

DESERT KNOWLEDGE CRC

The Working Paper Series

Livelihoods in desert Australia
from managing natural and
cultural resources:
DustWatch possibilities

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Working Paper

22

February
2008



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Desert Knowledge CRC Working Paper #22

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ISBN: 1 74158 056 0 (Web copy)

ISSN: 1833-7309 (Web copy)

Citation

Strong C, McTainsh G, Leys J and Davies J 2008, *Livelihoods in desert Australia from managing natural and cultural resources: DustWatch possibilities*, Desert Knowledge CRC Working Paper 22, February 2008, Alice Springs, NT Australia.

The Desert Knowledge Cooperative Research Centre is an unincorporated joint venture with 28 partners whose mission is to develop and disseminate an understanding of sustainable living in remote desert environments, deliver enduring regional economies and livelihoods based on Desert Knowledge, and create the networks to market this knowledge in other desert lands.

Acknowledgements

The Desert Knowledge CRC receives funding through the Australian Government Cooperative Research Centres Programme; the views expressed herein do not necessarily represent the views of Desert Knowledge CRC or its Participants.

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Abbreviations

ACRIS	Australian Centre for Rangeland Information Systems
ASISTM	Australian Schools Innovation Science Technology Maths
BoM	Bureau of Meteorology
CSIRO	Commonwealth Scientific Industrial Research Organisation
DECC	Department of Environment and Climate Change
DEDB	Dust Event Database
DEST	Department of Education, Science and Training (Australian Government)
DKA	Desert Knowledge Australia
DKCRC	Desert Knowledge Cooperative Research Centre
NASCAS	National Association of Storm Chasers and Spotters
NCST	National Committee on Soil and Terrain
NHT3	Natural Heritage Trust 3
NLWRA	National Land and Water Resources Audit
NRM	Natural Resource Management
OECD	Organisation for Economic Co-operation and Development
SDW	School DustWatch
SoE	State of the Environment
WCED	World Commission on Environment and Development
WEPP	Wind Erosion Expert Panel

Abstract

Livelihoods of the wider community in desert Australia are under pressure and some of the proposals explored in this report may assist small businesses and Aboriginal Australians to advance their livelihoods.

This study considers the potential of a community environmental monitoring program, DustWatch, to stimulate livelihoods in desert Australia. Acknowledging that ecosystem and cultural services underpin the sustainability of the environment as well as the health and wellbeing of desert people, communities and industries, this study uses DustWatch as an intermediate focus point between the environment and livelihoods. Using a simple economic supply and demand model, DustWatch is viewed as the conduit through which the suppliers interface with the demanders of ecosystem and cultural service information.

The proposed DustWatch Livelihoods model identifies two pathways in which the livelihoods of DustWatchers could be stimulated. The first is through traditional ‘markets’, such as government agencies and regional bodies, which require natural resource monitoring to meet their regional, national or international environmental goals and commitments. The second is through a non-traditional ‘market’, which acknowledges that the media and tourism industry find the outback image desirable.

There is potential for inhabitants of desert Australia to access both of these pathways through their membership of DustWatch. Landholders and Aboriginal groups have the capacity and advantage of isolation to offer natural resource monitoring services to governments. This would require new administrative structures to enable either individuals or groups to tender to provide the required data.

Small businesses could harness the media and tourist interest expressed in the cultural and environmental significance of desert Australia. Trends in tourist activities suggest that increasing numbers of people are interested in visiting remote rural regions. Groups such as retired caravaners, or 4WDers frequently travel through the desert region. Local businesses are beginning to acknowledge that coastal urban travellers have a positive perception of the outback and are interested in exploring this culture. By embracing and sharing the outback culture, smaller businesses are likely to attract further patronage. The cultural services pathway in the DustWatch model identifies a number of marketing strategies which can be used by local businesses to both enhance their appeal to travellers and to help build connections between urban and rural DustWatchers.

Introduction

The natural and cultural resources of desert Australia underpin desert industries, including pastoralism, tourism, mining, and a wide range of small businesses. But these resources do not adequately sustain the livelihoods of desert people. The Desert Knowledge CRC (DKCRC) Livelihoods InLand™ Project is examining how better natural and cultural resource management can improve the livelihoods, as well as the environment, of desert people.

While the pastoral industry has a long history in desert Australia, a significant number of mainly family-based pastoral properties have difficulty making a living, often manifesting in a decline in the number of young people willing to sustain these family-based properties. Livelihoods of the wider community in desert Australia are also under pressure and some of the proposals made here may assist small businesses and Aboriginal Australians to advance their livelihoods.

This paper proposes the DustWatch network as a basis to stimulate livelihoods in desert Australia. DustWatch is a network of volunteer observers throughout desert Australia collecting meteorological data on wind erosion events. The impetus for the network came from the need to increase the spatial resolution of wind erosion monitoring across Australia, both for research and for national reporting of land degradation.

The aim of this paper is to:

- examine if there is potential for pastoralists to derive income from providing natural ecosystem monitoring services to government within the framework of the DustWatch network of wind erosion observers
- identify if DustWatch offers potential for tourism-based and other sources of income by viewing desert Australia as a cultural resource
- develop an understanding of the supply mechanisms which may respond to the demand for land condition reporting and monitoring.

Consistent with these aims, this report will:

- explore the DustWatch network, its purpose, development and future directions
- develop the DustWatch Livelihoods conceptual model describing the information flows surrounding services provided by natural and cultural resources
- explore the potential players and activities of the ‘traditional’ demand path for land condition monitoring from government
- explore the potential players and activities of a new ‘tourism-based’ demand path
- review the supply side of both of these demand paths.

In preparing this report a literature review of government policy and national wind erosion research was conducted, current trends in eco-tourism both in Australia and overseas were explored, and case studies were examined to provide examples of developments in other industries from which desert Australia may learn.

DustWatch

Public awareness of environmental issues and government appreciation of their seriousness has prompted large-scale public participation in community environmental monitoring programs (Alexandra et al. 1996). Generally, most community environmental monitoring groups have a local or regional focus, involving collecting data for the collective benefit of the region. These activities could result in specific environmental outcomes for local planning or education purposes. The people of desert Australia, however, face a special challenge arising from their greater spatial separation and hence reduced regional focus. In this context the DustWatch network is an interesting community environmental monitoring group as it encompasses large areas crossing many of the 'traditional' catchment boundaries that often define a community group.

DustWatch is a network of volunteer observers throughout desert Australia who collect meteorological data on the frequency and intensity of wind erosion events. The DustWatch network was developed with two objectives: to improve the recording of wind erosion for researching and monitoring land degradation, and to raise public awareness of wind erosion as a land degradation problem.

