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Sustainable Desert Livelihoods:  
A cross-cultural framework

Michael LaFlamme

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A cross-cultural framework

Michael LaFlamme



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## Executive summary

Sustainability is widely accepted as a goal but it is rarely achieved in practice. In this study I present a framework for sustainable livelihood practices based on desert social, cultural, institutional and ecological principles.

Because cultures co-evolve with their changing environments, sustaining livelihoods has always been a challenge for land-based groups, and particularly so during the past centuries of colonisation. When Europeans settled in Australia, they did not begin by learning from the people and other biota. As a result, decisions were made that resulted in widespread biocultural degradation, which also alarmed pastoralists, scientists and the public. More recently, there has been strong demand through legislation for equitable partnerships that envision many cultures and biomes contributing to a distinctive and diverse Australia.

Other nations have faced similar challenges in designing effective responses to biocultural system degradation from economic growth. Through the United Nations, member states developed the principle of sustainable development that integrates a suite of social, environmental and economic metrics. International development organisations formalised these concepts into a sustainable livelihood framework (SLF). The basic framework illustrates the important relationships and feedback among six key elements:

- Assets: What people have.
- Strategies: What people do with what they have.
- Outcomes: What people get from what they do, which builds what they have.
- Rules: The things that regulate which people are allowed to do what.
- Risks: Threats that reduce what one has.
- Influence: The power to change rules.

People in many countries have modified and used the SLF to understand and strengthen the key relationships and elements in their local livelihood systems, to improve cooperation and outcomes. They often vary this framework but retain the six elements.

I brought together a cross-cultural Reference Group to investigate the usefulness of the SLF for designing desert livelihoods. They indicated that the primary value of the framework was to facilitate more equitable partnerships in each of the six SLF areas. However, all reference group members concluded that the SLF asset/strategy/outcome categories did not reflect desert experiences.

Recent research has synthesised much desert science and clarifies that desert Australia has diverse but tightly constrained climates, flora and fauna, soils, topographies, hydrologic and fire regimes, economies, languages, and cultures. Many mainstream desert livelihoods do not reflect these constraints, which increases risk to those assets. This paper argues that to sustainably address these constraints, desert/rangeland livelihoods must have six characteristics:

- Land: experiential knowledge and responsibility for places.
- Limits: willingness to live within desert constraints.
- Communication: ability to develop and communicate place-based meaning.
- Practices: diverse practices that enable systemic responses to change.
- Relationships: equitable, trusting and cohesive social networks.
- Biodiversity: priority on conserving the ecosystem.

These few characteristics enable a wide variety of context-specific behaviours to emerge, such as increasing local system understanding and reducing resource use. Some recent ecosystem-based grazing management systems also reflect similar characteristics. In addition, there is a strong movement among pastoralists and land management agencies for more coordination between small-

and large-scale responses to risks and opportunities. These characteristics also parallel those that have long been articulated by desert Aboriginal groups, and which can be summarised as:

- Land: knowledge, responsibility and identity with a place.
- Language: place-based expression of being and relating.
- Ceremony: experiential methods of social learning such as through ceremony.
- Kinship: spatially/culturally extensive relationship networks.
- Law: underlying principles of living systems.
- Plants/animals: conservation of food/medicine.

The key challenge reflected in these livelihood characteristics is for desert groups across cultures to design practices that more closely reflect the principles of sustainability in their desert environment. By developing practices based on key characteristics of desert sustainability, sparse desert populations can reduce their risks, and build a critical mass to enable equitable relationships with politically and economically powerful coastal regions.

In this paper, I propose a Desert Livelihood Framework as a cross-cultural model that highlights the central importance of these characteristics for sustainable desert livelihoods. The framework synthesises diverse scientific and cultural frameworks that address desert sustainable development. It offers a tool to facilitate the creative design of innovative livelihoods to sustain desert systems and generate widespread benefit.



