Australian Government
Department of Industry, Innovation, Science, Research and Tertiary Education

INSPIRATION FROM THE DESERTS

SCIENCE ENGAGEMENT IN AND ABOUT AUSTRALIA'S DESERT REGIONS

PREPARED BY THE EXPERT WORKING GROUP ON SCIENCE ENGAGEMENT AND AUSTRALIA'S DESERT REGIONS

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Prepared by the Expert Working Group on Science Engagement and Australia's Desert Regions

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The Chair of the Expert Working Group on Science Engagement and Australia's Desert Regions would like to acknowledge and thank all the members of the Expert Working Group and the many people who contributed to the collection of data and information for this report.

Executive summary

The deserts have the power to inspire all Australians. And, as the most productive region in export income per capita in Australia, they play a vital role in its future. The science that explains, reveals and develops opportunities within this region is essential to creating both inspiration and driving prosperity.

Australian deserts cover five million square kilometres (around 70% of our landmass), which is among the most sparsely inhabited regions on Earth. They represent a formidable science communication challenge; current programs, while many and enthusiastically delivered, are also fragmented, uncoordinated and under-resourced.

Consultations in Alice Springs during the development of the Inspiring Australia Report highlighted these challenges as well as the fact that many separate organisations across different states and territories are currently communicating science in various ways. It is therefore proposed that these challenges should be addressed across the desert regions as a whole rather than state-by-state or via individual organisations.

The Cooperative Research Centre for Remote Economic Participation was asked by the Department of Industry, Innovation, Science, Research and Tertiary Education to convene and coordinate an Expert Working Group (EWG) to gather expert views on how science engagement can be enhanced in and for the desert regions of Australia. Ninti One then brought together key organisations and individuals working in science communication in the deserts. We approached organisations whom we felt best represented the breadth of knowledge and skills in this field. They include agencies working in science education, community and Aboriginal organisations, tourism and natural resource management entities and research institutions.

Through the deliberations of the Expert Working Group and the results of the survey we conducted, we are able to report the views of more than 100 organisations and individuals involved in desert science communication and the constraints and opportunities they see.

The EWG believes strongly that a more strategic approach should be taken to science communication in the deserts, which is at present highly fragmented across jurisdictions, organisations, audiences, aims, activities, funding sources and geographic regions. To develop a strategic overview will involve the engagement and coordination of 100+ government, semi-government, non-government organisations, not-for-profit organisations and private entities spread over five million square kilometres. (This is reflected in Recommendations 1, 2 and 3.)

Guided by their experience in the field over many years of science communication and by the necessity to engage desert Australians in issues close to their interests and lives, the Expert Working Group proposes development of a list of key themes for science communication activities in the deserts (page 13) and a process for setting priorities annually.

The group also collected a large number of highly promising ideas and proposals for future science communication activities (page 15). In view of likely resource limitations and the need to prioritise, it has also proposed a framework for assessment and prioritisation (page 12).

The EWG therefore proposes that a national network be formed of bodies engaged in science communication in the deserts, and that a suitable agency be appointed by the Commonwealth on a three-year rotating basis to administer, coordinate it and lead it (Recommendations 1 and 2).

The role of this Deserts Science Network (DSN) is envisaged as:

- to find synergies and opportunities to extend collaboration among existing desert science communication programs and projects, to make their impact wider and their resources go farther
- to plan and fund (Recommendation 3) new science communication activities and partnerships, using the Inspiring Australia principles, the key themes process (Recommendation 5) to prioritise topics and the decision framework (Recommendation 6) to choose the right ones
- to share ideas and guidance for best-practice science communication in the deserts, based on the evaluation and impact of existing projects, across all participating bodies and individuals (Recommendation 4)
- to ensure science communication in the deserts is relevant to the needs and situation of desert people (Recommendations 7 and 8)
- to collaborate and share ideas with other compatible and relevant bodies (such as the EWGs for Science engagement and tropical Australia and Science engagement and Indigenous Australians).

The Expert Working Group considers its eight recommendations are of a practical, affordable character which will greatly improve the nature, strategy and delivery of science awareness and engagement across the desert regions of Australia, and which factor in the Inspiring Australia principles.

Overall, these recommendations represent a concerted effort to bring together the perspectives of people living in the desert and people with experience of science communication in desert regions of Australia to improving strategies, coordination, practice and results in this field. Most importantly, we have directed the recommendations towards meeting the needs of people living in desert regions.

Photo courtesy of Ninti One

Summary of recommendations

No.	Recommendation
1	That the Commonwealth fund a Secretariat to coordinate and facilitate a Desert Science Network (DSN).
2	That existing science communication organisations and relevant bodies be invited to join a national alliance or network, to be known as the Desert Science Network (DSN).
3	That the Commonwealth provide funding to the DSN for desert science communication projects and activities to help establish the work of the DSN.
4	That the DSN establish best practice models for desert science communication that can be adopted by other organisations to improve their outreach. These should be based on measurement and assessment of the effectiveness of existing projects.
5	That the DSN adopt a 'key themes' approach to enable prioritisation among competing science communication activities.
6	That the DSN adopt the decision-making principles outlined on page 12 in their funding decisions for science communication activities.
7	That the DSN seek to ensure that desert science communication activities contain a focus on local knowledge, Aboriginal traditional knowledge and scientific knowledge systems working together.
8	That the DSN seek to ensure that people across the full breadth of the Australian deserts have reasonable access to science communication activities.

Introduction

Australia aspires to be an innovative society with a technologically skilled workforce, a scientifically literate community and well-informed decision-makers. To fully realise the social, economic and environmental benefits of the nation's significant investment in science and research, there is a need to communicate and engage the wider community in science, technology and engineering. The Inspiring Australia Strategy seeks to build a strong, open relationship between science and society, underpinned by effective communication of science and its uses. The national strategy has broad objectives that require the widespread support of science and research agencies, education providers, industry and the business sector, cultural and community organisations and many others working together.

Summary points taken from the Inspiring Australia Report (see page 47) include:

- Australia is a high-performing country in a wide range of areas across the sciences, and this has to be acknowledged nationally and globally with appropriate reward and recognition (Chapter 2. Telling Australia's story).
- Australia has a small population in global terms and cannot afford to squander its brain power. Therefore, it is important to develop the potential and interest of Australians irrespective of geography, ethnicity, age or social condition (Chapter 3. Engaging all Australians).
- A capable science workforce is a prerequisite for Australia. Thus students need enhanced experiences in science and mathematics to help ensure an adequate supply of professionals with appropriate skills (Chapter 4. Building Australia's capacity).
- To build on national leadership and coherent action, a national framework—local action approach, a strong Web presence and improved information flow and organisational networking—is required to achieve the goal of a scientifically engaged Australia. A supportive research and evaluation program is also needed to monitor progress and inform investment decisions (Chapter 5. Mobilising capability across Australia).

The following recommendations from the Inspiring Australia Report are particularly relevant to the desert regions:

> **Principle 8: Engaging Australian Communities**
>
> It is important that Australia continue to deliver high-profile, nationwide science engagement activities providing opportunities for the entire community to participate.
>
> **Principle 9: Building Partnerships—Using Networks**
>
> Australia requires effective mechanisms to facilitate public information flow and information sharing in the sciences, utilising the knowledge and resources of existing organisations and networks.

Principle 12: Unlocking Australia's Full Potential

To ensure a more equitable Australia, a special focus is required to maximise the potential of people who may not previously have had interest in or access to science engagement activities.

The overall strategy aims to inspire Australians to lead the world in science. A key part of the work is to foster a more coordinated approach to communicating the sciences to all Australians.

To take forward its objectives, the Australian Government through the Inspiring Australia Program has commissioned six expert working groups to analyse and make recommendations with respect to specific regions of the continent or areas of science communication. This Expert Working Group focuses on Australia's desert regions, and two of the other groups are considering geographical or thematic areas that overlap with our work: the Expert Working Group on Aboriginal engagement and the Expert Working Group on science engagement and tropical Australia. We have sought to collaborate with these two groups and have therefore shared draft reports and cooperated through a teleconference of the Chairs of the three groups during the period in which they were operating.

The desert regions of Australia are subject to the perceptions of two different populations: those who live in the regions and those who live outside them. **Australia is unique in the way that much of our national identity is based on romantic notions of the vast outback and the demands of a harsh and remote environment, while the political and economic powers of the country are located on the coast.** In this sense, while the desert is geographically the 'backyard' of most of the states and territories of Australia, it remains a place to be imagined by most people rather than experienced.

This dichotomy introduces a challenge for science communication because we are working to meet the needs of two distinct audiences. On the one hand there are desert dwellers and people travelling to the desert, whose social, environmental and economic sustainability and advancement will benefit from more effective dissemination and use of scientific and technical knowledge. The other audience is people from outside the desert who stand to gain from improving their knowledge and understanding of the desert as one of the defining features of Australia, its economy and its culture. Failure by this group to understand the deserts and its people and to invest in the right desert science at national level could limit our ability to manage the greater part of our continent effectively and sustainably. This group includes decision and policy-makers based mainly in capital cities on or near the coast who have a major impact on the provision of desert services and infrastructure. We therefore recognise the value of complementary communication strategies and processes that make use of the same science content, but in different ways.

The role of the Expert Working Group was to explore the theme of science communication in the desert regions of Australia, with the aims of:

- developing a national strategy, aligned with government and Inspiring Australia priorities, which will strengthen science communication in the desert regions of Australia
- facilitating collaboration between stakeholders, including government, business, academia, research and the broader community
- identifying opportunities to improve and encourage science communication into and for the desert regions.

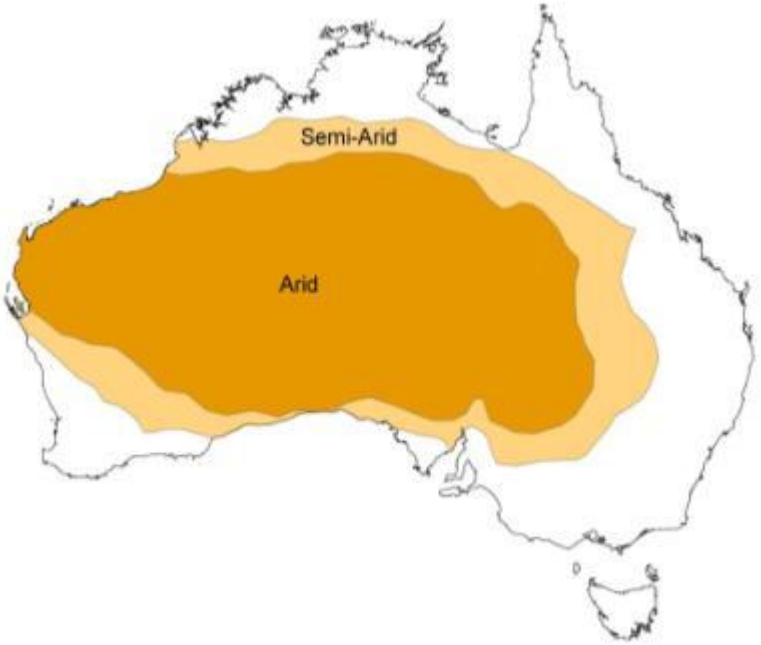
Its Australian Government 2010 members were drawn from the following categories, whose descriptions we recognise may not perfectly fit their activities but represent the core activities of each:

- government agencies working in science education: Northern Territory Government
- not-for-profit organisations in the science communications sector: Scitech Discovery Centre and Questacon
- community and Aboriginal organisations: Centre for Appropriate Technology, Arid Lands Environment Centre
- tourism and natural resource management organisations: Alice Springs Desert Park
- research institutions: Centre for Remote Health, Ninti One/CRC-REP
- media and science communication organisations: Australian Science Media Centre, eConnect Communications
- organisations working for economic development: Desert Knowledge Australia.