Wind erosion has been monitored in Australia by McTainsh and colleagues (summary in McTainsh and Leys 1993) over 20 years using Bureau of Meteorology (BoM) records of dust storms and other dust activity (McTainsh and Pitblado 1987, McTainsh et al 1990, McTainsh 1998, McTainsh et al. 2001b, 2006). These records are in the form of visibility assessments and records of dust 'phenomena' relating to wind erosion events. Currently, there are approximately 290 BoM sites recording dust phenomena, though this number has fluctuated through time and there are only about 110 stations with complete records back to 1960. This record has been organised in the Dust Event Database (DEDB) at Griffith University. The DEDB has the major advantage of providing at least twice daily records of wind erosion throughout the continent since 1960. The main deficiency of the BoM network has been the low station density, particularly in arid regions. DustWatch was set up to fill the gaps in the formal BoM network (Leys et al. 2007).

DustWatch began with a pilot scheme in NSW in 2002 (Leys and McTainsh 2004). The network was established within the NSW Department of Environment and Climate Change (DECC) and engaged approximately 145 interested persons across western NSW, making visual observations and taking photographs of dust events. The success of this pilot program clearly demonstrated the potential of the DustWatch concept, which was then expanded Australia-wide with the support of the DKCRC. Funding of the network has been taken over (on an interim basis at least for 2007–2008) by the National Landcare Program.

The national DustWatch network was launched in 2005. The official launch followed a large dust storm which passed over eastern Australia and which created significant media interest. From the outset, it became apparent that DustWatch concept of using rural volunteers to report on dust storm activity was an attractive notion to the urban-based media, with over 60 reports in the radio, print and television media within 12 months.

Australia-wide there are currently approximately 100 registered DustWatchers. There is a diverse range of people who are participating. Pastoralists dominate the network at 36% across all states, followed by government employees at 33%. To a certain extent this membership reflects the origins of DustWatch within the NSW DECC. Conservation groups and Catchment Management members represent 9%. Researchers (with a range of interests) represent 8% of the membership. Small business,

such as publicans, general store operators and miners make up 6% of the membership. Eco-tourism ventures and the general public make up the remaining 8% membership.

Discussions with DustWatchers indicate that typically three motivations drive membership:

- (i) A keenness to know more about the natural environment (in particular, the weather)
- (ii) An acknowledgement that land degradation is a problem
- (iii) A history of attachment to the land and an interest in better understanding what is happening on it.

The enthusiastic response of the media to the DustWatch concept appears to reflect the fascination of city dwellers with the outback in general – and with dust storms in particular – and has raised the possibility of turning a negative (land degradation), into a positive (dust storms), with desert Australia exploiting the commercial potential of the DustWatch concept.

The following discussion will develop the propositions that DustWatch has potential to act as a conduit through which pastoral landholders can receive funding as custodians of outback lands that provide ecosystem services; and through which small business in desert Australia may generate funding through the provision of tourism-related commercial services to the wider Australian community. This discussion will be initially placed in a broader conceptual framework using a demand and supply model.

DustWatch Livelihoods demand and supply model

Natural and cultural resources underpin desert industries such as pastoralism, tourism, mining and small businesses. These resources provide important ecosystem and cultural services that are not immediately visible in the market. *Ecosystem services* are the functions performed by ecosystems that lead to desirable environmental outcomes, such as the role that vegetation plays in protecting the soil from erosion. These services underpin the sustainability of the environment as well as the health and wellbeing of desert people, communities and industries. *Cultural services* are the relationships between peoples and the landscape that produce the identity and image of regions, for example: desert Australia. Cultural services inspire people to create their sense of identity and produce the image of desert Australia.

These ecosystem and cultural services often remain invisible in the market because it is difficult to attribute a dollar value to them. For example, how can the retention of vegetation be accounted in real dollar terms? What is the real financial cost of wind erosion in terms of productivity, community health or global climate contributions? It is difficult because ecosystem and cultural services are multilayered, interactive and financially abstract constraints. To turn these ‘invisible’ services into something that society can value requires a tangible product which is seen to link services to national benefit.

In this context, DustWatch provides a structure through which desert Australians can gain income from responding to the demand for these services. Using the simple economic paradigm of demand and supply, this paper explores the demand of both ecosystem and cultural services from desert Australia. A model is constructed highlighting the potential information flows within desert Australia relating to the monitoring and enhancement of ecosystem and cultural services. This DustWatch Livelihoods model identifies possible opportunities for desert people living and working within the natural and cultural resources of desert Australia through participation in the DustWatch program

(Figure 1). Opportunities can be viewed as coming from traditional ‘markets’ – government agencies – and non-traditional ‘markets’ – the outback tourist market. The ranges of supply mechanisms from desert people are also explored.

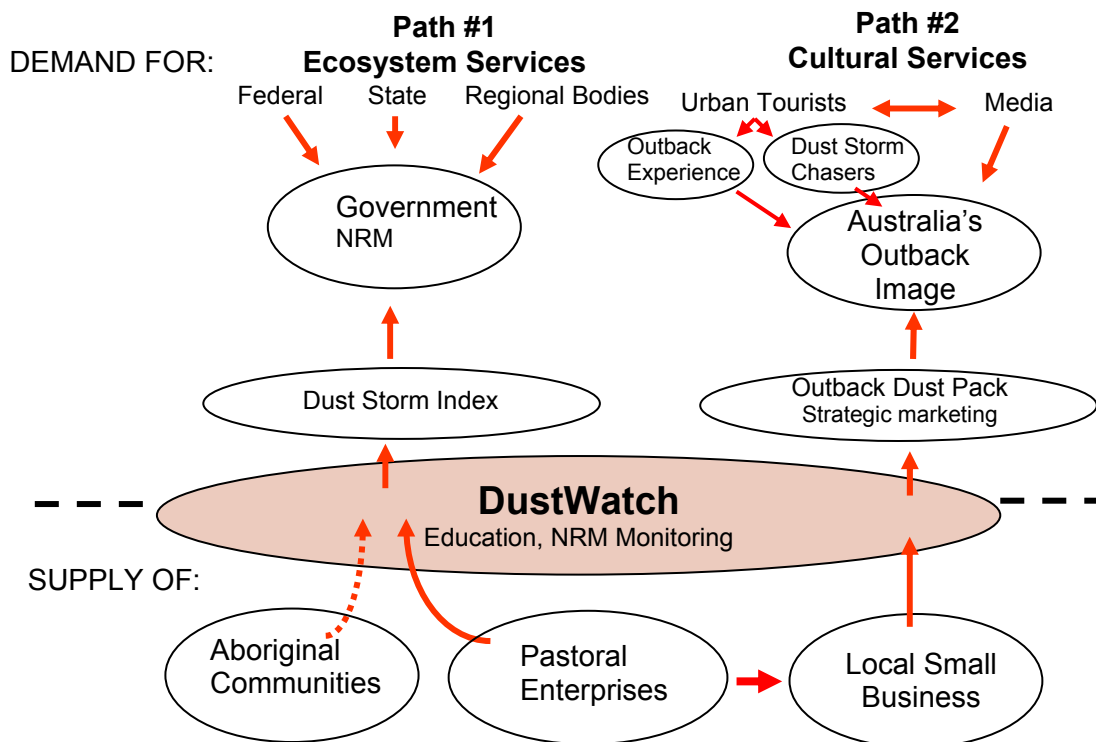


Figure 1: Information flows within desert Australia relating to the monitoring and enhancement of ecosystem and cultural services