## Introduction: Sustaining biocultural diversity

This paper presents a framework for designing desert livelihoods – ways to make a living that are adapted to the biologically and culturally diverse arid zone of Australia. Cultures are shaped by the biophysical characteristics of the places within which they evolved, and cultural practices in turn shape their environments. This diachronic relationship between natural and cultural systems around the world has developed a large body of Indigenous knowledge (e.g. Posey 1999). Biological and cultural diversity frequently co-occur: Australia is one of six nations that is mega-diverse biologically and linguistically due to its high numbers of endemic vertebrates, plants, birds and languages (Harmon & Maffi 2002). In turn, the high extinction rates of our biocultural diversity may have profound consequences for our national identity. In this context, cross-cultural sustainability is the challenge to safeguard human wellbeing and the adaptive capacity of ecosystems by maintaining a functioning life-support system (Fischer et al. 2007).

The consequences of degrading biocultural systems has been studied in detail and clearly understood since the early days of Australian colonisation. For example, in 1811 a team of renowned scientists published a four-volume analysis of the effects of colonialism on the people and cultures of Latin America, the *Political Essay on the Kingdom of New Spain* (Humboldt 1811). It established the field of tropical science, while concluding that ‘colonialism is corrupt and cruel, and its feudal mismanagement of the land and its people must be ended if a true civilization is to emerge’ (Walls 2005, pgf. 274). A similar synthesis, the epochal *Man and Nature* (Marsh 1864/2003), also documented the effects of human action on the environment, and helped popularise the concept of conservation.

Australia at that time was in the midst of our ‘greatest period of mammal extinction’ (Lunney 2001, p. 44). Management of millions of sheep was the primary cause of 24 mammal extinctions in western NSW between first settlement and federation. The extensive degradation was documented by the 1901 NSW Royal Commission, which invited the testimony of pastoralists who ‘sensed that they had disrupted earlier, Aboriginal systems of habitation and management and felt that they had tipped the land into escalating instability. They began to argue that the land needed people as much as people needed the land’ (Griffiths 2001, p. 11).

As a result of these kinds of difficult experiences, some land managers are rediscovering that sustainability requires partnerships among desert lands and people as one system. At the national level, a demand for sustainability has been expressed through a number of policy documents. For example:

- The *Environment Protection and Biodiversity Conservation Act 1999*, the Commonwealth Government’s central piece of legislation that integrates environmental protection, biodiversity, cultural places and sustainable development. The Objects of this Act include ‘to promote a co-operative approach to the protection and management of the environment involving governments, the community, land-holders and indigenous peoples’ (Section 1d).
- The *National Principles and Guidelines for Rangeland Management* (ANZECC & ARMCANZ 1999) presented a 25-year vision for ecologically sustainable rangeland management that supports diverse social, cultural and economic activities. To attain this vision, it presented three goals: conservation and management of the natural environment; sustainable economic activity; and recognition and support for social, aesthetic, cultural and heritage values, diversity and development. To achieve these goals, it established a set of principles and values to underpin guidelines and action.
- *Environment Budget 2008–09* that invests \$2.2 billion over five years through Caring for our Country for six priorities: the National Reserve System; biodiversity and natural icons; coastal environments and aquatic habitats; sustainable farm practices; natural resource management in remote and northern Australia; and community skills, knowledge and engagement.