About the deserts

There are many ways to define the desert regions of Australia. For the purpose of this report they are taken to be the 70% of the continent that is remote, dry, sparsely populated and with a highly variable climate and scarce resources. This includes the deserts themselves, and the semi-arid rangelands (see Figure 1).

Figure 1 The desert regions of Australia



Source: DKCRC and CSIRO 2005

Everything that lives in deserts, including people, depends for survival on highly specialised strategies (such as high mobility, ability to capitalise on ephemeral resources, ability to store and eke out scarce resources etc) that capitalise on unpredictability and resource scarcity. These strategies, and the knowledge that underlies them, are likely to be of increasing significance in a world in which (a) deserts are expanding everywhere, (b) resources are becoming scarcer, and (c) the climate is becoming hotter and more uncertain (Stafford Smith & Cribb 2010).

Deserts are also distinctive in other important ways. Their people rely on a body of highly specialised knowledge about survival in challenging conditions. This leads to unique desert cultures, based on deep local knowledge—Aboriginal people, miners, pastoralists, ecotourism operators and the Royal Flying Doctor Service are all examples of this. Second, they are often at the mercy of political and economic decisions taken by people or markets thousands of kilometres away, which may not always fit with the 'rules' and conditions of desert life and survival. This explains why well-intentioned central policies or advice do not always translate into effective outcomes on the ground in remote regions.

Deserts are different from the rest of Australia environmentally, culturally, economically and physically. Their people depend critically on local knowledge and on relationships for their survival and prosperity—so it is essential to engage them in the conversation about what knowledge they need and how best to apply it. This perspective informs the advice tendered in this report. The wide dispersion and high mobility of the desert population makes science communication, indeed any form of communication, a constant and substantial challenge.

Although the Australian deserts contain only 3–4% of the population of the country as a whole (about 700 000 people) these people are significant in many ways. Desert people tend to be widely dispersed, live in small communities and are far more mobile over large distances than their urban counterparts. Many are permanent desert dwellers, with high levels of local knowledge and multiple skills, such as Aboriginal people and pastoralists, while others are itinerant visitors such as miners, government officers, teachers or tourists. Between them, **this population generates $90 billion in annual export incomes—more per capita than any other region of the continent.** The deserts contain much important economic and physical infrastructure, vast natural resources and are central to national security. Their starkly beautiful landscapes, wildlife and diverse cultures are intrinsic to our self-image as Australians.

The more remote desert regions in Australia are predominantly populated by Aboriginal Australians, who experience significantly poorer health outcomes and higher rates of chronic disease (especially diabetes, kidney and cardiovascular diseases) than the non-Aboriginal or Torres Strait Islander population. This burden of disease is estimated to be two and a half times greater than that of the total Australian population. This health gap is caused in part by the distance from medical services, with 417 Aboriginal communities (mostly located in desert regions) being located ≥100 km from the nearest Aboriginal Primary Health Care Centre. These alarming facts highlight the need for culturally appropriate, effective science communication and engagement strategies that are tailored to individual desert community needs, which will enable people to understand how to avoid disease, stay healthy and help 'close the gap' in health outcomes for Aboriginal and Torres Strait Islander Australians (COAG 2007).

Finally, an important feature of desert regions in Australia is the high degree of mobility of its residents compared to other settings. This mobility includes the regular travel required for people living in small settlements, mine sites or cattle stations to make use of essential services in towns, the migration required for work, and the travel that is part of the culture of many Aboriginal people in remote Australia. Mobility is therefore a characteristic of the deserts and represents both a challenge for and a means of people gaining access to services such as health, education, food, water and the other necessities of life.

Photo courtesy of Ninti One

Science communication in desert Australia

Science is of exceptional importance in the desert and arid rangeland regions, which comprise almost three-quarters of the Australian continent. It is the underpinning of most of the industries, such as pastoralism and mining, that provide income and livelihood in these regions. It is essential to understanding and caring for the complex and fragile landscapes that comprise the desert, and to the conservation and wise use of their physical and biological resources. It is core to the delivery of services from communication, transport, housing, water, energy and health care, to education, financial services and physical infrastructure. It is key to healthy, happy, prosperous and sustainable communities, towns and cultural activities.

In this report, 'science communication' refers to the wide range of activities that enable the public, communities, industries and government to interact with science, scientists and scientific issues and processes, and especially to apply scientific knowledge and insights in their own lives, work and thinking. A 'science communicator' is anyone involved in the transmission of scientific knowledge or technology for beneficial use; this could be a professional communicator, but it can also include scientists themselves, science teachers, technical trainers, health care workers, journalists, technical experts in industry and government, skilled members of local communities and elders. This broad definition allows us to take advantage of the very wide range of ways that knowledge is disseminated in desert society, the networks and the many people involved in its transmission.

We also acknowledge that **effective communication is a two-way street involving interaction, dialogue, participation and exchange of knowledge and insights between desert people and those involved in science**. It is not a one-way 'science push' activity. This view recognises that, in order for science to be adopted and widely used, it must meet the manifold needs and values of the society it serves, and the society must feel some ownership of it. Importantly for the desert regions, an understanding of the science of the desert must embrace the local knowledge of people living there, including Aboriginal people, pastoralists and those with extensive experience and knowledge of the resources and the environment of desert regions.

Aboriginal knowledge systems, including cultural and technical knowledge, deserve a particular emphasis since they have much to contribute to scientific understanding of the deserts. Science communication that simply promotes Western science overlooks the complementarities and synergies between Aboriginal perspectives and contemporary scientific understandings of the Australian desert regions.

Currently science communication in the deserts is fragmented among many different jurisdictions, agencies, funders, actors and activities. One of the most urgent and obvious necessities is the formation of a network that will enable people to collaborate across jurisdictional boundaries and the funding frameworks that currently exist.

Digital communication in the desert

Web and digital technologies have great potential to contribute to improved science communication in desert regions. However, the effectiveness of these methods in communicating with desert audiences needs to be carefully considered. The following points are relevant to online communication in particular for Aboriginal and Torres Strait Islander communities and have been considered in the rationale for Recommendation 8 of this report:

- at the last completed Census (2006), only one in five Aboriginal and Torres Strait Islander households in remote and very remote Australia had an Internet connection compared with four in five of the rest of the population
- the portion of households with Internet connection was even lower in some parts of the country, including central Australia where take-up was 2.2% for Aboriginal and Torres Strait Islander households.

These figures demonstrate that Aboriginal and Torres Strait Islander people living in regional and remote areas have less access to the digital revolution, which has and will continue to change the social and working lives of other Australians.

Access to communication services, especially the Internet, is essential to achieve the targets agreed by COAG for closing the gap in Aboriginal and Torres Strait Islander disadvantage. Improved access to ICT for Aboriginal and Torres Strait Islander people in remote communities is required for participation in contemporary Australian economic, political and social life.

Technology is one of the most powerful catalysts of change at hand today. Yet under current National Broadband Network (NBN) planning, 93% of Australians will have access to the fibre solution; the remaining 7% will receive a satellite or wireless solution. Some Aboriginal and Torres Strait Islander populations living in remote Australia (over 108 000 people) may not have access to the fibre solution.

As in many fields, the growth of social media is relevant to any discussion of science communication in Australia's desert regions. A good example is the use of Facebook by the Country Women's Association, which has reported a large increase in membership due to its use of social media. This form of communication is particularly

suited to desert regions where distances are great, face-to-face options are more difficult, and individuals may be reliant on community or shared IT resources, but it relies on good Internet access.

Activity of the Expert Working Group

The Expert Working Group—Desert Regions held two physical meetings in Alice Springs, three by conference call, and had extensive email exchanges in response to the report as it developed. The meetings included members of other Inspiring Australia expert working groups, to ensure continuity and consistency with their findings. This was supplemented by an extensive phone and online survey of 101 organisations and individuals unable to take part in the teleconferences. Those consulted through the survey are listed in Appendix 1.

Survey

The survey questions gathered quantitative information about basic demographics of science communicators in desert Australia, whether they knew of the Inspiring Australia Strategy, the types of organisations they worked for and who their audiences were for science communication. Then the survey gathered qualitative information about the examples of activities and programs people used to communicate science and what they regarded as the main obstacles to effective science communication in desert Australia. It asked people to identify things that would increase the effectiveness and reach of science communication, to rate methods of effective communication, and to give suggestions for projects that would help communicate science in desert Australia.

The results are described in more detail in the next section.

This consultation has produced four outputs:

- a proposed method for selecting and prioritising science communication activity, based on some key principles (see page 12)
- an overview of current science communication activities and comment on what most limits them (Appendix 2 Q. 9 and Q. 11)
- a list of key themes to guide future desert science communication activity (see page 13)
- examples of potential science communication activities across the deserts and beyond (see page 15).

From these, the Expert Working Group—Desert Regions has derived nine recommendations which we consider to be practical, affordable and capable of delivering the results required by Inspiring Australia and by the people of desert Australia.

Results of consultation

Overview of science communication in the deserts

As described above, besides its direct consultation, the Expert Working Group conducted an online survey of 101 organisations and individuals involved with or interested in science communication in desert regions. These consisted mainly of government agencies, universities and research centres, educational and not-for-profit bodies (Appendix 2, Q. 5). Their main activities are (i) research, (ii) education and training, and (iii) communication (Appendix 2, Q. 6). Almost 60% of respondents said they were engaged in some form of science communication in the deserts. They identified their main target audiences (Appendix 2, Q. 8) as:

- Aboriginal people, organisations and communities (62%)
- the general public (56%)
- school students (50%)
- industry (50%)
- teachers (48%)
- community groups (46%)
- media (26%).

Respondents were able to select all applicable audiences and therefore the percentages total more than 100.

Science communication activities

These organisations provided many worthwhile examples (Appendix 2, Q. 9) of current science communication activities, which included:

- interactions with schools through visits and information displays, hosting visits from schools, conducting field trips and ongoing schools programs
- publishing in formats ranging from fact sheets, big books and newsletters through to magazines, reports and journal articles
- presenting at conferences, exhibitions, public lectures, seminars, information nights and on radio programs
- hosting awareness events, workshops and websites.

The topics covered in these activities ranged from dog health and pest control to geophysics and climate change. The audiences were school and university students, the general public, Aboriginal communities and scientists.