In the ecosystem services path of Figure 1, land condition monitoring services are demanded by federal and state government and regional bodies. Pastoral enterprises and Aboriginal communities have potential to supply land condition information (e.g. dust observations), improving the resolution of monitoring. In the cultural services path the demand from the media and urban Australian tourists is for information on and experience of the romance of the ‘outback’. At the supply end, pastoralists and other local businesses have the potential to respond to this more tangible commercial demand through their membership of DustWatch, and in doing so are acting as carers of outback cultural values and the desert environment. This model therefore identifies potential new demand/supply path (Figure 1) that could generate incomes for desert people.

Demand/Supply Path # 1 – Ecosystem services

Can pastoral landholders fit into this demand/supply model and improve their livelihoods? There are two potential services that pastoral landholders could supply to government that could help meet the demand for the sustainable management of desert Australia: land stewardship and land condition monitoring. These services directly or indirectly enhance ecosystem services.

Figure 2 summarises an ecosystem service pathway in which NRM monitoring of wind erosion could be performed by pastoralists and Aboriginal communities through the engagement of the DustWatch project.

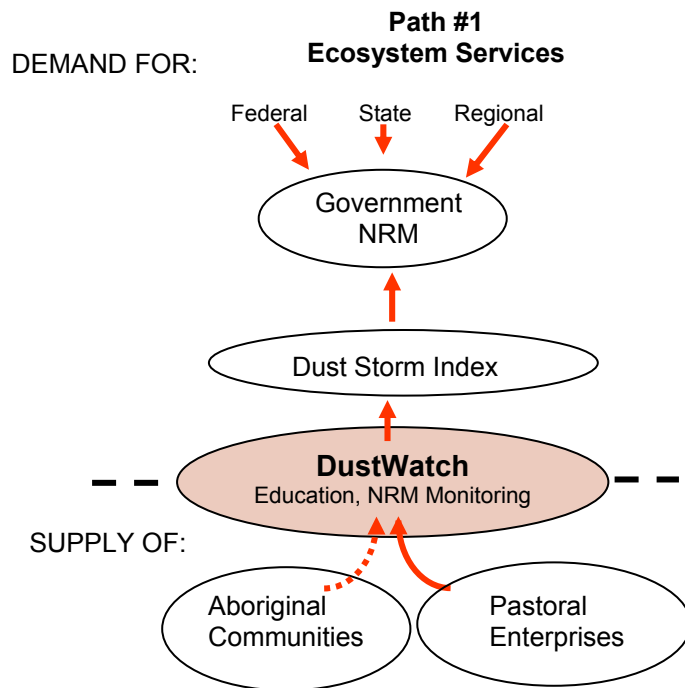


Figure 2: Conceptual model of demand and supply operating along the Ecosystem service pathway

Land stewardship services

The proposition that the government may provide ‘stewardship’ payments for the role that pastoral landholders play in sustainably managing significant tracts of desert Australia is briefly examined here.

The difficulty of making a living from beef or sheep in some desert regions has led to the decline of pastoral populations and disinterested future generations. This has raised the question of where the workforce will come from to manage the natural and cultural resources of pastoral lands. Pastoral organisations have called for ‘stewardship’ payments to recognise the role of pastoralists in management of non-market values (e.g. SAFF 2004). A mechanism for stewardship payments to landholders who act to protect and enhance environmental assets above and beyond their legal responsibility was also introduced into the National Heritage Trust in 2007 (Australian Government 2007). The scheme uses market incentives, following on from a national pilot program addressing design of market-based approaches to environmental management services (see Whitten et al 2007).

Landholders who responsibly operate their pastoral enterprises in an environmentally sustainable manner are in effect performing a community service. However, the notion of a ‘land stewardship payment’ for this community service could perhaps be interpreted as a reward for what could be considered a citizen’s duty of care of the land. Do not all landholders – from an owner of a small suburban block to a large pastoral landholder – have a responsibility to manage their land environmentally responsibly? This comparison between suburban landholders and pastoral landholders breaks down when the level of government support and environmental controls are considered. There is less investment by government in supporting pastoral landholders to exercise their duty of care towards the land. For example, suburban landholders receive more public infrastructure support (for provision of water, waste management and other services) than pastoral landholders, who often are required to provide for themselves. As a counter to this, it could be argued that suburban landholders have more stringent environmental controls upon their land use (e.g. controls upon garden refuse, sewerage, water use), but in more recent times this imbalance has been

reduced. There are now significantly more stringent environmental controls placed upon pastoral landholders through either government regulation (e.g. vegetation management, water licence) or market drivers as incentives (e.g. Cattlecare accreditation). It follows, therefore, that if pastoral landholders receive less government support for land management than their suburban counterparts, yet have similar environmental controls, there should be potential for pastoral landholders to be paid a land stewardship fee, for providing these land management services to government.

Land management services are associated with protecting soils from erosion and other forms of degradation. Maintenance of biodiversity is an associated issue and market approaches to achieve biodiversity outcomes in pastoral rangelands have been explored by DKCRC for Department of the Environment and Water Resources (Smyth et al. 2003). Conclusions from this study highlight that a market approach should recognise, support and build on existing personal motivations for biodiversity conservation. Further, given the uncertain property rights in pastoral rangelands, focusing on 'rewarding' ongoing and improved management of areas that are currently in good condition is likely to be more cost effective, and have less risk of slippage in management standards on other lands, than promoting management changes in lands which may initially be in relatively poor condition (Gordard et al 2007).

Implementation of stewardship schemes in rangelands will need reliable quantitative measures of land condition to assess the extent to which pastoral landholders are managing the land in a sustainable manner. The DustWatch concept is relevant to land stewardship in at least two ways:

- (i) DustWatch membership may be used as evidence of a landholder's environmental awareness and motivation, and therefore provide an indication of landholder's potential engagement with a land stewardship program
- (ii) The increased spatial resolution of wind erosion maps that could arise from widespread DustWatch membership could provide evidence to government of where sustainable land management is occurring.