Together with the emphasis on sustainability indicated above, national policy has given recent attention to fostering equitable partnerships with Aboriginal and Torres Strait Islander peoples. For example:

- The priority in the Caring for our Country program on community skills, knowledge and engagement intends to ‘invest in the skills and knowledge of Indigenous Australians, volunteers and communities to enable them to partner more effectively with regional and other organisations to deliver landscape-scale change’ (DEWHA 2008a, p. 17).
- *Overcoming Indigenous Disadvantage: Key Indicators 2007*, reports on the federal government’s ‘commitment to be held accountable for improving outcomes for Indigenous Australians’ (SCRGSP 2007, p. ii), and identifies success factors that underlie ‘things that work’. These show that outcomes respond to equitable partnerships among Indigenous people, government and the private sector, through support of ‘bottom-up’ decision-making.
- An intention of the federal government’s *Indigenous Budget 2008–09* is ‘to involve Indigenous people in the design and delivery of programs locally and regionally, and share responsibility for outcomes. Solutions developed on the ground must be driven by the communities that will ultimately determine their success or failure’ (Macklin 2008, p. 5).

Implementing these intentions in a culturally plural nation is politically challenging. Since federation, Australian approaches to Aboriginal and Torres Strait Islander policy have become entrenched in three separate but interacting political logics based on different concepts of identity and values: liberal democracy; the Indigenous domain; and protection and segregation, as shown in Table 1 (Stokes 2002). Stokes argues that Aboriginal self-governance is constrained through policies that promote either inclusion through assimilation to a uniform set of social and economic institutions (e.g. through centralised bureaucracies, and delegated powers), or exclusion from power through segregation from mainstream political institutions (e.g. through welfare colonialism, incarceration and the persistent ‘gap’). Stokes argues that the ‘carrot’ of inclusion and the ‘stick’ of paternalism inhibit contemporary expressions of Aboriginal traditions of political autonomy and self-governance.

**Table 1: Three political logics in Indigenous affairs, 1901–2001**

Domain	Liberal democracy	Self-determination	Protection and segregation
Political logic	Inclusion, participation, representation, public accountability, instrumental rationality	Self-determination, autonomy, accountability to kin, clan and land	Exclusion, segregation, paternalism, lack of accountability
Policies	Political reproduction: incorporation, integration, assimilation	Reproduction of material life, society and culture; patriarchal	Hastening the inevitable demise of the race and culture
Institutions	Liberal democratic, federal, hybrids	Social, clan, religious, land	Protection, segregation, incarceration
Identity	Active civic identities, individual and group	Kinship-based, local, regional variations	Passive, narrow legal and administrative identity

Source: Stokes 2002

Nevertheless, the ideals of liberal democracy place a high value on self-governance. For example, Australia has ratified the International Covenant on Civil and Political Rights, whose Article 1 (1) states that ‘All peoples have the right of self-determination. By virtue of that right they freely determine their political status and freely pursue their economic, social and cultural development’ (UNGA 1966). Stokes therefore recommends that Australia promote Aboriginal self-governance by engaging the best qualities of democratic institutions. These include political representation, participation in decision-making and government accountability to citizens. In the long-term, such a democratic approach avoids assimilation and promotes cultural pluralism, a strategy supported by the Harvard Project’s analysis of North American, New Zealand and Australian Indigenous groups. That project has found (Cornell 2006, p. 18):

*the best way to avoid the one-size-fits-all recipe for failure is to let Indigenous peoples decide for themselves who the appropriate self in self-governance is and how self-governing institutions should be structured – and to accept the variety of relationships and governance solutions that will surely result.*

Supporting diverse Aboriginal identities in collaborative policy design and implementation is difficult but necessary for a culturally plural nation. However, Dillon and Westbury (2007) find that Australian governments have not yet developed their capacities in this area. They present evidence that the resulting ‘policy paralysis’ causes ‘destruction of indigenous lives’, and of ‘the nation’s social cohesion, sense of national unity and reputation’ (Dillon & Westbury 2008, p. 207). The Indigenous Community Governance Project (Hunt et al. 2008), an extensive set of comparative case studies, also concluded that the relationship between government and Indigenous Australia has become dysfunctional for both groups (Hunt et al. 2008, p. 22):

*It is likely, therefore, that the legitimacy and effectiveness of both Indigenous governance and the ‘governance of governments’ in Australia will continue to be inextricably linked, not only to the priorities, normative codes and institutional predilections of each, but to the extent of their mutual understanding and engagement.*

Changing entrenched systems such as these requires a ‘transformation’ of this system into new configurations (Walker et al. 2004). For example, in desert Australia the close and mutually exclusive relationship among Aboriginal and government groups necessitates a difficult transformation toward equitable intercultural governance of resources and decision-making power (e.g. Desert Knowledge Australia 2008).