Constraints to effective science communication

Respondents were asked how effective they currently found science communication (Appendix 2, Q. 10). Just over 40% had a neutral response to this question, but almost 35% found it 'somewhat ineffective'. Only 20% responded positively, saying they found it 'somewhat effective', and just 2% found it 'highly effective'. No-one responded that it was 'totally ineffective'. The constraints they identified to effective science communication in the deserts were a lack of funding, resources and skilled staff at the right locations. These primarily reflect the challenges and costs of distance, isolation and reaching small, dispersed populations. As one respondent commented: 'Seems to me that this is probably an overlooked audience—out of sight, out of mind.' Increased Internet bandwidth and access to it for remote populations are regarded as very important enablers by many respondents.

Several people were concerned at the lack of cohesion, consistency, strategy, cooperation and clear direction for science communication in the deserts. For example, one individual commented: 'Dysfunctional system. Needs a total rethink for desert communities.'

Improving the effectiveness of science communication in desert Australia

Respondents were asked to nominate three changes which, in their opinion, would most increase the effectiveness of science communication in the deserts. This produced a long and diverse list of suggestions ranging from increased funding to better training, greater collaboration, stronger networks, improved Internet access, greater cultural relevance, local champions, multi-lingual communicators, more roadshows, more health awareness programs, local resource centres and scientists in schools. These are reflected in our findings.

There was strong agreement among respondents that **face-to-face interaction is the most effective way to communicate science**. However, this raises obvious cost and logistic issues in the context of sparse desert populations. Face-to-face contact is especially important for isolated communities and particular audiences, and the Expert Working Group considers that special consideration should be given to programs that 'train the trainers', develop science champions within local communities and industries, and generally enable local science advocacy to develop.

Balancing this, there is **an equally strong case for projects that employ mass communication methods (Internet, radio, video, films, TV) to reach large widely dispersed audiences**. We consider that well-thought-out desert science communication projects will address both macro- and micro-level communication. In practice, this means achieving a suitable balance between the communication methods available for the activities we wish to pursue, with macro-level methods to include mass communication, social and broadcast media, and micro-level methods to include face-to-face contact with people through schools, roadshows and similar means.

The use of social media is currently regarded by some as a less effective method of science communication, chiefly because of the low access of remote communities to it. However with the advent of the NBN and growth in availability of digital media and devices this situation may change rapidly, even in very remote areas. In general the EWG recognises the huge potential of social media as a tool for low-cost, interactive science communication and knowledge sharing in the deserts.

Decision-making principles

In order to set priorities and make sensible, cost-effective choices among a very wide range of potential science communication activities and organisations, the Expert Working Group—Desert Regions considered there should be a set of basic principles against which proposed projects can be assessed (see Recommendation 6 below). These are:

1. **Proposed projects should harness existing activities, knowledge, skills and resources, improve coordination and use existing networks wherever possible.** The Expert Working Group—Desert Regions took a strong common view that science communication across such a vast and multi-jurisdictional area as the Australian desert regions will always be prone to fragmentation of effort. An important step towards achieving better results is therefore to coordinate more effectively and work together to make the best use of existing resources.
2. **Projects should recognise science communication as a two-way exchange of ideas and information and provide scope for dialogue and participation.** The Expert Working Group—Desert Regions rejects the model where people are passive recipients of science knowledge imported from elsewhere. It regarded specialised 'desert knowledge' as equally valid with other forms of scientific knowledge, and considers that a two-way exchange of knowledge offers the best prospects for engagement of desert people.
3. **Projects should pay close regard to the 15 principles articulated in the Inspiring Australia Report, meeting as many as possible.** The underlying value of the Inspiring Australia initiative is recognised by the Group and we wish to articulate its principles in our work. In practice, this means that the design and implementation of any new science communication activity would take into account the principles and be evaluated on their effectiveness. This will also enable us to gauge which principles are most relevant and effective in desert region science communication.

Photo courtesy of Ninti One

4. **All projects should incorporate an evaluation process that can demonstrate beneficial impact.** Achieving meaningful change depends on proper reflection on what has been achieved. The evaluation methodology needs to be practical and to be shared, so that the measurement of performance and outcomes of projects is helpful in planning future projects and in creating a 'best practice' model.
5. **Projects should have, as a clear goal, the aim of transforming the desert economy, environment or society in ways that improve wellbeing, prosperity and sustainability.** Clarity of the purpose of improved science communication is essential, meaning that work should start with the end in mind. Science is transformational and its objectives for the desert should focus on priorities for people living there.
6. **Projects should seek a balance between broad-scale mass communication methods and more direct, face-to-face methods.** Effective science communication relies on well-informed strategic choices. Across such a large area as desert Australia, this means making decisions about situations in which direct and personal communication would achieve most impact compared to mass communication methods. We envisage a mixture of both approaches being appropriate.
7. **Honouring the diversity of desert languages, science communication activity should not be restricted to the English language.** Most Australians are unaware of the range and importance of Aboriginal languages in desert regions. To reach the largest number of people, we recommend that science communication should make use of Aboriginal languages where feasible.

Key themes requiring focus in desert science communication

To bring greater clarity to the task of selecting suitable science communication activity in the deserts, the Expert Working Group—Desert Regions identified a number of key themes which it considers merit greater emphasis in science communication activities within and about the deserts.

Each of these issues was regarded as critical to the survival and prosperity of desert communities, industries and people. The list is not fixed, nor did we seek to assign

priorities—it is intended purely as a guide to assist in choosing relevant science communication projects for funding, to be revisited and revised annually. However it is based on a realistic assessment of the issues which people working in science in the deserts know to be of major concern and relevance. See Recommendation 5, below.

The issues are (*not* in order of priority):

- **Water:** new approaches to sustaining and recycling water in dry regions, improving water use efficiency in industry, communities and the home.
- **Energy:** sustainable energy from the deserts, including solar thermal, photovoltaics, geothermal, natural gas, wind, etc.
- **Health** and mental health: with a particular focus on the health care and mental health care needs of desert and Aboriginal people often beyond the reach of normal services; improving health 'on country'.
- **Biodiversity**: protecting and enhancing the diversity of Australian desert landscapes, dealing with feral animals and weed invasions.
- **Aboriginal** knowledge and its growing relationship with science; better intercultural links.
- **Climate** change impact and adaptation.
- **ICT**: help introduce novel communication technologies to remote areas; increase impact of the NBN.
- **'Desert syndrome'**: research ways to overcome the impact of isolation from mainstream economic, political and social decision making on the deserts.
- **Minerals**: latest technologies for low-impact mining operations in remote regions; role of mining in sustaining desert cultures and ecosystems; origins of landscape.
- **Food** and medicines: unlocking the treasure chest of Australian native plants for food, medicine and other uses that have been largely ignored for 250 years.
- **Appropriate Technology**: better ways of sharing technology across isolated communities and enterprises.

Photo courtesy of Ninti One

Proposals for new/enhanced science communication activities

The Expert Working Group—Desert Regions survey yielded a wide range of exciting science communication suggestions for the future, proposed by different organisations. The Expert Working Group—Desert Regions felt it did not have the time, expertise or resources to scrutinise and decide between so many promising proposals, which is properly the role of a coordinating body or deserts science communication network, as proposed in Recommendations 1 and 2 below.

However we list 17 ideas here, as illustrations of the wide scope, high enthusiasm, promise and lively imaginations at work in the deserts. At the same, we acknowledge fully the value of existing science communication programs, many of which have been identified in the survey summarised in Appendix 2.

- **Hooking up**: formation of a Desert Science Communicators Network for rapid sharing of ideas, resources and expertise, coordination of projects, improved planning and training with the purpose of reducing duplication of effort and ensuring that knowledge and resources are used effectively.
- **Hot and dry**: exploring the impact of climate change on desert communities, industries and ecosystems. A national science communication discussion project bringing together the latest scientific forecasts with the best ideas from communities, industries and individuals, via the Internet, mass media and

'science in the park' in order to promote increased understanding of the impact of climate change.

- **Online to the world**: a project exploring what current and future advances in ICT, the Internet and social media mean for desert people and their enterprises.
- **Champions of science**: a project to train Aboriginal champions of science and technology within remote communities as teachers and leaders in their communities for accessing the latest science and technology solutions and identifying science opportunities in their communities.
- **Eat for your life**: bush tucker and the secrets of a healthy diet. Project aimed at raising awareness in remote communities and desert towns of the importance of a healthy diet, the value of fresh food, and the role of Australian desert plants in combating heart disease, cancer, diabetes, stroke and obesity.
- **Deserts on Facebook**: creation of a worldwide site for discussion and debate about the future of deserts and the sharing of desert science, led by Australia but open to any, on the world's most powerful and fastest-growing medium Facebook, which has more than 840 million users.
- **Deserts: shaping the future**: a series of 20+ professionally made short news videos (3 to 5 minutes each) for screening on YouTube, Desert TV, ABC and Australian commercial TV networks, inflight and cable TV and also to be shown in communities. Each item will focus on a major scientific discovery or advance made in or about the deserts, engendering pride in desert science or desert Aboriginal knowledge, leading to greater awareness and more rapid adoption.
- **Science live from the deserts**: a program to coordinate the release of science and technology news from all the main desert science organisations and agencies, to generate 50+ media releases a year on cutting edge work. It would exploit existing media streams and communication to achieve a higher profile for desert science. A pilot program, Kimberley Science Portal, is being run by Scitech.
- **Desert gardens**: School Gardens program into desert schools, where children learn plant science, how to grow things, how to prepare food and eat a healthy diet.
- **Scientific storytellers**: a training program for desert scientists in storytelling, media communication and other useful techniques to help them reach Aboriginal people, school and other public audiences.
- **Desert oration**: an annual oration presented by a leading desert scientist or thinker highlighting issues of critical importance to the deserts, both in Australia and globally, and the scientific challenges and opportunities they pose with accompanying media and social media promotion.
- **Desert in the city**: a national tour of desert science exhibits, events and speakers to key museums, science centres and urban audiences.

- **Scientists in desert schools:** a program to take a scientist from a relevant discipline from the local area or beyond to desert schools to share their discoveries, enthusiasm and knowledge.
- **Desert climate watch**: an online project inviting schools, communities and individuals to report and discuss evidence of changing climate on desert environments and communities, and debate possible adaptations.
- **The story of arid Australia:** its geological origins, human cultures, scientific discoveries, resources and industries, told via a range of formats.
- **Telescopes in the outback**: a program to take astronomy and telescopes into remote communities to interest and engage their youth. It could capitalise on the Square Kilometre Array (SKA).
- **Desert movie ecotourism**: linking desert science with iconic movies and films set in the region so that visitors to a particular part of the desert where a film has been set (e.g. *The Adventures of Priscilla, Queen of the Desert*) could obtain online ecological and other science information relevant to the landscape they are visiting.

Photo courtesy of Ninti One

In each activity above, we envisage a central role for existing science practitioners and communicators in desert regions. These people fall within a broad definition and could include, for example, Aboriginal organisations, mining industry staff, pastoralists and others involved in science communication as part of their existing work.