Land condition monitoring services

Background on government demand for reporting on land condition in relation to wind erosion

Soil loss by wind erosion is an important component of environmental health which is reported in national and state-based State of the Environment Reports (McTainsh et al. 2001a). For the past two decades, McTainsh and colleagues have been developing measurement techniques and models to describe the impact of wind erosion across the Australian continent. Throughout this period the public awareness and government interest in wind erosion has increased, which has resulted in state and federal governments conducting an increasing number of environmental audits.

State of Environment (SoE) reporting in Australia has followed the lead of many overseas initiatives. Through the 1980s there were a number of major international initiatives including the formation of the World Commission on Environment and Development (WCED) in 1983 and its publication of *Our Common Future* in 1987 (WCED 1987). The Worldwatch Institute produced a *State of the World* report in 1985, Canada produced its first SoE report in 1986, the Netherlands in 1987 (Hammond et al. 1995), and the USA followed in 1988. These early reports were characterised by data overload due to the large quantity of scientific information gathered that was not easily understood by decision makers, or translated into policy (Hammond et al. 1995). To counteract this, a suite of more specific

environmental indicators were developed by the Organisation for Economic Co-operation and Development (OECD) (OECD 1993, Hammond et al. 1995).

Australia published its first SoE report, *State of the Environment in Australia*, in 1986. After the Rio conference in 1992, momentum was regained for a national SoE framework in Australia (Commonwealth of Australia 1992a). This framework was established in 1994, and was entitled *State of the Environment Reporting: Framework for Australia* (Commonwealth of Australia 1994a). It comprised seven panels of experts to complete each thematic chapter (Atmosphere, Marine and Estuarine, Inland Waters, Land Resources, Biodiversity, Human Settlements, Natural and Cultural Heritage) and to develop indicators for each area. The panels, in conjunction with the federal government, published the third SoE report for Australia in 1996 (Lloyd 1996). Data on wind erosion was included at the national level for the SoE reports of 1996, 2001 and 2006. As a result of national and international agreements, Australian governments have been obliged to conduct a number of other environmental audits (see for example: Commonwealth of Australia 1992b, 1992c, 1994b, 1994c).

As a result of these international commitments, the federal government has been restructuring natural resource management throughout Australia, leading to the establishment of 56 regional bodies. These regional bodies have the formal responsibility to identify the natural resource management (NRM) targets that are most appropriate to their regions and deliver land management change that will enhance the resources of their area. The effectiveness of their programs is also to be assessed through monitoring management and resource indicators (e.g. soil cover and wind erosion respectively).

To assist the regional bodies, monitoring, evaluation and reporting programs are being established in each state. At a federal level, expert advisory panels of the National Committee on Soil and Terrain (NCST) have recently been established under the jurisdiction of the National Land and Water Resources Audit (NLWRA) to develop the monitoring tools for assessing environmental condition. One environmental condition, wind erosion, has been discussed with formation of the Wind Erosion Expert Panel (WEEP), formed in 2006. Wind erosion reporting at the national level has been institutionalised through NCST, including monitoring guidelines. Recommendations and protocols have also been recommended for state, regional and point of investment monitoring.

Can DustWatch provide a framework for landholders to contribute to government sponsored land condition monitoring?

This brief history of environmental reporting in Australia highlights that various levels of government are involved in monitoring land condition to varying degrees.

A top-down approach could be interpreted as when the government defines the problem, sets the targets, monitors, polices and then re-evaluates the success of monitoring. A bottom-up approach could be interpreted as when a locally empowered body, such as a regional body, is given the responsibility to define the problem, set the targets, monitor, police and then re-evaluate.

Currently in Australia, both approaches are partially being conducted. NLWRA is defining the national problems and setting the standards to which monitoring should be conducted, while regional bodies are defining locally important land management issues, and producing a regional plan of what will be monitored and reported back to government. While the bottom-up approach is to be applauded, there is the potential that the perceived needs from the ground may disconnect with the perceived needs defined at a national level. National resource management issues require a coordinated approach to ensure continuity of monitoring. In effect, the federal government needs to define the perceived important issues and coordinate data collection.

The national approach to NRM currently being developed through NLWRA and its sub-committee, the NCST, has targeted four aspects of soil condition: soil acidification, soil carbon, water erosion and wind erosion. The four Expert Panels responsible for developing soil condition monitoring protocols have submitted their reports to NCST and demonstration trial projects have recently been completed, demonstrating the utility of the land condition monitoring methods. It is expected that when the details of the land condition monitoring methods have been finalised, some of the monitoring will proceed through regional bodies, or through other bodies with the particular expertise to carry out the monitoring (McKenzie and Dickson 2006).

In the wind erosion area there will be a suite of methods ranging from routine site-based field assessments of land condition through to more sophisticated and broadscale wind erosion modelling and monitoring (McTainsh et al in press, Leys et al. 2007, Butler et al. 2007). A monitoring structure such as this opens up the potential for proactive pastoralists to perform such monitoring tasks on a fee-for-service basis. Pastoralists would need to nominate their interest in participating in the scheme and demonstrate effective monitoring skills for the payment to be made.

Perhaps the greatest challenge right across the range of monitoring methods is the practical difficulty of obtaining accurate field data, particularly in the more remote pastoral properties in desert Australia. On the one hand, these monitoring challenges are greater in desert Australia, but on the other hand, the smaller population base there provides an opportunity to pastoral landholders to perform monitoring tasks more economically than state government departments or other government institutions could, due to capital and operational costs required for remote activities.

There are a number of uncertainties surrounding such a proposal, and while the details of such a scheme are beyond the scope of the current paper, there are grounds for optimism that it could happen. The 'top-down' approach taken by NLWRA uses state-based specialist land managers and researchers, in the Expert Panels, to develop land condition monitoring methodologies. Standard monitoring techniques have been seen by many community environmental monitoring groups to be crucial for consistent data collection (Alexandra et al. 1996). These methodologies have now been trialled, and once approved, may be implemented as part of the Natural Heritage Trust 3 (NHT3).

Regional bodies face challenges in monitoring at a high enough spatial and temporal resolution. This opens up the potential for proactive pastoralists, or groups of pastoralists, to perform such monitoring tasks on a fee-for-service basis. Because of their remoteness, pastoral landholders have a competitive advantage in being on site, offering cost-effective alternatives to monitoring. Potential monitoring services which pastoral landholders could contribute via DustWatch are outlined.

Pastoralists could provide significant services in relation to a range of soil condition monitoring techniques appropriate to wind erosion. These include:

- (i) conduct site-based wind erosion land condition surveys
- (ii) contribute to ground-truthing of remote sensing of, for example, vegetation cover;
- (iii) provide a range of field data on, for example, vegetation and other ground cover and soil condition, for testing wind erosion models
- (iv) provide DustWatch data for the broadscale wind erosion monitoring.