## **Sustaining biocultural diversity through livelihoods**

In 1983, the United Nations recognised the impact of more powerful groups on less powerful people and places by convening the World Commission on Environment and Development (WCED). Its intent was to address concern ‘about the accelerating deterioration of the human environment and natural resources and the consequences of that deterioration for economic and social development’ by establishing international policies ‘for sustainable development to the year 2000 and beyond’ (UNGA 1987a, 1987b).

The WCED (1987 report, *Our Common Future*, introduced the triple-bottom-line concept of the ecological, social and economic dimensions of sustainability. A fourth, institutional dimension reflected policy and capacity. This holistic view was a significant step for nations to formally recognise the unequal impacts of economic growth and to identify wide-ranging measures for reducing those impacts.

At that time, other analyses focused narrowly on market-based systems of resource production and consumption, job-based employment and income-based measures of deprivation and wellbeing. The WCED Advisory Panel on Food Security (WCED 1987 studied land-based livelihoods with an innovative method that used the testimony of the poor to expand the definition of poverty. Poor people described what poverty meant to them using measures that included income, vulnerability, lack of influence and degraded assets.

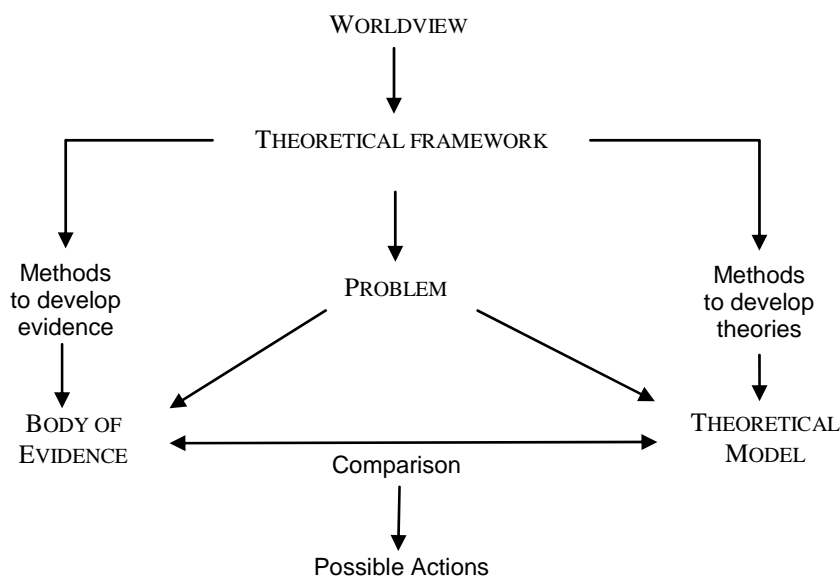
A *livelihood* came to be defined broadly as people, their land, their capabilities and their means of making a living (Chambers & Conway 1991). The idea of *capability* was based on Sen (1979, 1981; Dreze & Sen 1989). It recognised the right of less-powerful people to fulfil aspirations that differ culturally from those of dominant groups. Sen argued against equality based on goods (utilitarian equity). He argued for interpreting needs in the form of basic capabilities, a broad concept allowing culturally diverse meanings that include the ability to meet requirements of nutrition, clothing, shelter and quality of life. He also introduced the idea of ‘capability equity, that more equal access to resources is necessary to develop livelihoods’ (Sen 1979).