Strategy for desert science communication

The Expert Working Group—Desert Regions believes strongly that a more strategic approach should be taken to science communication in the deserts, which is at present highly fragmented across jurisdictions, organisations, audiences, aims, activities, funding sources and geographic regions. To develop a strategic overview will involve the engagement and coordination of 100+ government, semi-government, non-government organisations, not-for-profit organisations and private entities spread over five million square kilometres.

The EWG therefore proposes that a network be formed of bodies engaged in science communication in the deserts, and that a Secretariat be appointed by the Network for a three-year rotating basis to administer and coordinate the activities of the network. (Recommendations 1 and 2).

The role of this Deserts Science Network (DSN) is envisaged as:

- to find synergies and opportunities to extend collaboration among existing desert science communication programs and projects, to make their impact wider and their resources go farther
- to plan and fund (Recommendation 3) new science communication activities and partnerships, using the Inspiring Australia principles, the key themes process (Recommendation 5) to prioritise topics and the decision framework (Recommendation 6) to choose the right ones
- to share ideas and guidance for best-practice science communication in the deserts, based on the evaluation and impact of existing projects, across all participating bodies and individuals (Recommendation 4)
- to ensure science communication in the deserts is relevant to the needs and situation of desert people (Recommendations 7 and 8)
- to collaborate and share ideas with other compatible and relevant bodies (such as the EWGs for Tropical Australia and Indigenous Australians).

Recommendations

Based on the above, our recommendations are:

Recommendation 1

That the Commonwealth fund a Secretariat to coordinate and facilitate a Desert Science Network (DSN)

Rationale

The wide diversity of organisations, the challenges of remoteness and isolation, as well as the high cost and small audience size, make coordination and strategic oversight of desert science communication essential. This can assist likeminded bodies and activities to work together, coordinate related activities over a huge area, avoid duplication, share knowledge and ensure resources are directed to programs that will achieve the greatest results and widest benefits. This lead agency role can be rotated among different organisations on a three-yearly basis, based on a call for expressions of interest.

Resources

Estimated annual cost is $50 000 for five years, totalling $250 000, to be matched by in-kind contributions from existing science communication bodies and agencies working in the desert regions.

Recommendation 2

That existing science communication organisations and relevant bodies be invited to join a national alliance or network, to be known as the Desert Science Network (DSN).

Rationale

The DSN will facilitate contact and collaboration between science communication programs currently spread widely across the deserts and working in isolation, leading to more efficient use of resources and sharing of ideas and skills. It will involve communicators who may not necessarily be from science disciplines but have a contribution to make through their experience with communities, such as Aboriginal and technical experts and educators.

Resources

The cost of running the network is covered in Recommendation 1 above.

Recommendation 3

That the Commonwealth provide funding to the DSN for desert science communication projects and activities to help establish the work of the DSN.

Rationale

It is highly desirable that those who live and work in the deserts have at least some scope to select and fund science communication projects that meet their needs, rather than having those needs determined externally. For this reason it is proposed that the DSN be provided with sufficient resources to annually fund a number of small, medium and larger science communication projects, guided by the IA principles, the key themes and decision framework. This funding can be used both for new projects, and to generate greater synergies and efficiencies from existing projects.

Resources

The amount of funding for desert science communication requested is $300 000 in the first year, $200 000 in the second year and $100 000 in the third year.

Recommendation 4

That the DSN establish best practice models for desert science communication that can be adopted by other organisations to improve their outreach. These should be based on measurement and assessment of the effectiveness of existing projects.

Rationale

This approach will help prevent 'reinvention of the wheel' by many different organisations, will share knowledge more widely about what works in the desert context, and provide scope for collaboration where none exists currently.

Resources

Covered in Recommendation 1 above.

Recommendation 5

That the DSN adopt a 'key themes' approach to enable prioritisation among competing science communication activities.

Rationale

By identifying key themes for science communication focus on an annual basis, the DSN will be able to increase emphasis on those of particular relevance or topicality for desert audiences. This will help in selecting projects for support, increase audience engagement and also serve as a useful guide to the network's 100+ partners in making their own decisions on what activities to pursue.

Resources

Covered in Recommendation 1 above.

Recommendation 6

That the DSN adopt the decision-making principles outlined on page 12 in their funding decisions for science communication activities.

Rationale

This will enable all project proposals to be assessed, evaluated and prioritised using uniform criteria, thus ensuring only the most effective are funded.

Resources

Covered in Recommendation 1 above.

Recommendation 7

That the DSN seek to ensure that desert science communication activities contain a focus on local knowledge, Aboriginal traditional knowledge and scientific knowledge systems working together.

Rationale

There is a wonderful story to be told to Australia-wide Aboriginal and non-Aboriginal audiences about the weaving together of traditional knowledge and science and the benefits this can bring to our nation. As part of the two-way character of this communication, effort should be made to ensure a significant part is in the main Aboriginal and other relevant languages. The DSN should encourage this approach among its members.

Resources

Covered in Recommendation 1 above.

Recommendation 8

That the DSN seek to ensure that people across the full breadth of the Australian deserts have reasonable access to science communication activities.

Rationale

The enormous area to be covered requires a weighting in emphasis towards mass communication techniques (e.g. Internet, radio, TV, social media) over other kinds, given the issues of low population numbers, distance, isolation and high costs. However this can also be married with more direct (face-to-face) communication by training a new cadre of science advocates, champions, trainers and communicators within communities and local districts. The DSN needs to encourage an appropriate balance.

Resources

Covered in Recommendation 1 above.

Appendix 1 Expert Working Group members and their organisations

Name	Position and organisation	Website
Science/Industry		
Metta Young	Executive Officer Centre for Appropriate Technology	www.icat.org.au
Tim Carey	Mental Health Academic Centre for Remote Health	www.crh.org.au
Prof Steve Morton	Group Executive CSIRO Sustainable Ecosystems	www.csiro.au/Organisation-Structure/Divisions/Ecosystem-Sciences.aspx
John Huigen	CEO Desert Knowledge Australia	www.desertknowledge.com.au/Home
Peter Stephens	Communications and Development Manager Menzies School of Health Research	www.menzies.edu.au
Rod Gobbey	Executive Director Primary Industries Northern Territory Government	www.nt.gov.au
Education/ Communications		
Gary Fry	Director Alice Springs Desert Park	www.alicespringsdesertpark.com.au
Jimmy Cocking	Coordinator Arid Lands Environment Centre	www.alec.org.au
Hujjat Nadarajah	Science Communications Coordinator Centre for Appropriate Technology	www.icat.org.au

Name	Position and organisation	Website
Linda Cooper	Communications Manager and Chair, Expert Working Group Ninti One/Cooperative Research Centre for Remote Economic Participation	www.nintione.com.au
Geoff Crane	Program Manager Questacon	www.questacon.edu.au
Alan Brien	CEO Scitech	www.scitech.org.au
Media		
Dr Susannah Eliott	Director Australian Science Media Centre	www.aussmc.org
Jenni Metcalfe	Director Econnect	www.econnect.com.au

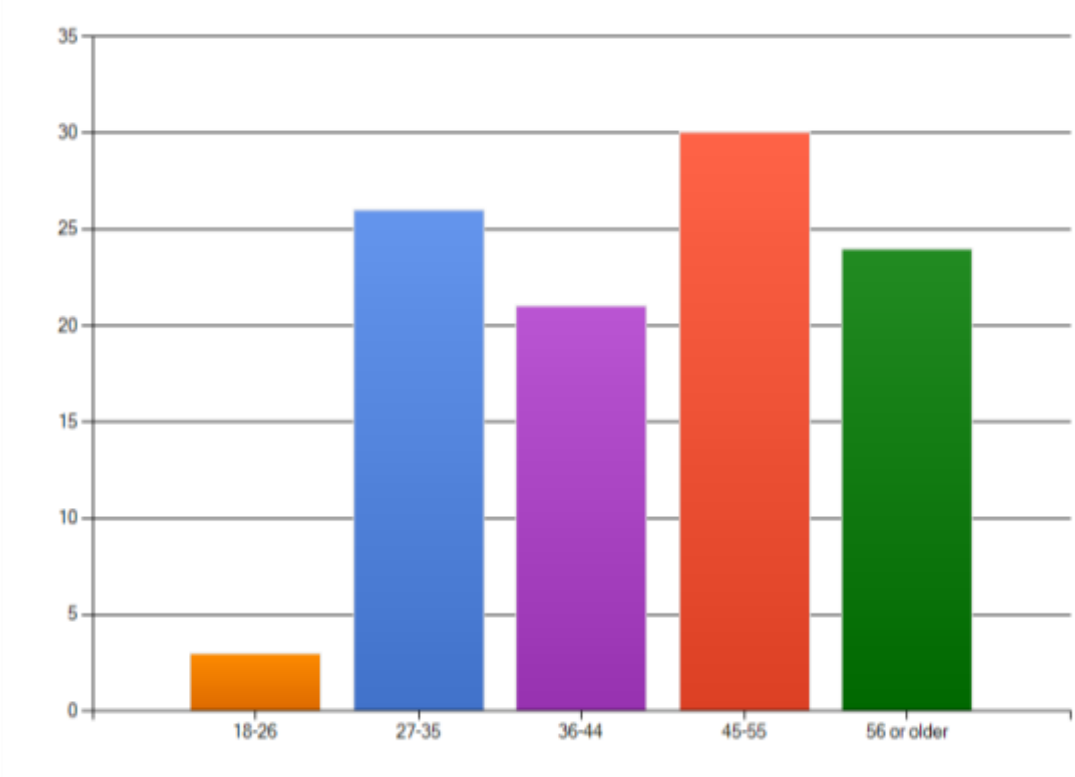
The Expert Working Group met twice face to face in Alice Springs. The first meeting was held at the Business and Innovation Centre, Desert Knowledge Precinct on 24 October 2011 and the second meeting was held at the Alice Springs Desert Park on 7 November 2011. At these meetings the group identified and discussed the key Principles and Recommendations for this report. The group also spoke about the needs and practicalities of science communication in desert Australia regions.

The group also met via teleconference on 7 February 2012, 20 March 2012 and 27 March 2012 to review the report and survey findings. Throughout this time there were extensive email exchanges in response to the report as it developed.