These services are achievable by the landholders and may be marketable to government and regional bodies. New administrative details outlining how these community services could be paid for would be required. For example, a tendering process could be used in which individual landholders, or groups of

landholders (e.g. the Centralian Land Management Association), submitted tenders to a formal government body for the provision of these monitoring services.

Although there are significant challenges involved in the implementation of such a scheme, there may be institutional analogies in the BoM and ACRIS. The BoM has a history of managing and remunerating community-based service providers as Meteorological Observers, therefore there may be institutional lessons to be learned from a closer association of DustWatch with the BoM. ACRIS currently provides a national picture of rangeland condition using data provided by state bodies, CSIRO and the universities. A DKCRC wind erosion project (McTainsh et al. 2006) has recently been extended to provide ACRIS with Australia-wide wind erosion maps from 1960 to the present (McTainsh et al. in press). There is therefore excellent potential for information exchange in relation to how the ACRIS model could be adapted to facilitate landholder soil condition monitoring. It may also emerge from such an investigation that there may be an opportunity for an innovative centralised body, such as the DKCRC, to take a strategic step and facilitate such activities.

Questions have been raised with respect to whether landholders could collect such baseline data in an unbiased, robust, methodical way. Similar issues have contributed to difficulties encountered in biodiversity studies conducted in desert South Australia (Smyth et al. 2003), but it could be suggested that biodiversity issues pose a greater perceived threat to landowners than do wind erosion issues. For example, the discovery of a threatened species could result in greater constraints imposed on land users, often intimidating landholders from participating. In contrast, land condition monitoring currently has less government controls and therefore a reduced threat of restricted land use. Significantly, there are also tangible productivity incentives for a landholder to manage the land, making it more appealing to focus on the scientific contribution as opposed to the ramifications of 'performing poorly'. To date, such issues have not been experienced with the pastoralists participating in DustWatch project as they are self-selected volunteers keen to participate.

Can Aboriginal people fit into DustWatch Livelihoods model?

Almost all of the arguments presented above for the payment of pastoral landholders for providing services to government to advance the sustainable management of desert Australia can be used to argue for the payment of Aboriginal people to perform the same or similar services. A very strong case can be made for Aboriginal landowners to be involved in both schemes:

- (i) To be paid a land stewardship fee
- (ii) To be paid for the provision of land condition measurement services to government on a fee-for-service basis.

Such schemes could provide land condition measurement and promote sustainable management of the very large areas of desert Australia which are Aboriginal owned.

In some respects the implementation challenges of such Aboriginal schemes would be greater, but in others less. The provision of education and training to community members to perform these land management tasks could be more difficult and expensive, but then the possibility of linking such training to Aboriginal perspectives and techniques of caring for land is an exciting prospect. Also on the positive side, these Aboriginal lands are already generally in better condition than many pastoral lands because the grazing pressure is lower, although some areas in the immediate vicinity of larger settlements are severely degraded and would require intensive attention.

The time frames for implementation of Aboriginal schemes would need to be much longer than for the pastoral sector, and the strategies quite different. For example, additional assistance would be required by some Aboriginal groups in the preparation of tenders and the specific training required for conducting the work. This could initially involve the setting up of a 'train the trainer' program involving the intensive training of a small group of Aboriginal trainers (details later). Some Aboriginal groups may already be in a good position to tender for the provision of land condition measurement services to government, because of their experience with other government grant application processes – even though the two are different in detail. For example, in the fifth round of the Envirofund, the Apmwerre Aboriginal Corporation successfully received \$12 342 for 'looking after our country' and the Julalikari Council Aboriginal Corporation received nearly \$5000 for 'dust suppression' on one community.

Land condition measurement and associated training could couple with other work and education initiatives already in existence to help Aboriginal groups develop vocationally relevant skills and income-earning opportunities. Although income from land condition measurement would be small in itself, it could play a role in reducing welfare dependency, given the existence of appropriate institutions. Ranger programs in existence or in development in some desert Aboriginal communities may provide structures for provision of land condition measurement services in some places. Currently, many such programs are in a development phase and appear to focus on remediation rather than the more technically demanding monitoring work, although the Tanami Biodiversity Strategy (Stoll et al 2005) provides an example of desert ranger group involvement in measurement and monitoring. Davies et al (2007) and Davies (2007) canvass prospects for desert ranger groups, or Aboriginal individuals and families living in remote settlements, to provide other environmental management services, notably biodiversity, that would complement income from land condition measurement. They also stress the key role of brokers in linking between these service providers and differentiated markets for the services they provide, which is a potential role for DKCRC or DKA.

School DustWatch: a prototype for a 'train the trainer' prototype?

The School DustWatch (SDW) program, which is currently being scoped in six Aboriginal communities in the Northern Territory, may offer some 'prototype' training programs which could be modified for a 'train the trainer' program.

The SDW pilot project aims to build a land management package into the science curriculum, providing an entry point for knowledge of land condition measurement in Aboriginal settlements. It involves the extension of the DustWatch concept into the science curriculum of remote primary schools, endeavouring to foster environmentally responsible attitudes in the next generation of land managers. As the project is working mainly with Aboriginal children who use English as a second language, many visual and auditory teaching strategies have had to be adopted. The children learn scientific skills in making real life measurements which can be incorporated into the DustWatch observation network. The strengths of the project are three-fold: first, it uses a subject matter (i.e. dust storms) which the students are familiar with; second, because it is curriculum-based, the teachers can use the resource package in their normal teaching lessons, reducing their workload; and third, the data gathered by the students can contribute to better land condition monitoring via the linkages between SDW and DustWatch.

Currently, the SDW pilot project has received funds from DEST Australian Schools Innovation Science Technology Maths program (ASISTM), DKCRC, and Newmont mining company. The SDW pilot project is a joint project between Griffith University and six predominately Aboriginal schools throughout Northern Territory (Alpurrurulam, Canteen Creek, Stirling, Laramba, Walungurru and

Finke Schools) aimed to develop the teaching and learning resources required to run a sustained project. These resources could then easily be extended to suit different age groups or schooling formats.

In summary, while there would be many challenges in the implementation of both the Aboriginal land stewardship scheme and the scheme for the provision of land condition measurement services to government, these challenges would be far out-weighed by the large livelihood benefits that could arise.

Demand/Supply Path #2 – Cultural services

In the preceding discussion, the proposition has been made that pastoral landholders and Aboriginal groups could gain an income from providing a service to government by providing field data for wind erosion monitoring. In the coming section a quite different demand/supply path will be examined. This could involve landholders and/or Aboriginal individuals and groups diversifying their activities to exploit new commercial opportunities.