Chambers and Conway emphasise that ‘capabilities are both end and means of livelihood: a livelihood provides support for the enhancement and exercise of capabilities (an end); and capabilities (a means) enable a livelihood to be gained’ (Chambers & Conway 1991, p. 5). There are no easy indicators in this dynamic system. However, positive strategies and changes can be easily recognised. For example, ‘a general hypothesis can be that recirculation through local purchases and provisions of goods and services will be more livelihood-intensive than their import from outside’ (Chambers & Conway 1991, p. 17).

Over the decades, Chambers’ analyses have remained focused on the links between poor and rich as one system. Similarly Hunt (2005) argues, based on a review of international development practice, that building capacity ‘without paying much greater attention to the changes needed in the non-Indigenous environment, to create genuine and trusting partnerships, will fail to realise the potential which is there’ (Hunt 2005, p. 26). Such arguments indicate that a livelihood framework which Aboriginal people and agencies use in working together to design meaningful livelihoods can contribute to better results. The Sustainable Livelihood Framework provides a starting point for this.

# The Sustainable Livelihoods Framework

A framework is an explicit and simplified representation of reality that groups use to interpret evidence and solve problems to successfully act in a changing world (Fararo 2003). Frameworks are at a level of complexity between a worldview (a cultural interpretation and organisation of knowledge), and a model (a detailed and predictive theory constructed from empirical evidence), as shown in Figure 1. All cultural groups have their own frameworks for major life tasks such as raising children, staying healthy and making a living. Because frameworks are built on experience, they are also strongly influenced by our historical contexts (Shore 1996). Frameworks that consistently 'fit the evidence' improve outcomes, but must be able to adapt to a changing world (e.g. Abel et al. 1998). In a culturally diverse situation, a common framework facilitates experimentation by making explicit the worldviews that define problems, evidence and models, so that people in that situation can act together more effectively.