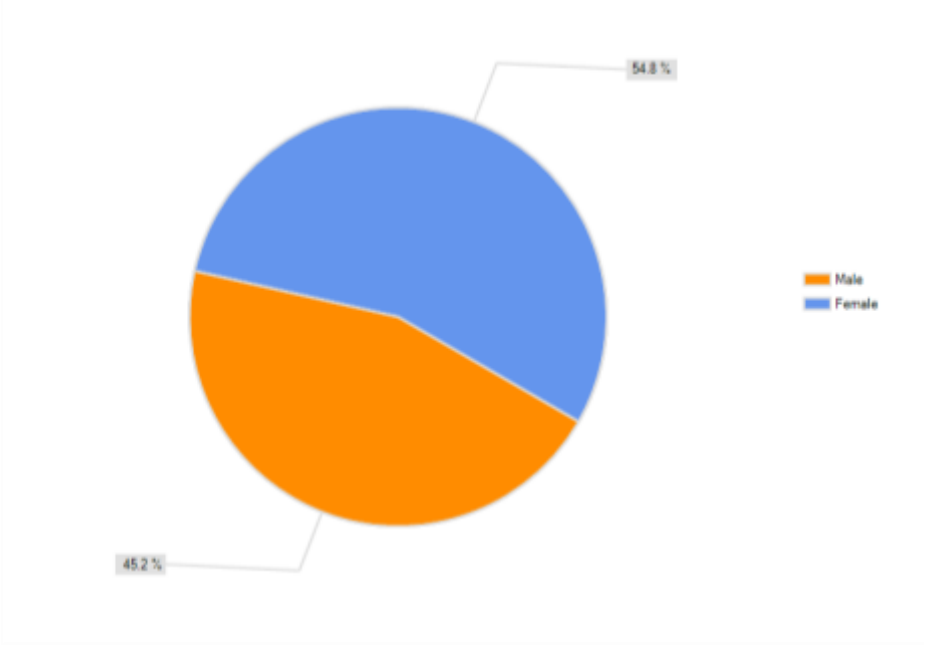
Appendix 2 Survey results

The survey was carried out online, using Survey Monkey. Quantitative data are included here; qualitative data have been summarised. Original responses are held with the authors and can be accessed by emailing linda.cooper@nintione.com.au.

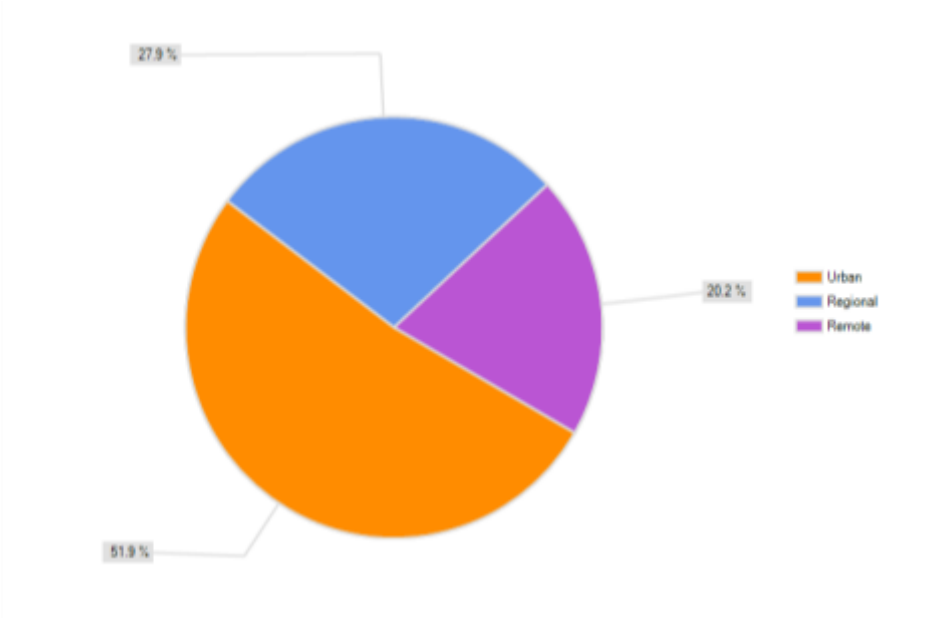
Question 1: Which category below includes your age?



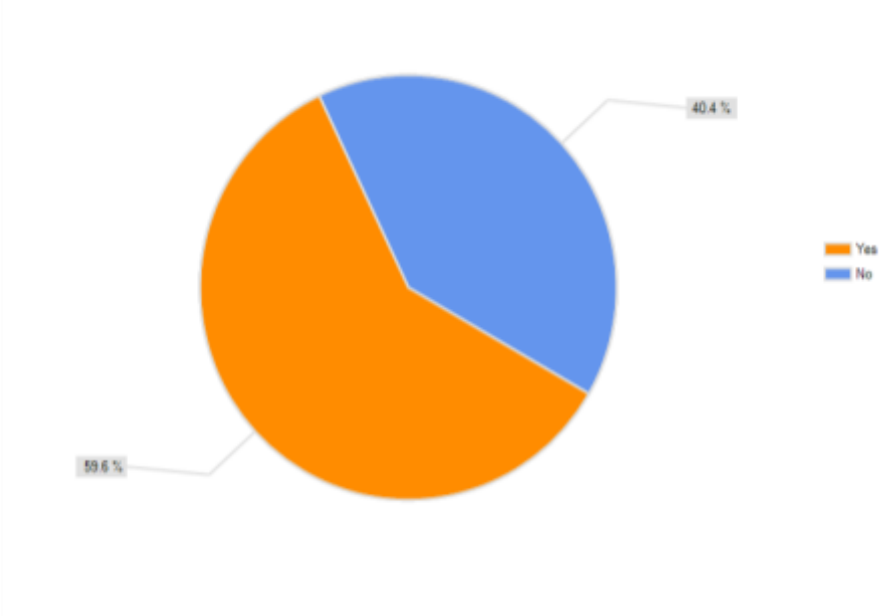
Question 2: Are you male or female?



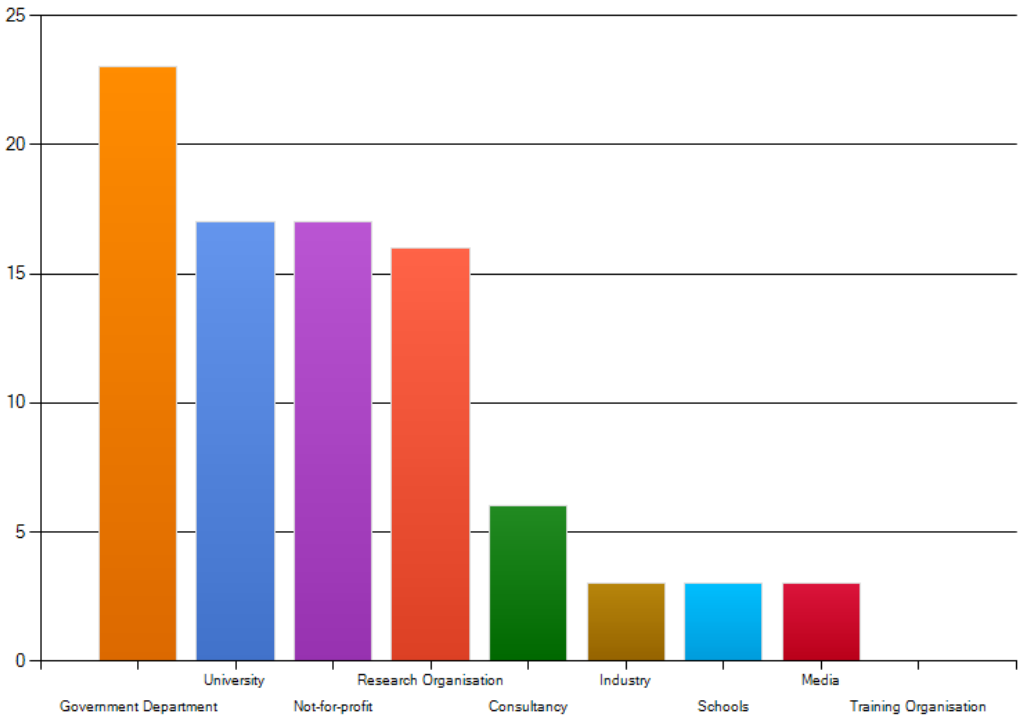
Question 3: Where in Australia do you live?



Question 4: Are you aware of the Inspiring Australia Strategy?

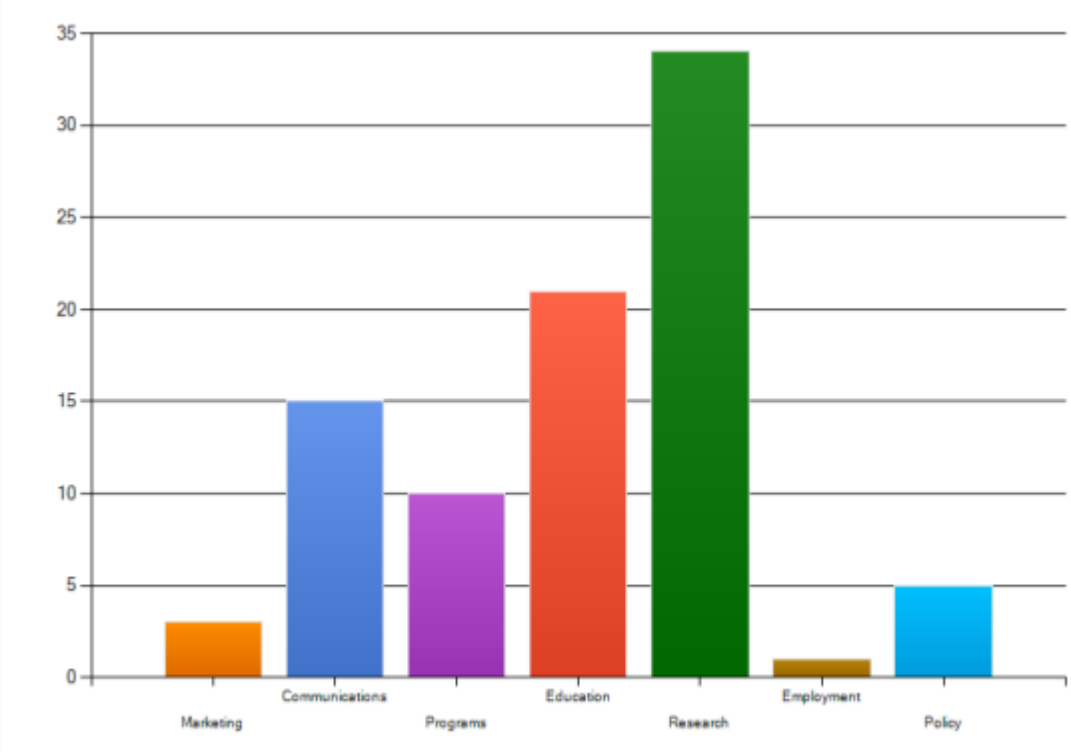


Question 5: What type of organisation do you work for?



* Other—mining

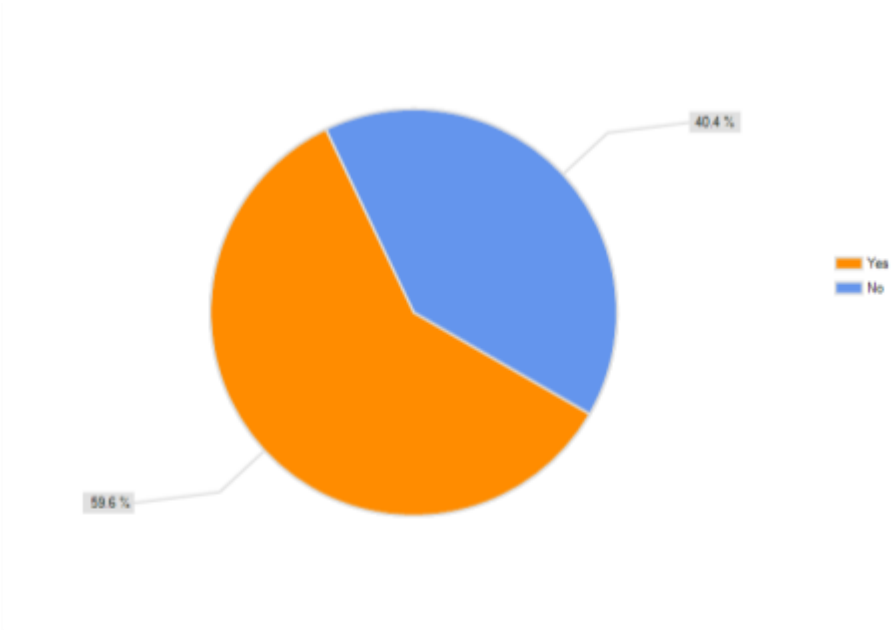
Question 6: What is the core business of your organisation/department or unit?



