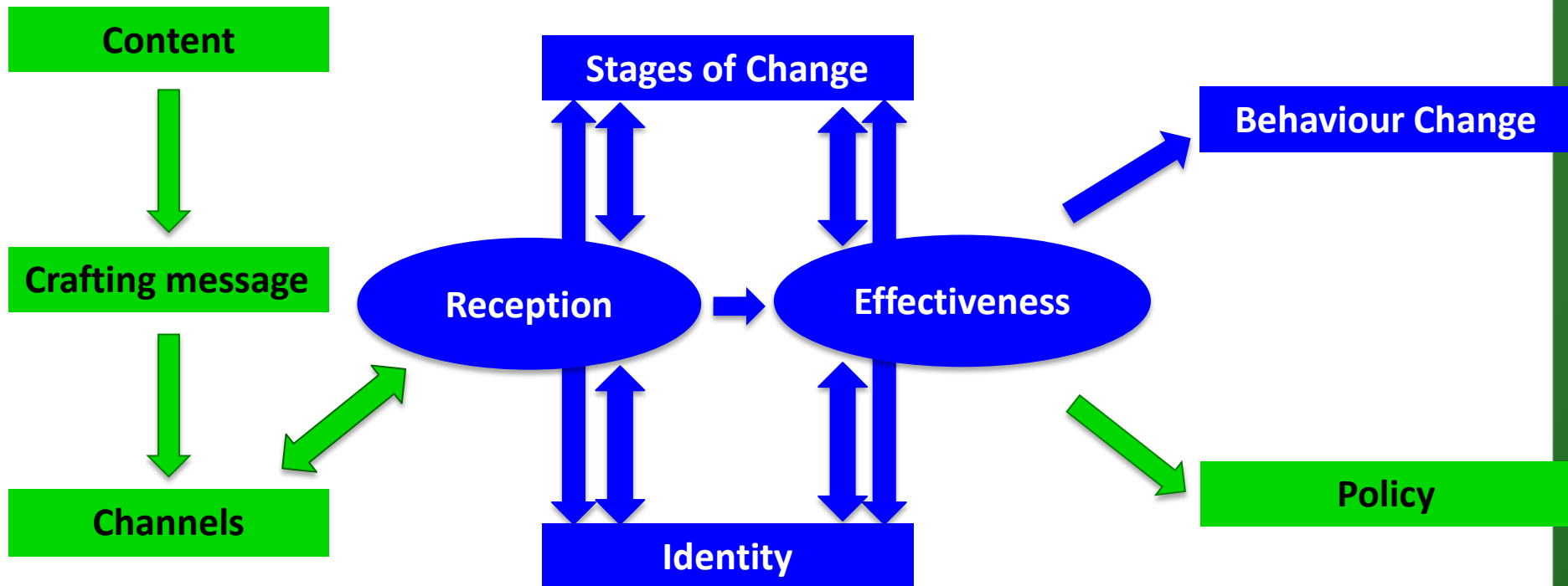


Theory of Planned Behaviour

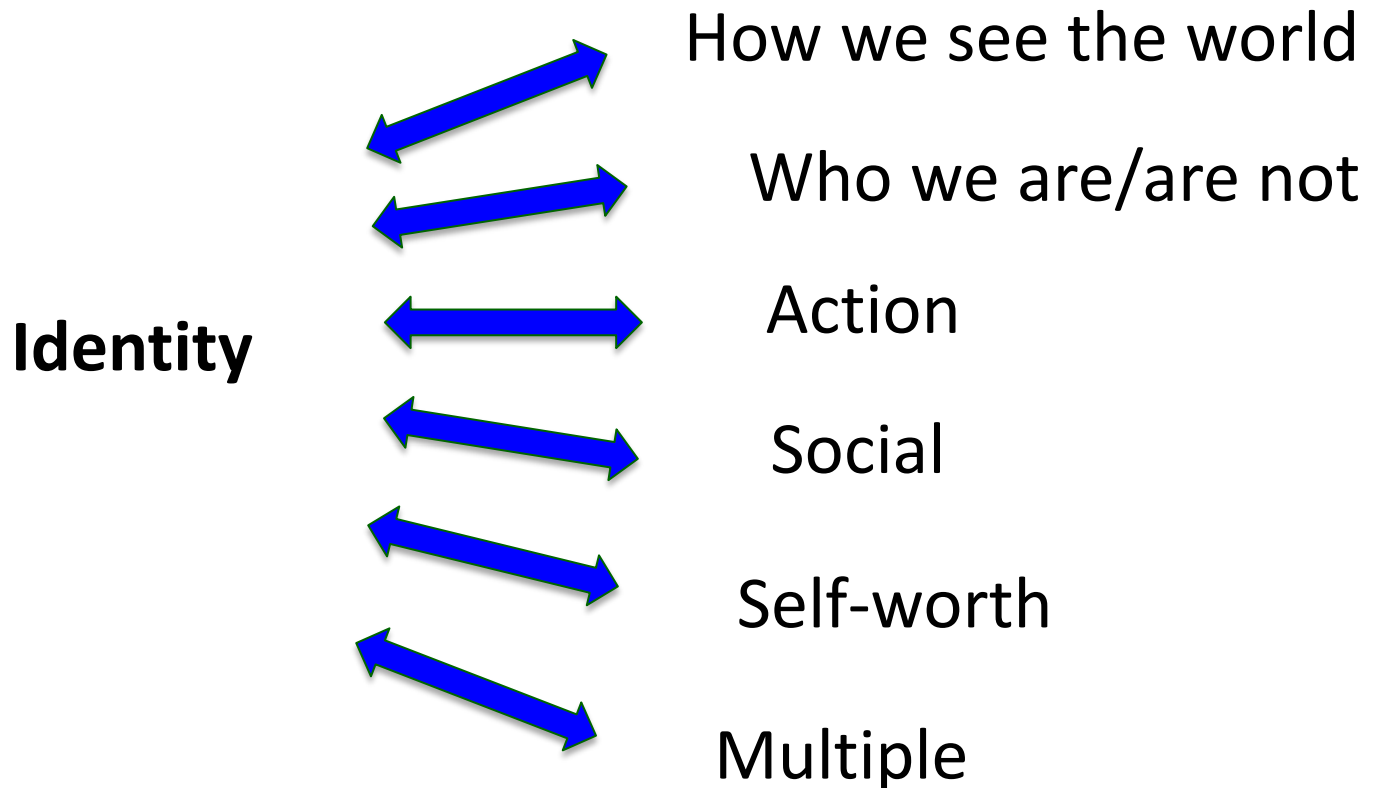


Fishein and Ajzen; from Ajzen, 2012

Integrated Model of Science Communication



Identity Framework



Identity



How we see the world

[I wanted to] do a little bit in helping to monitor global warming.

PlantWatch, Canada



Targeted recruitment



Identity



Who we are/ are not



I have always been brought up with a strong service ethic...I am interested in the environment... I want to play a public part, which is the reason for my volunteering efforts... To contribute.

ClimateWatch volunteer, Australia

Identity ↔ Action

Participants:

- do,
- observe,
- contribute



We went to the beach and did an emu walk to pick up rubbish. Then we did a data chart of the colour and type of rubbish. Then we watched a video and talked about what rubbish can last the longest.

student; 2 months after TeachWild excursion; Australia

Identity \longleftrightarrow Action

To maximise chance of behaviour change,
model the behaviour.

I don't buy bottled water.

Student, TeachWild, Australia



Identity ↔ Social

Participation as part of bigger whole

I liked the idea that my tiny contribution could become part of a bigger observation.

PlantWatch Volunteer, Canada

[I] enjoy reading other observers' comments and comparing dates in other areas with my observations.

PlantWatch Volunteer, Canada

Identity ↔ Social

Participation as part of bigger whole



Identity ↔ Self-worth

Empower participants.