Dust storms are both natural and land-management induced phenomena. Therefore, while dust storms can be viewed as negative occurrences these visually impressive events also have tourist potential. Through strategic marketing of dust storms and DustWatch to tourists, it may be possible to turn a negative into a positive, and benefit desert livelihoods. Rather than viewing wind erosion – and, in particular, dust storms as agents of wind erosion – as a problem, by viewing dust storms as visually impressive natural phenomenon which are distinctive to the outback, there is potential to exploit their tourist potential (Figure 3).

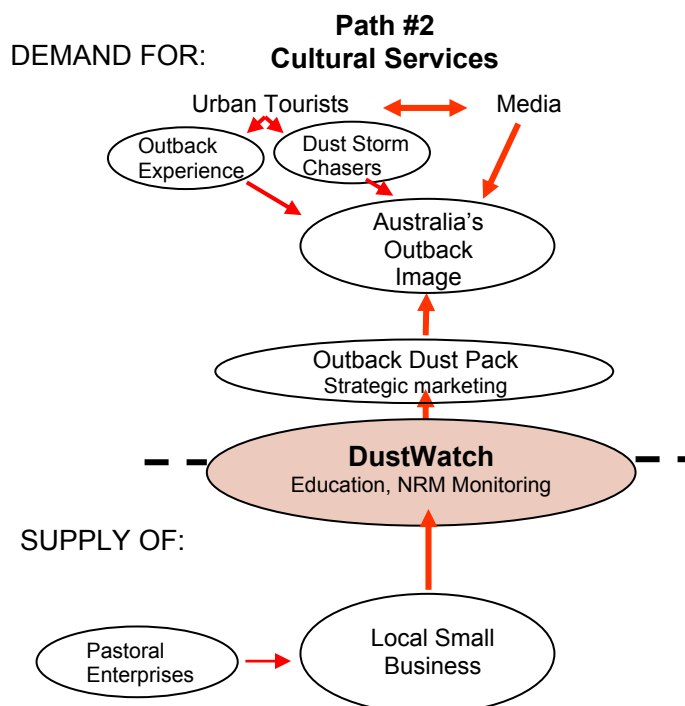


Figure 3: Conceptual model of demand and supply operating along the Cultural Service pathway

What is the commercial demand for Cultural Services which DustWatch could respond to?

Many Australians have a romantic connection with the outback – with what lies beyond ‘the black stump’. Many of Australia’s stories and myths originate in the outback – from the drovers and squatters of the barren dusty plains – yet very few Australians live in the outback, preferring to live an hour or two hours’ drive from coastal cities. Nevertheless, after a century or more spent absorbing the bush yarns of Henry Lawson and the poetry of Banjo Paterson, many Australians now want to experience the ‘unique’ characteristics of their home continent.

This long-standing fascination of Australians with their outback is fueled by an increased community awareness of and fascination with the environment in general. Dust and dust storms are a distinctive part of the outback and they too are the subject of curiosity in the minds of city dwellers. Another perspective of the urban Australian fascination for dust storms may arise from their being very large, and intimidating natural phenomena which people would like to experience first-hand. There may be parallels here with the explosion of tourist interest in whale watching, and it may reflect the increasing popularity of adventure-based tourism.

The details of the demand for cultural services from desert Australia are discussed here, first in terms of the demand for outback tourist experiences, and then a few examples are provided of how small businesses and individuals could supply services in response to that demand.

The media and the outback

The media plays a critical role in reinforcing the romance of the outback within Australia and internationally. The urban coastal newspapers publish about the large dramatic dust storms which have significance for public health, which impact on cities, and which promote images of outback adventure and romance. Birdsville is an iconic desert town, so when a large dust storm rolled through, it made the front page of *The Australian* (Figure 4).



THE AUSTRALIAN

THE NATION

Once-in-a-lifetime view of what lies beyond the Birdsville track

Brendan O'Keefe
January 27, 2006

EVEN in the parched and dusty outback Queensland town of Birdsville they have never seen anything like the storm that rolled in late on Wednesday afternoon.

A wall of dust, blown by gusts from a thunderstorm, tumbled across the landscape, blanketing the town and its famous watering hole as it stretched across a kilometre of the vast sky.

A wall of dust blown by thunderstorm gusts rolls in to Birdsville, in southwestern Queensland, on Wednesday. Picture: Karen Brook

Figure 4: Beyond the Birdsville Track

On the 27th January 2006, a dust storm associated with thunderstorm activity formed and rolled into Birdsville, south-west Qld. The wall of dust was blown over Birdsville with such spectacular force that even long-term residents were reported to be in awe. Local photographer, Karen Brook, captured the moment. *The Australian* newspaper ran a front page story with this picture as the image grabber.

The Australian's photo marketing division NewsPhoto, has been promoting and selling this image since January, with the image promoted on the home page of the online version. The image provides striking imagery, colour and cultural intrigue.

Source: NewsPhoto, 2006

Tourist demand for the 'outback experience'

Marketing of tourism in Australia is diverse: utilising the wealth of natural resources and depth of culture as promotional tools. A current marketing slogan of 'Where the bloody hell are you?' draws directly from our distinctive culture and often features the classic 'outback pub scene'. Some examples are provided of how the outback experience is being marketed.

The simulated outback experience

The following example of the *Australian Outback Spectacular* on the Gold Coast provides evidence of the commercial potential of the outback, even for those tourists who are unwilling to spend the time or money to actually visit the outback.

Figure 5: Wake up desert Australia – Movie World is cashing in on the outback image!

HOME THE SHOW BOOKINGS VISITOR INFORMATION CAST & CREATIVE TEAM R.M.WILLIAMS

Discover the Outback Spirit with Australian Outback Spectacular, an evening dinner show presented by R.M.Williams, filled with outback music, drama and action!

Australian Outback Spectacular, is a permanent new attraction located on the Pacific Motorway between Warner Bros. Movie World and Wet'n'Wild Water World, just 20 minutes from the heart of Surfers Paradise.

Nightly, from Tuesday to Sunday, the \$23m attraction, set in a 1000 seat enclosed arena, features a one and a half hour extravaganza with spectacular audio and visual effects as well as a three-course Aussie BBQ dinner featuring quality Australian beef. As part of the entry ticket, in addition to the show and dinner, guests also receive beer, wine or soft drink during the show as well as a free Stockmen's hat!

[Find out how to make a booking now!](#)

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Movie World on the Gold Coast has got the Outback Spirit: what about you? Australian Outback Spectacular, is a \$23m permanent new attraction featuring the adventure and excitement of outback life. Horses, stock whips, camels, stockmen and stockwomen, dogs and sheep. The one-and-a-half hour extravaganza also features spectacular audio and visual effects while being served a three-course Aussie BBQ dinner, including the beer! Just to be sure you walk away with that outback spirit everyone receives a free Stockman's hat!