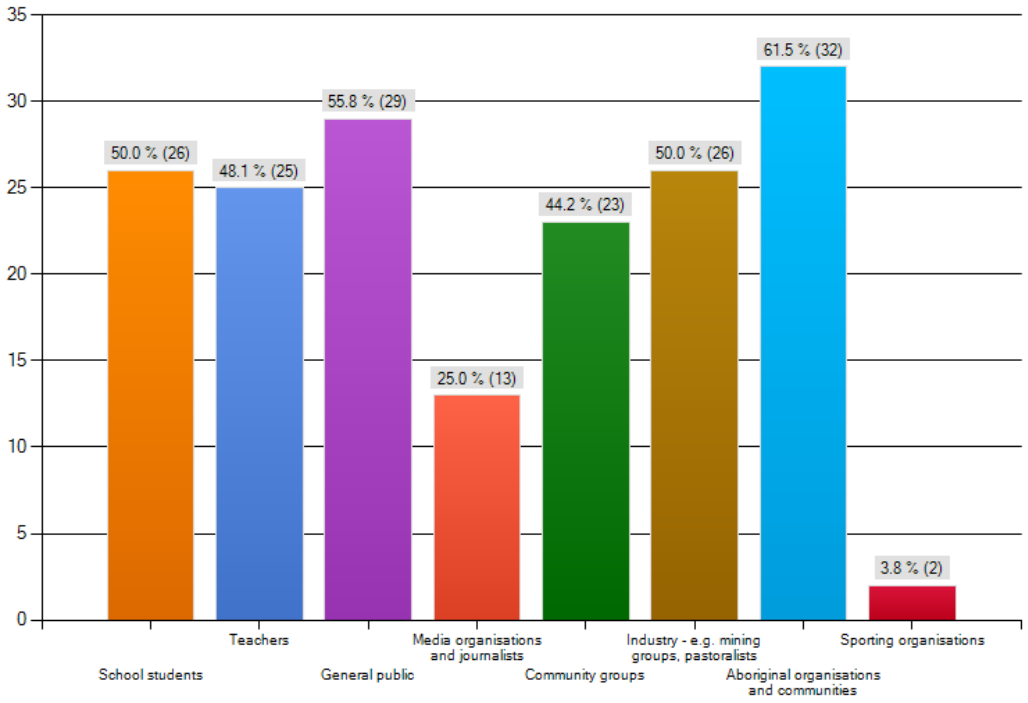
* Other answers for question 6 include:

- mining (particularly science and math education in remote areas)
- livestock
- natural resource management
- health
- conservation
- capacity building and advocacy.

Question7: Does your organisation engage in science communication in desert regions of Australia?



Question 8: If you answered 'Yes' to the previous question, who is your primary target audience? (You may tick more than one box)



These figures are raw numbers; the amounts shown in the body of the report are the percentages.

Question 9: Please give examples of the kinds of activities and/or programs you use to communicate science.

Respondents described a large number of activities they use to communicate science to their target audiences.

Many of the responses were about ways of presenting science information, with different levels of interaction and formality. They included conferences and seminars; government submissions, position papers, briefing papers and policy documents; public lectures, tours and events; travelling shows; information displays and exhibitions; direct communication, either face to face or through email or phone; interpretive signage; and website content.

The main media channels used were radio and Internet, with interviews being the most common format of radio science communication, and online applications including lessons, education packages and citizen science data gathering.

Forms of print science communication described were journal and magazine articles, reports, maps, fact sheets and newsletters, big books and media releases.

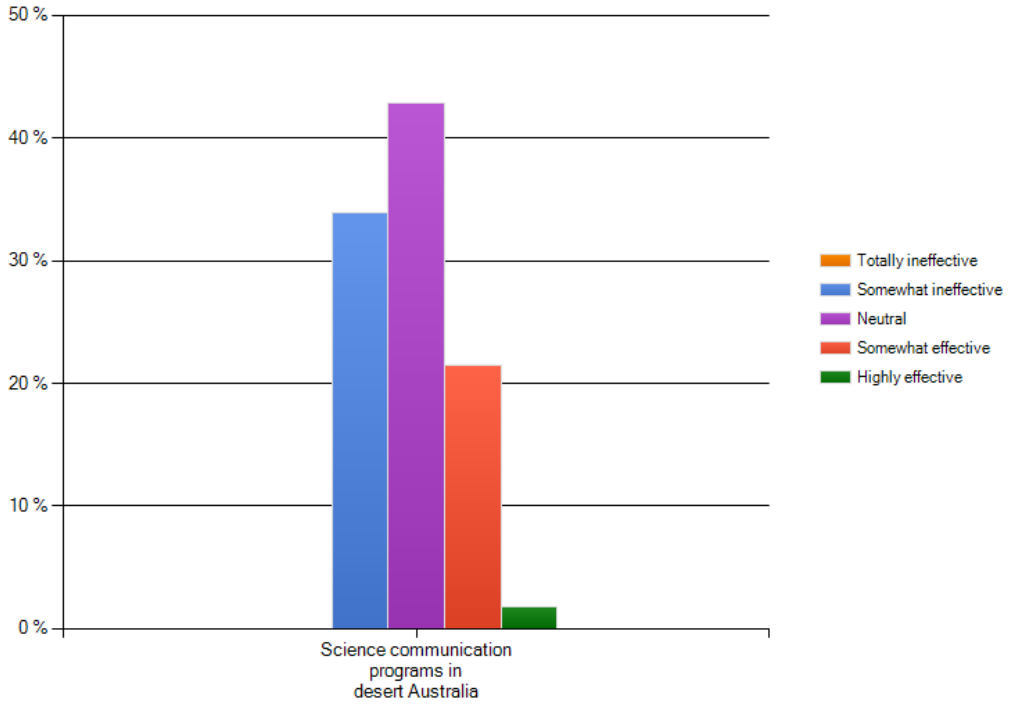
There was focus on the school audience, with respondents describing school lessons, programs, visits and tours (of science communicators to schools and of school groups to science workplaces) for students, and professional development activities for teachers. Some activities were targeted directly to Aboriginal audiences, others directly to government audiences.

A number of interactive activities were described, including field trips, participatory research, surveys, workshops, walks and tours, and supply of equipment and toolkits.

Although the question did not specifically ask about the purpose of the science communication activities, some respondents described how their activities were based around general promotion of science and research; or to encourage recruitment of students into particular fields of science-based industry; or to effect behaviour change with regards to pest management or environmental regulations.

Topics for the science activities were varied, and included mining, geology, metallurgy, OH&S, the environment, pest control, dog health, fauna events such as whale migration and turtle nesting, livelihoods, water, waste, health, climate and climate change, wound management, astronomy, world solar challenge, land management, sustainability, nuclear energy, biodiversity conservation and resource security.

Question 10: Thinking about the current state of science communication activities in desert Australia, please rate its effectiveness



Question 11: What do you regard as the main obstacles to effective science communication in desert Australia?

Respondents identified a number of barriers to effective science communication in desert Australia. The lack of resources was noted by most; more funding, time, infrastructure and facilities, networks, Internet connectivity, higher education facilities and people are all needed to communicate science effectively. The remoteness, distance and isolation of desert Australia cause some of these problems, as increased distances make cost per head of delivery higher than in non-desert regions; isolation can be a cause of high staff turnover and can make it difficult for people to develop and maintain networks and for organisations to collaborate effectively. People outside the desert said that it was difficult to access existing desert networks.

Conditions in desert Australia such as high levels of linguistic diversity, dysfunction in some communities, low levels of numeracy and literacy, and competing priorities of people involved in different industries such as mining and pastoralism contribute to the difficulties. The audiences for science communication may be disengaged with the issues, or the issues may not be or may not seem relevant to them. Some respondents found that crisis management and competing priorities leads to short-term solutions and to problems developing long-term strategies and engagement.

Diverse approaches instigated by on-the-ground people are needed, but science communication in the desert is often based on programs that have come from temperate regions. The support from those head offices in temperate regions was sometimes lacking, and at a higher level there was a lack of strategy to inform policy about science communication in the desert.

The challenge was also about how to make complex ideas accessible in language, and through the appropriate forums, as well as how to prevent the media from trivialising and sensationalising complex issues.

Question 12: Please identify three things which, in your opinion, would most increase the effectiveness and reach of science communication in desert Australia.

Respondents gave a raft of suggestions about how to improve science communication in desert Australia. Many of the suggestions focused on relationship building: understanding that two-way learning is required; that the audiences of the desert are valid; that more collaboration and coordination between people and organisations, including desert and mainstream schools, will help; that science communication requires 'champions', both local and celebrity; and that developing networks, including a dedicated science communicators network, with designated points of contact facilitates long-term connections. The importance of follow-up and of relevance—what does this issue mean for you?—was highlighted in maintaining the presence of science communication, as was the need for positive focus and enthusiasm and passion for the topic.

The importance of creative, quality staff was mentioned in the suggestions about further professional development, rewarding excellence in teaching, and creating internship opportunities to bring more people to the desert. This is related to having more resources for schools and for science programs in schools, and improved access to higher education in desert areas.

There was a group of suggestions about changing the focus from bringing outside knowledge into the desert to using local resources to reach audiences: asking communities what their concerns are; teaching in, rather than about local learning styles and perspectives; using local content, local languages and local timeframes, and employing local educators; and using local vehicles, such as existing events and weekly news items, to convey science messages.

Access to more resources was a common suggestion, through increased funding to schools and to science communication generally, better marketing opportunities, better access to scientists as the conveyors of science communication messages, and understanding of the need for more planning and lead time in the desert where long travel times are common. A database of resources was suggested, so that people know what they can access close by.

Some suggestions were about improving technical facilities, such as improving Internet and other ICT access, having more choice of Internet provider, getting

access to video and teleconferencing facilities in communities, and using social media and multimedia channels to deliver science communication messages.

Others were about the importance of face-to-face delivery, with suggestions about more conferences, excursions, road shows and hands-on activities (and the necessity for infrastructure and services, such as venues and accommodation, to support these), and also ideas about targeting groups outside the formal education system such as whole families and workers' camps. The importance of keeping these displays and information sessions current was also mentioned. Some suggestions for presentation styles included combining art with science messages and using photo-based summaries to describe the differences between desert and coastal environments.