- Training

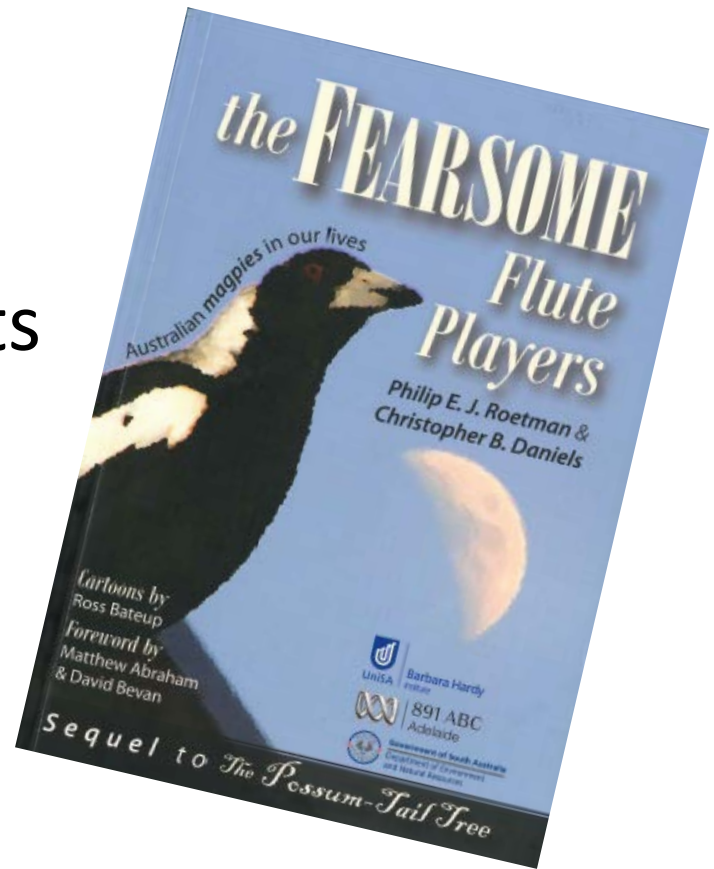
I did things that I'd never done before and I did things that I didn't think I could do - like cutting up a bird to learn the techniques without fainting or vomiting. So I came back thinking 'well if I can do that then there's lots of things I can do.

TeachWild Teacher, Australia



Identity ↔ Self-worth

- Rewards
- Acknowledgements



Identities



Multiple

- Good citizen
- Teacher
- Parent

[I got involved because of] concern for the environment and Australia's unique biodiversity.

ClimateWatch, Australia

As a teacher and the environmental coordinator I wanted to motivate my students to find ways to help and observe environmental issues.

ClimateWatch, Australia

I wanted to show my son how important it is to look after your environment and become a role model for him to follow...

ClimateWatch, Australia

Can participation change behaviour?

Have you done anything differently to reduce the impact of marine debris?