Movie World markets at both the domestic and international tourists. The financial investment indicates that they expect to make money directly from the tourist trade seeking a bit of the outback spirit. For \$80 they can walk away being entertained, feed and given a taste of the outback Australian character.

Source: AOS 2006

The real outback tourist experience

There are increasing numbers of tourists who are prepared to spend the time, effort and money to visit the outback. This has been identified by Tourism Australia and they are actively promoting tourism away from coastal regions. In the first 14 years after its construction, the Stockman's Hall of Fame in Longreach had over a million visitors (ASHF 2002). Considering its remoteness from major population centres, the popularity of the museum is testament to the strength with which visitors relate to the Hall of Fame's theme, philosophy and aims. The high visitation rates at Uluru also indicate that opportunities do exist for desert tourism actually in the desert.

In 2003, the federal government produced a Tourism White Paper identifying tourism as a way to foster long-term economic growth, especially in regional areas (DCITA 2003). Tourism Australia has declared industry goals based on growing visitor expenditure and dispersal (i.e. travel beyond major gateway cities). The strategy taken is to focus on the potential of unique experience, or niche markets,

such as Aboriginal tourism, ecotourism, caravan and camping/touring, food and wine to achieve growth (Hill 2006).

DustWatch: assisting local businesses to provide outback experiences

Small businesses throughout desert Australia are in a strong position to exploit the demand from both international and domestic tourists for an outback experience. Participation in DustWatch could give small businesses information and education tools, to attract and engage outback tourists.

By participating in DustWatch, small desert businesses – including: farm stays, small tourist resorts and tour guides, pubs, general stores and fuel stops – could enhance their appeal to nature-based and other tourists. These local tourist businesses would be able to couple their local environmental knowledge with locally relevant information about dust storm activity in their area, provided as part of an Outback Dust Pack which would be prepared especially for that location. The pack could include a site-specific poster identifying the nature and causes of dust storm activity in the local region and when the best viewing times are. The pack, plus any computing facilities at the location, could provide on-line access to the DustWatch website for information on recent dust storms, meteorological conditions, a dust storm forecasting service, and current dust storm research information.

Labelling of a small tourist business as a DustWatch site would be a simple but effective strategy in attracting customers. A good example of this approach is the ‘Land for Wildlife’ program in Queensland (Figure 6) which flags to a passer-by that a local business is ecologically sensitive and could provide locally relevant environmental information.

Figure 6: Labelling



Land for Wildlife is a voluntary, non-binding program which encourages and supports landholders to provide habitat for native plants and animals on their property.

The program offers landholders a variety of benefits which include:

- free advice and assistance on managing wildlife habitat with other land uses
- recognition and support for your contribution to nature conservation in Queensland
- opportunities to share ideas and experiences through the Land for Wildlife network and publications.

Source: Greening Australia nd

By displaying the recognisable label on the property gate, the owners clearly identify themselves as participants in the program. This brand recognition enables travellers to identify that the owners are ecologically sensitive. This can be viewed as a form of Corporate Social Responsibility, albeit at a small scale.

In the longer term, if this application of the DustWatch concept catches on, there would be potential to establish a DustWatch accreditation system (similar to the current Eco-tourism accreditation scheme), whereby a formal accreditation body administers the registration of tourism-based DustWatch members and administration of the program. This body could be set up through the DKCRC, and may be a revenue-raising body.

Other tourism niche market opportunities

National tourism strategies emphasise the targeting of niche markets; that is, aligning supply and demand carefully. Three niche markets are examined here, in which there is potential to extend the DustWatch concept to stimulate new tourist-based commercial opportunities in desert Australia.

1. Aboriginal cultural/heritage based tourism

Cultural and heritage-based tourism has experienced, on average, 18% growth between 2002 and 2004 with the majority of domestic tourists being over 55 years of age. It is expected that this trend will continue in the future (TRA 2005a,2005b). There is excellent potential for Aboriginal communities to enhance their cultural/heritage offerings to tourists by becoming DustWatch sites and, in the manner described above for small businesses, promote the unique characteristics of their local environment.

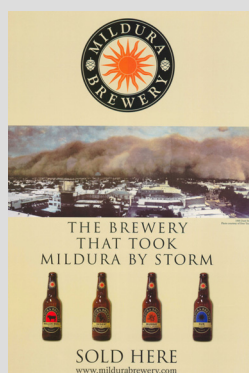
2. ‘Grey Nomads’: senior travellers in the outback

Grey nomads are generally well-educated retirees with disposable incomes who not only want to experience an outback journey but want to learn as well. They have larger amounts of free time and are often keen to stay in the caravan parks of local towns. Due to the ageing of the Australian population, the number of nights spent in caravan and camping accommodation by senior travellers is expected to increase by 27% in the next five years (TRA 2005c). A niche tourism market therefore exists in desert Australia catering for their tourist needs, and DustWatch can enhance the experience of these senior Australians.

There is potential to recruit grey nomads as mobile DustWatchers (through caravan clubs, 4WD clubs, etc) who could record and communicate their observations of dust storms and smaller wind erosion events, such as willy willies (or dust devils) via the DustWatch website or other means. These mobile DustWatchers could make valuable data contributions in that they may be in remote locations which are not covered by pastoralist DustWatchers, and being mobile, they may be in a better position to actually track dust storms. Their DustWatch membership could be formalised with a DustWatch number on a sticker for their caravan or 4WD vehicle.

A distinctive feature of DustWatch is that it builds social networks – it brings people who would not normally have much contact into closer contact, such as connecting university researchers and school teachers with people in government and private sector. It is likely that the grey nomads would fit easily into the DustWatch social network.

Figure 7: Niche Pub Marketing



The Mildura Brewery is an example of a small business exploiting the outback romance of dust storms to advertise a product.

Outback pubs could capitalise on the movement of grey nomads and 4WD enthusiasts across the country, displaying their DustWatch participation, thereby promoting:

- a sense of familiarity between mobile DustWatchers and themselves
- interest from the travellers with respect to the levels of local dust activity compared with other places that they have travelled.

3. Dust storm chasing: a new adventure tourism activity?

The concept of 'recreational' or 'hobbyist' storm chasing evolved in the late 1970s, according to the National Association of Storm Chasers and Spotters (NASCAS) in the USA (NASCAS 2006). The majority of pre-1990s chasers pursued storms for the pure 'love of it'. By 1997, storm chasing in the USA became commercial, stimulated by three factors:

- (i) the financial accessibility of laptop computers
- (ii) the increasing media exposure
- (iii) (most influential) the release of the motion picture *Twister* in the spring of 1996 (Coleman and McCloud 2005).