Research-specific suggestions were to do with getting local people more integrated into research design and the implementation of research outcomes, and providing effective channels for people to communicate their research.

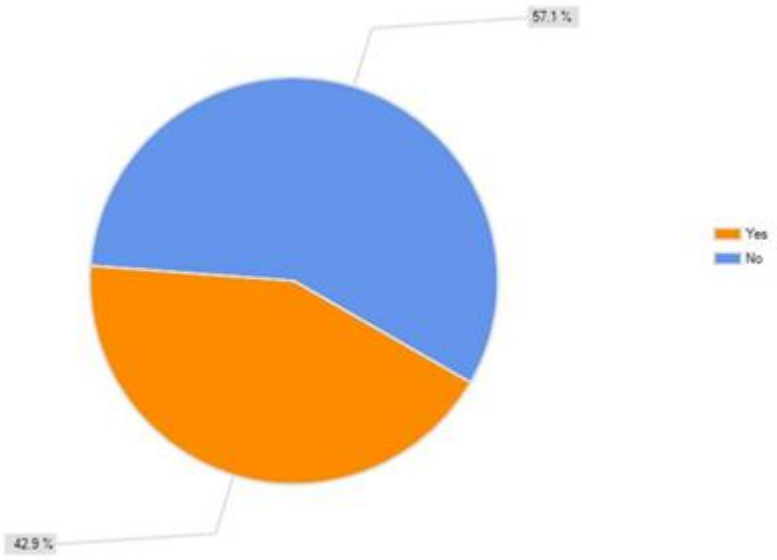
Respondents also looked at the strategic view, with people suggesting that better relationships be developed with politicians and other decision-makers from various levels of government and industry, that there be overall communication strategies for regions that link information together, and that monitoring and evaluation of activities occur so that people get feedback about what works and what does not. The role of the media was mentioned, with the suggestion that developing personal relationships with journalists and media staff can help in less sensationalist portrayal of complex issues.

Question 13: Please rate the methods you regard as most effective in communicating science in desert Australia (most common response shown in bold for each category)

Answer options	Totally ineffective	Somewhat ineffective	Neutral	Somewhat effective	Effective	Response count
Print media	1 (1.8%)	11 (19.6%)	14 (25.0%)	**27 (48.2%)**	3 (5.4%)	56
Radio	1 (1.8%)	3 (5.4%)	10 (17.9%)	**31 (55.4%)**	11 (19.6%)	56
TV	2 (3.6%)	6 (10.7%)	14 (25.0%)	**26 (46.4%)**	8 (14.3%)	56
Online	1 (1.8%)	8 (14.3%)	17 (30.4%)	**25 (44.6%)**	5 (8.9%)	56
Social media (e.g. Facebook, YouTube)	7 (12.5%)	9 (16.1%)	**20 (35.7%)**	16 (28.6%)	4 (7.1%)	56

Answer options	Totally ineffective	Somewhat ineffective	Neutral	Somewhat effective	Effective	Response count
Conferences	5 (8.9%)	17 (30.4%)	13 (23.2%)	**18 (32.1%)**	3 (5.4%)	56
Exhibitions and events	1 (1.8%)	9 (16.1%)	13 (23.2%)	**26 (46.4%)**	7 (12.5%)	56
Documentary film	2 (3.6%)	5 (8.9%)	9 (16.1%)	**33 (58.9%)**	7 (12.5%)	56
Face to face	1 (1.8%)	1 (1.8%)	3 (5.4%)	9 (16.1%)	**42 (75.0%)**	56

Question 14: Do you have a particular science communication project or idea you would like to share with the Inspiring Australia Expert Working Group for Desert Regions?



Question 15: If you answered 'Yes' to the previous question, please provide more information.

The specific programs people mentioned in response to this question often had the focus of bringing together and exploring western and local forms of knowledge, experience and interest around a particular issue—e.g. sport, nutrition, the environment, music, astronomy—as a method that was effective and could be of value to others in science communication. There was also a focus on developing the appreciation of science itself, and of seeing desert science as being of value to those outside the desert, not just to desert dwellers.

Another method of information exchange was to 'swap' people: that is, get scientists into schools or field trips and students into science labs. Vehicles recommended for science communication included taking science to people in the form of road shows or science in the pub; and bringing people in to see science, for example in hubs or resource centres. These methods also work in affiliated industries, such as mining, health care and environmental management.

Some suggestions were about targeting specific groups of people for specific issues of relevance to them (e.g. wound management or diabetes or particular environmental issues). There were also suggestions about making use of programs that initially had narrow audiences and adapting them to be more broadly used in science communication activities.

In terms of resources for science communication activities, there were suggestions about exploring different media channels while recognising that print media is still important in the desert, about tapping in to existing science networks such as www.climatewatch.org.au and about having programs and activities in languages other than English. The importance of fundamental literacy and numeracy was mentioned.

Appendix 3 List of some existing science communication programs in the desert regions of Australia

This list is not intended to be a complete audit. Responses were sought from Expert Working Group members, organisations and from survey respondents. Current science communications activities operating in desert regions of Australia include:

Scitech

- Scitech Outreach Aboriginal Education Program, including Professional Learning and AEP DIY Science Kits www.scitech.org.au/travelling-programs/travelling-programs/aboriginal-education.html
- Scitech Outreach DIY Science Kits (not exclusively for schools in remote communities but often booked by them) www.scitech.org.au/travelling-programs/travelling-programs/diy-science.html
- However, all our Outreach programs are delivered all across regional Western Australia, and so visit many desert regions www.scitech.org.au/travelling-programs/travelling-programs/
- Science Network WA Kimberley Science Portal www.sciencewa.net.au/explore-by-region/kimberley-science-portal
- Science Network WA Aboriginal Science and Knowledge section www.sciencewa.net.au/topics/aboriginal-science-a-knowledge
- Astronomy WA SKA News Updates www.astronomywa.net.au/whats-happening/ska.html

Invasive Animals CRC

- Feralscan
  - You can now go online www.feralscan.org.au to map where camels, wild dogs, rabbits, feral pigs, foxes, Indian Myna birds, cane toads, feral goats and starlings occur anywhere across Australia, to record sightings, damage and control activities to help manage these pests. FeralScan is an initiative of the Invasive Animals CRC and the NSW Department of Primary Industries, with sponsorship also from the Australian Government Caring For Our Country Initiative and the Australian Bureau of Agricultural and Resource Economics and Sciences. Supporters include the Australian Feral Camel Management Project—supported by the Caring For Our Country Initiative, NSW Government Western Catchment Management Authority, Toshiba, Woolworths, Ninti One Limited, Landcare Australia and the Australian Broadcasting Corporation. FeralScan has received overwhelming community participation with more than 9000 records of feral pests entered by 5000 participants Australia-wide since it was launched in January 2011. For the first time, FeralScan gives a national overview of the extent of pest animals and damage they cause as well as

a mapping tool to help coordinate on-ground pest control. FeralFishScan and DeerScan will soon be made available to graziers to map deer and the problems they cause and allow recreational fishers to start recording carp and other pest fish in our rivers.

Royal Institution of Australia

- Regional Outreach Program—World Solar Challenge
  www.worldsolarchallenge.org/regional_outreach_program

Centre for Appropriate Technology

- *Our Place* Magazine
  - *Our Place* Magazine is published in hard copy, three times a year by the Centre for Appropriate Technology. It focuses on stories and projects across remote Indigenous communities involving technology, education, livelihoods, projects and interviews with Aboriginal practitioners across these areas. An international section highlights projects happening overseas that are of use, as well as opinion pieces that raise awareness on various issues and new learning relevant to remote Indigenous communities and people. *Our Place* magazine (hard copy) is distributed to over 1700 stakeholders, including remote Indigenous communities, service-providers, Aboriginal corporations, government agencies, research institutions, NGOs and people. This magazine has reached its 42nd issue.
  - *Our Place* Magazine is also published online in PDF and e-book format. There are more than 2000 downloads of the magazine per month.
- Bush-Techs
  - CAT produces 6 bush-techs per year. These Bush-techs are practical, technical scientific articles written by researchers, engineers and scientists associated with or working for the Centre for Appropriate Technology. Articles centre on practical things that people living in remote communities can do themselves, in terms of fixing problems or looking at areas that impact them, like looking out for dengue outbreaks, in the event of temperature fluctuations brought on by climate change. These articles focus on practical information or issues, like how to install and read a water meter, which a person living out in a remote desert region can read, and apply, using the infrastructure on their community.
  - Bush-techs are published online on www.icat.org.au and continue to be one of the most popular downloads by the general public, averaging 3000 downloads per month on a range of topic areas.
- *Our Place* Radio
  - *Our Place* radio is a national radio 20-minute segment focusing on issues across livelihoods, energy, water, waste, education, technology and communications, impacting Aboriginal people living in remote Indigenous

communities. CAT produces 12 of these radio segments every year. *Our Place* Radio has been running for 10 years, and is distributed to 58 radio stations, networks and community radio stations across Australia. Stories are interview-style, featuring different Aboriginal people and practitioners talking about their own experiences or stories, across issue areas that impact Aboriginal people. The program has won a number of Walkley and CBAA awards over the past years.

- Website
  - CAT produces and generates content for its website, www.icat.org.au. This website has a range of free science and research tools, discussion papers, applied research, and information available for download. The visits on the CAT website are substantial, with an average of 20 000 visits and downloads per month.
- Bushlight newsletter
  - Bushlight, a major project of CAT, produces a quarterly newsletter. This focuses on stories relating to renewable energy systems that Bushlight installs and maintains across remote Indigenous communities across Australia. Stories relating to Bushlight's Energy Efficiency and Livelihood programs are also featured. This newsletter is also available online on www.bushlight.org.au
- Resources and posters
  - CAT has produced a number of resources and posters, including the *Field Guide* for small water supply management and energy planning and energy efficiency resources. CAT also developed the National Indigenous Infrastructure Guide (NIIG), which addresses infrastructure topics across roads, transport, energy, water, waste and housing areas for remote communities. NIIG is very popular on CAT's website, averaging 4000–5000 downloads per month.
- Papers and conferences
  - CAT's staff and board members present discussion papers and deliver keynote addresses across Australia and occasionally overseas. A recent example was the Infrastructure Australia conference *Connecting the Dots*, where CAT presented keynote addresses on remote power supply, and sat on various panels on issue areas including renewable energy.
  - CAT produces applied research which is downloadable on our website. A recent example of this was our 'home Internet study', looking at home Internet usage and uptake across three small remote communities in the central desert region.
- Workshops and tours
  - CAT runs workshops across desert Australia and other remote regions on water supply management, and the National Indigenous Infrastructure Guide. Over 200+ people attend these workshops each year. CAT also

participates in trade-shows like the Eco-fair (run in Alice Springs annually), NAIDOC week and DET-sponsored training and education information sessions. Last year, CAT ran a tour for National Science Week, for 80 high-school students from Centralian, Yirara and St. Philips high-schools.