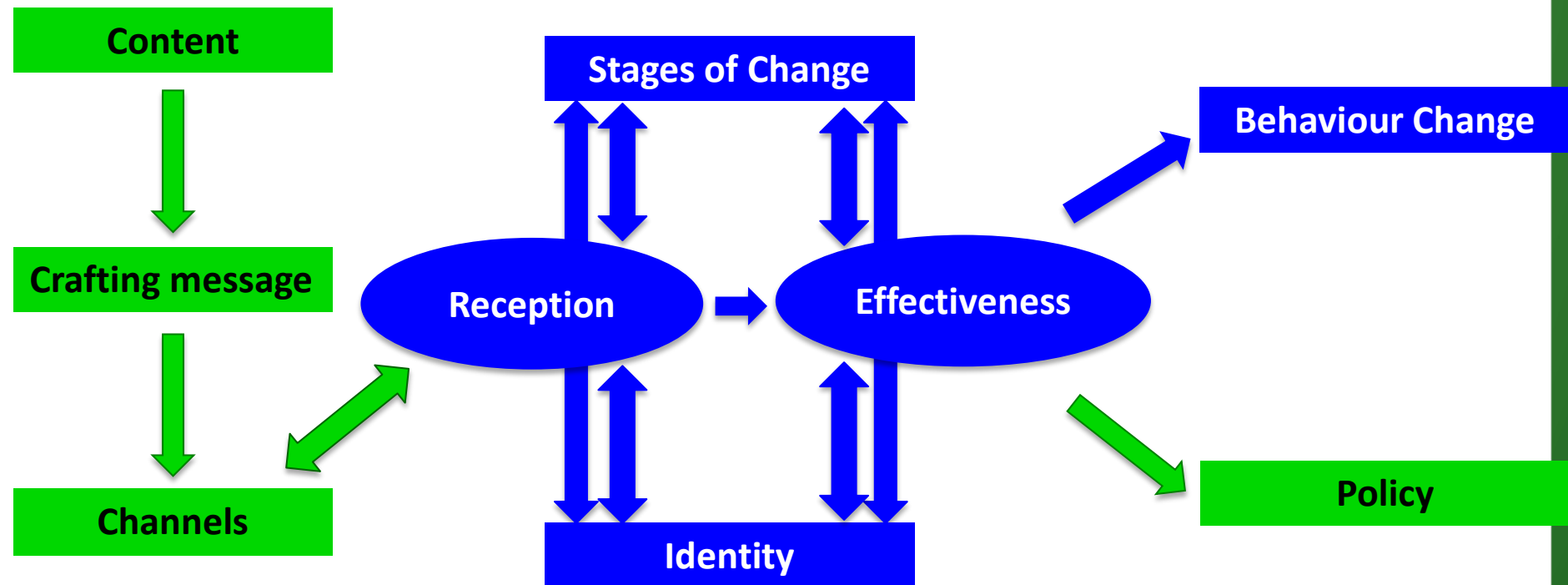
I have become a sustainability ambassador and a Millennium Kid and I have been looking for ways to stop using plastic: eco cups. I also went to the eco fair with Millennium Kids.

student; 2 months after TeachWild excursion, Australia



Photo: Jean Fletcher

Integrated Model of Science Communication



Take home message

Knowledge and information are not enough.

Programs should provide benefits to participants' sense of identity.

Research on citizen science



Centre for Science Communication *the home of storytelling and science*

Menu 



Contact: nancy.longnecker@otago.ac.nz

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Exercise: *theory into practice: 'ideas bank'* (10 mins)

Purpose: *Identify citizen science projects and behaviour change which can assist in protected area management*

Task: *In pairs or small groups, use the activity sheet provided to:*

1) Identify a PA management issue that could benefit from citizen science

2) Identify change in behaviour(s) (to correct issue)

3) Identify citizen science activity

<https://www.surveymonkey.com/s/58M7K59>

Example

Target audience: mountain bike riders

1. Mountain bike riders not staying on designated trail (causing erosion)
2. Stay on designated trail
3. (a) Measure sedimentation loads in nearby streams
(b) Analyse camera trap footage

Citizen science and protected area management: *'Ideas bank'*

Please leave your contact details if you wish to be contacted about future IUCN CEC citizen science initiatives:

Name	Institution	Email	CEC member?

In pairs or small groups, identify:

Target audience: _____

1. Management issue:	
2. Change in behaviour(s) required to correct issue:	
3. Citizen science activity(s) that could assist:	a. b. c.

Session summary

Theme one:

Citizen science is a successful, practical tool to engage adults and youth in conservation, PA management and can act as a catalyst for behaviour change

Theme two:

For maximum effect, behaviour change needs to be actively designed into citizen science projects

Outcomes

1. Citizen science incorporated into the Promise of Sydney
2. 'Ideas bank' summarised and emailed to participants
3. Establish special interest group for IUCN CEC

Session facilitator: Chris Gillies

The Nature Conservancy
chris.gillies@tnc.org

We value your feedback

1. Please rate how useful you found this session (circle number)?

(not very useful)

(extremely useful)

1

2

3

4

5

6

2. Further comments:

Thank you for your participation