Driven by the unrealistic idea of intercepting several tornadoes in a single day, hundreds of inexperienced people began to invade the Great Plains region. Tour groups sprang up overnight, offering chase adventures for a fee. News stations began to compete for coverage, deploying customised chase units and helicopters. Laptops, internet data, satellite receivers and mobile phones allowed anyone to gain instant access to current data (Coleman and McCloud 2005).

Could this happen in Australia? There is a movement already happening. The official Australian Storm Chasers website (ASC 2006) provides an online facility for members to chat, share experiences and most importantly alert others to where the action is happening. Membership in June 2006 was reported to be near 400. This hobby should be viewed as a fledgling one, but signs are there that it could grow. The strong US trends legitimise it in the eyes of many Australians; increased publicity entices participation; and perhaps the predicted increase in extreme weather associated with climate change will also entice participants.

As in the USA, Australia has professional tour groups, offering a safe alternative for inexperienced persons wanting to chase storms. The most established, ThunderBolt Tours, has been operating since 2000. Part-owner Jimmy Deguara describes it as 'a mystery tour; you don't know where you will end up' (Thunderbolt Tours 2005). What you *will* get is 'an intense journey into severe weather, a spectacle that is witnessed each year by a privileged few'.



Figure 8: Australian storm adventures

An innovative desert Australian could supply a niche market chasing dust storms or even willy willies (or dust devils). Given the episodic nature of dust storms this activity would be best suited to a mixed business operation. Tours marketing to Australian travellers could access the DustWatch network as a source of predicting current active spots and best sighting opportunities. Just like the USA has its ‘tornado alley’, Australia could have a ‘dust storm track’. For example, travelling the Birdsville track between September and December will maximise the chances of seeing a ‘big one’. Places along these tracks could be promoted as the birthplaces of dust storms; for example, Lake Eyre North, the Strzelecki Lakes and the Simpson Desert.

Since 1997, the USA storm-chasing industry has experienced enormous growth. However, there have also been negative environmental and social outcomes. Issues such as accessing private land without permission, inappropriate use of vehicles, and damage to surface soil and vegetation are a few negative by-products of loutish behaviour. A small proportion of newsgroups and individuals have identified these problems via their websites. As reported by the National Association of Storm Chasers and Spotters, while this loutish behaviour is confined to a small minority, it has potential to diminish the positive image of the new generation of hobbyist chasers. A respected US chaser recently said: ‘If something is not done soon to weed out the troublemakers and police ourselves, the future of chasing will not be determined by us, but rather, by state legislatures’ (NASCAS 2006).

Australia could learn from this US experience and DustWatch could provide a code of practice and an environmental certification for commercial storm chasers. At minimum, membership of DustWatch would help ensure that dust-storm chasers are familiar with the fragility of desert landscapes and that they comply with social norms such as not trespassing on pastoral properties and Aboriginal lands. This certification program could be administered by the same body administering the mobile DustWatch program.

Summary

In this study, DustWatch, a community environmental monitoring program, has been proposed as a basis to stimulate livelihoods in desert Australia. The remoteness and sparse population creates many difficulties in sustaining the livelihoods of land owners, Aboriginal people and small businesses. For example, the difficulty of making a living from beef or sheep in some desert regions has led to the decline of pastoral populations and disinterested future generations.

DustWatch is a network of volunteer observers throughout desert Australia collecting meteorological data on wind erosion events. The impetus for the network came from the need to increase the spatial resolution of wind erosion monitoring across Australia. Initially this need was driven for research purposes, but progressively the national reporting of land degradation has become an issue. The network currently has volunteers from across Australia representing a wide range of livelihoods and age groups. The simple observational data they collect is complementary to Bureau of Meteorology data and is therefore used to increase the spatial pattern of reporting.

Another objective of DustWatch is to increase public awareness of wind erosion and the associated land degradation. The response from the media has been enthusiastic, reflecting the fascination of city dwellers with the outback in general, and dust storms in particular. This has raised the possibility of turning a negative – land degradation – into a positive – dust storms – with desert Australia exploiting the commercial potential of the DustWatch concept.

The DustWatch Livelihoods model is proposed in order to explore how DustWatch can stimulate livelihoods. This model explores the potential flow of information between groups that demand

environmental monitoring data and those groups that can supply it. The DustWatch Livelihoods model identifies two pathways in which livelihoods, of the ‘suppliers’ could be stimulated. First, the *ecosystem services pathway* taps into traditional ‘markets’, such as government agencies and regional bodies that require natural resource monitoring in order to meet their regional, national or international environmental commitments. Second, the *cultural services pathway* is a non-traditional ‘market’, which acknowledges that the media and tourism industry find the outback image desirable.

Pastoral landholders and Aboriginal people could potentially supply government with two ecosystem services: land stewardship services and land condition monitoring services. Land stewardship services acknowledge that remote desert people have the potential to maintain and look after country. They are the best positioned, because they live in the environment, to maintain the wellbeing of the ecosystem. Payment for such a stewardship service would require reliable quantitative measures of land condition to assess the extent to which the land is being managed in a sustainable manner. Participation in DustWatch identifies sustainability-minded land managers while increasing the spatial resolution of wind erosion monitoring.

Land condition monitoring services are the second service which can be provided by pastoral landholders and Aboriginal people to government. Various government agencies seek land condition monitoring, but the major constraint on accurate data is the low spatial resolution of monitoring. Government-based monitoring is becoming increasingly uneconomical, yet there is an increasing pressure to report on the state of the environment. As a result, regional bodies have been formed and given the task of identifying and reporting important local environmental issues. Pastoral landholders and Aboriginal people of desert Australia are well positioned to provide monitoring services to both government and regional bodies, enabling them to meet their reporting commitments. Provision of land condition monitoring could be conducted by landholders or Aboriginal people individually or collectively, on a fee-for-service basis. Although there are significant challenges involved in implementing such a scheme, there are in part, institutional analogies in the BoM and ACRIS which warrant further consideration.

Small businesses could harness the media and tourist interest expressed in the cultural significance of desert Australia. Trends in tourist activities indicate that increasing numbers of Australians are interested in visiting rural regions. Local businesses need to acknowledge that many Australians now want to experience the distinctive character of desert Australia. By embracing and sharing the outback culture, smaller businesses are likely to attract further patronage. The cultural services pathway in the DustWatch model identifies a number of marketing strategies which can be used by local businesses to enhance their appeal to travellers. For example, carefully advertising involvement in the DustWatch program would identify the business as being both sensitive to land degradation issues and able to provide local natural history information. Concurrent recruitment of urban-based travellers as mobile DustWatchers will develop common interests between urban and rural DustWatchers, fostering camaraderie. This will develop stronger bonds between desert and urban Australians, while improving the livelihoods of desert Australians.

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