The Goldfields Education Mining Industry Alliance (GEMIA) Inc and Goldfields-Esperance Development Commission (GEDC)

- The Goldfields Education Mining Industry Alliance (GEMIA) Inc is an Incorporated organisation established in 2008 to link the mining and education sectors to enrich curriculum and promote employment in the resources sector. With the ongoing regional skill needs for the mining, related and support sectors the first GEMIA's sought to introduce mining to local students, who, while surrounded by the sector were not showing an obvious interest in taking up trades or tertiary studies related to mining. Additionally, when choosing commerce, health and other areas after school, students were not looking to the resources sector for their employment, many relocating to metropolitan areas. Indications from students were that they neither knew about, nor understood the real value of the sector as an employer and career choice. GEMIA comprises volunteers from mining, education, government and community workplaces where the work of GEMIA allies to their organisation's objectives. Some personal time is also expended by volunteers for GEMIA reflecting the passion and interest of the group in furthering the exposure of the opportunities in the resources sector to students.

  Over the past four years GEMIA has delivered well regarded programs and events to over 2000 students, from around 20 schools across the Goldfields-Esperance region and beyond. GEMIA has enjoyed strong support from schools, vocational and tertiary institutions in particular from the Western Australian School of Mines, the resource sector, government and the media.

  The success of GEMIA's approach is that people who work in the sector are the people that the students are engaged with. Students experience and learn about geology, metallurgy, underground mining, occupational health and safety, administration and the environment, for example, from geologists and metallurgists, trades and other mining people, making it real to the student. Formal evaluation of GEMIA events has indicated clear growth in awareness and interest in the mining sector as well as trade, maths and science options by students.

- Goldfields-Esperance Development (GEDC): Though not a science organisation, the GEDC has a long-time association with various science projects as a part funder, as a co-organiser, linker of relevant persons/groups and as a communicator/promoter; e.g. it has assisted with the AusIMM Sustainable Mining Conference 2010, supported other science activities such as CSIRO projects (e.g. climate change), supports research projects into various science-related topics and regional needs, and promotes research and

information gathering and communication, media releases and community information workshops.

- The GEDC attracts and grows investment and population in the region. GEMIA links the education sector to the mining sector to create awareness, interest in the mining sector and science and maths education to grow participation in the mining sector.

Arid Recovery Reserve

www.aridrecovery.org.au

- Annual open day at Arid Recovery Reserve
- Information nights
- Volunteer groups—working on-site
- Social media
- School activities—outreach and on-site
- Media releases regarding current activities
- Research papers, publications for general public (including pastoralists/landholders)
- Guided nature tour

Arid Land Environment Centre (ALEC)

www.alec.org.au

- EcoFair
- Presentations to schools on sustainability and environmental issues to explain the impacts of climate change, nuclear issues, biodiversity conservation and resource security.

Menzies School of Health Research

- A Grog Brain Story animation and flip charts that explain the impact alcohol has on the brain and behaviour. It has been designed to provide relevant and accessible information for Indigenous people (including those in the desert regions) with diverse cultural and linguistic backgrounds. The animated video and flipcharts have been used in health, education, corrections and substance abuse rehabilitation services to improve knowledge about how alcohol affects health and wellbeing. Video and flip charts can be viewed at: www.menzies.edu.au/research/healing-and-resilience/substance-misuse/brain-stories
- The Australian Integrated Mental Health Initiative in the Northern Territory (AIMhi). This was a five-year action research project that engaged with

managers, service providers, Aboriginal Mental Health Workers and communities to explore mental health in remote communities (including the desert region) and to find new ways to deliver services. This was the largest mental health research project to date in the NT. It established baseline measures, explored understandings of mental health from the community perspective, developed service-based strategies for improved cross-cultural assessment, conducted the first Indigenous mental health clinical trial of a new brief psychotherapy, and developed a range of targeted resources for service providers and the community linked with a training program. The communication material can be downloaded from: menzies.edu.au/research/healing-and-resilience/mental-health/aimhi-nt-australian-integrated-mental-health-initiativ

Tangentyere Council

www.tangentyere.org.au

- Tangentyere Council operates a wide range of services and programs for Aboriginal people in central Australia.
- While Tangentyere Council's role developed initially around tenure, housing and essential services for town camp residents in the 1970s and 1980s, it quickly developed to encompass a range of family, community and social services to which people in town camps did not otherwise have access.
- While most programs are for residents of town camps, there are a number of programs that are also directed at people from the wider Alice Springs community and from remote communities. Tangentyere Council believes that supporting remote communities on a regional basis is of benefit to those communities and town camps because of the close links between their residents.

Akeyulerre Incorporated

- Akeyulerre Inc is a service developed by Aboriginal people to acknowledge and promote Indigenous knowledge, practice and expertise recognised as being integral to the wellbeing of the community. Akeyulerre supports the transference of knowledge and expertise which provides answers to the issues they are facing. The foundation of Aboriginal culture is the family and connection to the land—this is what Akeyulerre supports. The service works with the Aboriginal philosophy that wellbeing is a holistic phenomenon, which includes social, emotional, and cultural health as well as physical.
- Akeyulerre assists people to both access and practice their culture and be proud of their cultural knowledge and identity. Cultural practices supported by the centre include Bush medicines collection, preparation and distribution; access and support to Ngangkeres (Traditional Healers); country visits; song; dance; smoking ceremonies; and bush foods.

Rangelands NRM Western Australia

- Rangelands NRM WA are a non-government, not-for-profit organisation which encourages sustainable use of land, flora and fauna, fresh water, and coastal marine environments whilst representing community needs, acknowledging cultural significance, and incorporating Aboriginal knowledge. The Western Australian Rangelands NRM region covers more than 2.3 million square kilometres and encompasses the Kimberley, Pilbara, Gascoigne-Murchison and Goldfields-Nullarbor regions.

CSIRO Ecosystem Science in Alice Springs

- The broad aim of our current research is to contribute to better regional planning for sustainable livelihoods and habitation of the Australian rangelands and deserts. This requires solutions that recognise regional differences and support better management for environmental, social and economic outcomes.
- CSIRO aims to understand these solutions using a research approach that integrates environmental, social and economic considerations in developing new approaches to complex issues, and incorporates uncertainty about possible impacts of climate change in Australia's interior.

In addition to the above, the Expert Working Group noted the programs and activities conducted by the Territory Natural Resource Management, the Natural Resource Management Council, the Alinytjara Wilurara NRM Board, and the South Australia Arid Lands NRM Board.

Appendix 4 The Council for the Humanities Arts and Social Sciences feedback and recommendations

About the Council for the Humanities Arts and Social Sciences

The Council for the Humanities Arts and Social Sciences (CHASS) is the national peak body for 90 organisations including universities, schools and faculties, national institutions, professional peak bodies in design, performing arts, creative industries and arts and technology and others. We support our members in their advocacy for humanities, arts and social sciences (HASS), work with the government in strengthening the agenda around HASS issues and create links between policy and research in these learning areas. Currently CHASS is planning its landmark inaugural **The Human Dimension** National Forum in Canberra on 25 and 26 September. This aims to set a forward vision for the HASS sector and to link HASS learning to the burning issues facing Australia including sustainability, Australia in the Asian Century, science engagement and the human dimensions of new technology.

CHASS feedback on the four Expert Working Groups draft papers and recommendations

- *Inspiration from the Deserts* (referred to here as 'Deserts')
- *Science Engagement into and for Australia's Tropical Region* ('Tropical Region')
- *Indigenous Engagement with Science: Toward Deeper Understandings* ('Indigenous')
- *Effective Communication of Marine Science to the Australian Community* ('Marine Science')

General comments

Taken together, the four reports give a compelling and enlightening view of science engagement in Australia, and provide useful evidence and recommendations to the Inspiring Australia Strategy. Some comments are as follows:

- Each paper uses different definitions of 'science communication' or 'science engagement'. Some definitions are explicit and others implicit. The Tropical Region Expert Working Group uses 'science engagement', while the Deserts report favours 'science communication', defined as follows:

  > In this report, 'science communication refers to the wide range of activities that enable the public to interact with science, scientists and scientific issues and processes, and especially to apply scientific knowledge and insights in their own lives, work and thinking. (p9)

- Each working paper also has subtly different definition of the nature and purpose of the *Inspiring Australia Strategy*.

- *Deserts*: 'IA seeks to build a strong open relationship between science and society, underpinned by effective communication of science and its uses.'
- *Tropical Region*: 'IA is a high-level national strategy for public engagement with the sciences and a key element of Australia's innovation agenda.'
- *Marine Science*: 'IA is a high-level national strategy for engagement with the sciences and a key element of Australia's innovation agenda.'
- *Indigenous*: 'IA is a national strategy led by (DIISR) with the broad aim of realising the full social, economic and environmental benefits of investment in science and research.'

The *Deserts* report states that it has worked with the Indigenous and Tropical Region Expert Groups to avoid overlap and to have a consistent approach (p 7). The Marine Science Expert Group could be more closely linked to the other three by consultation and cross-referencing, for example, by expanding Recommendation 14, 'That dialogue is encouraged between Indigenous communities that live on or near sea country, and researchers, industry, government and the public'. In its report, the Indigenous Expert Group replaces the term 'traditional knowledge' with the more comprehensive term 'indigenous knowledge systems'. CHASS notes that the Tropical Region report recommends full adoption of the Indigenous Expert Working Group recommendations as part of its own recommendations.

Specific comments

- In Recommendation 13 of the Marine Science Report, there are comments about difficulties in engaging NGOs with marine science; more data or case studies would be helpful in understanding the challenges and creating solutions.
- The Marine Science Report could discuss the findings of its Marine Science Communicators survey in greater detail, either in discussing each survey question in detail, or integrating results in the greater body of the report.
- The 'increasingly important role of the social sciences' is noted in the Tropical Region report (p 32); the role of 'the art world' in the Marine Science report (p 5), and numerous cultural issues, including the idea of cultural competency (p 12) are raised in the Indigenous report. In compiling its report to the **Expert Working Group on developing a national evidence base of completed research regarding public attitudes and behaviours towards science in Australia**, CHASS is exploring these issues through consultation with its membership about how humanities, arts and social sciences organisations engage the public in science.

CHASS Recommendations

1. That there is more inclusion of HASS knowledge and leadership in expanding and reviewing current models of science communication and engagement across the board. This would mean that HASS knowledge is not juts used as an instrument of facilitating science communication but also in more 'bottom up'

ways to understand a person centred approach to engaging individuals and communities with science.

2. That more integrated paradigms of communication and engagement (as suggested by the Indigenous EWG Group) are considered which could create interdisciplinary knowledge sharing between HASS and Science to deliver enhanced outcomes for science communication strategies.
3. That the Expert Working Group conveners discuss definitions and terms to establish a consistency among their reports. The Centre for the Public Awareness of Science at ANU (contact Suzette.searle@anu.edu.au) is working on definitions of science engagement/science communication and could offer useful advice in this regard.
4. That science communication models would need to look at cultural competency issues beyond Indigenous engagement given that nearly 45% of Australia's current population claim to come from overseas. In order to engage the broadest cross section of the Australian communities, cultural competency frameworks, as developed by service delivery design in other government sectors such as Department of Human Services, would need to be considered.

31 May 2012

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