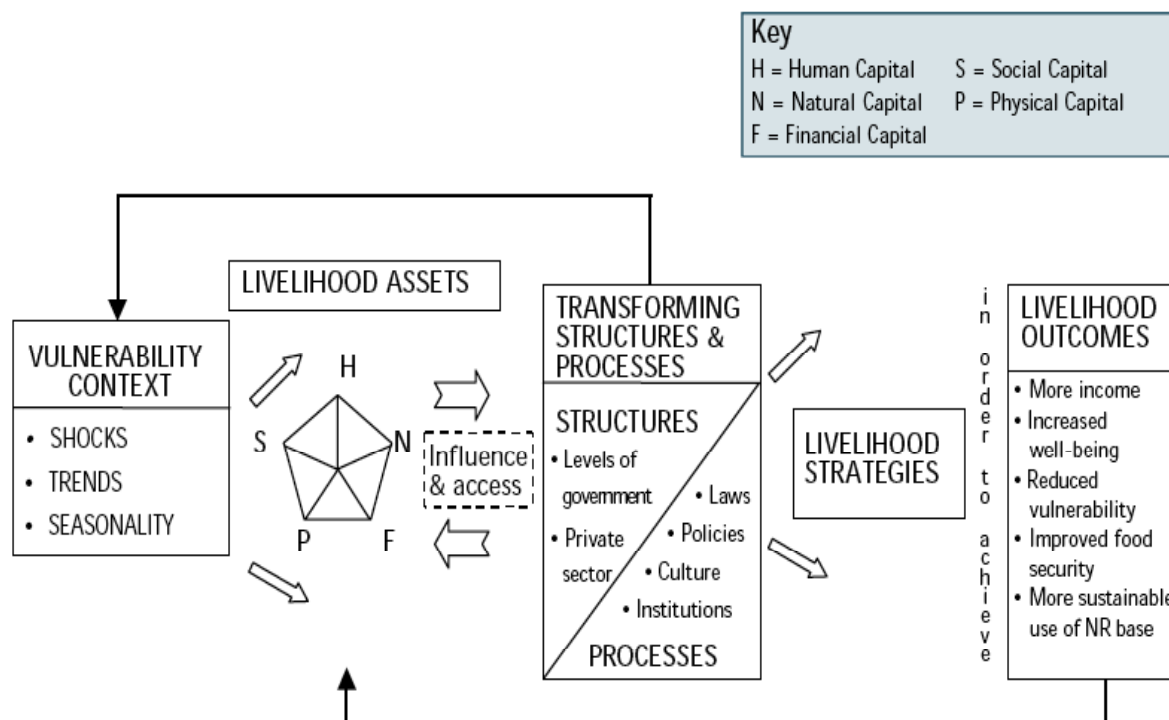


**Figure 1: A hierarchical view of links between worldview and actions**

Source: Fararo 2003, p. 20

In 1998 Ian Scoones of the Institute for Development Studies (IDS) formalised sustainable livelihoods concepts into a framework designed to help development organisations answer three questions (Scoones 1998, p. 3):

- How can you assess who achieves a sustainable livelihood and who doesn't? In other words: what are the relevant outcome indicators?
- What are the livelihood resources, institutional processes and livelihood strategies which are important in enabling or constraining the achievement of sustainable livelihoods for different groups of people?
- What are the practical, operational and policy implications of adopting a sustainable livelihood approach?

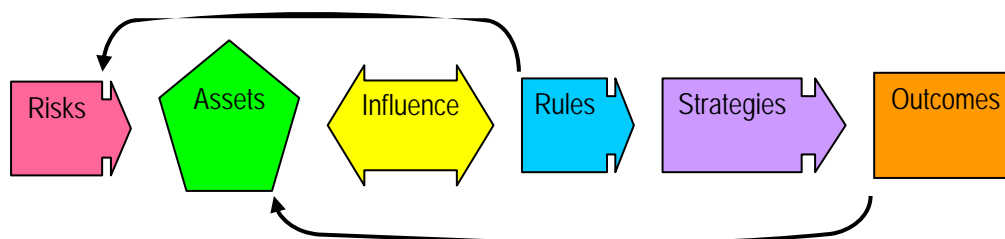


**Figure 2: The sustainable livelihood framework**

Source: DFID 2008

This formalisation led to the UK Department for International Development (DFID) Sustainable Livelihood Framework (SLF) in Figure 2 (above). It is based on the interactions of six elements necessary for livelihoods, organised in a simple structure to stimulate discussion. Using the framework to design livelihoods helps ensure the important components described below are included:

1. **Assets (what people have).** The SLF presents many types of assets, and emphasises that they interact in different ways. Versions of the SLF present different asset categories.
2. **Strategies (what people do).** The SLF indicates that strategies are determined by assets and by the rules that determine what people can do with their assets.
3. **Outcomes (what people get from what they do).** In the SLF, strategies produce outcomes (e.g. nutrition), but those outcomes must be sustained to build assets (e.g. health).
4. **Transforming structures and processes (the rules that determine who can do what).** The SLF emphasises the interactions: top-down and bottom-up, cross-sectoral and cross-scale.
5. **Vulnerability context (the risks to people's assets).** The SLF clarifies that risks are linked to rules and affect assets, but that strong assets can resist the risks or can be used to influence the design of rules that enable risks to be managed with more certainty.
6. **Influence and Access (the ability to change rules, using assets).** The two arrows indicate that rules must be accessible to change, but the ability to influence those rules depends on assets, such as relevant knowledge or political status.



**Figure 3: The sustainable livelihood framework simplified to show system interactions**

The typical ‘jobs’ model emphasises only the ‘strategies’ element, while the intent of the SLF is to present livelihoods as systems with feedback to clarify how participants learn and respond to change (Pound et al. 2003; Davies et al. 2008). In Figure 3, I redraw and simplify the SLF to clarify the interactions in this system. Transforming structures and processes are simplified as ‘rules’, the context of vulnerability as ‘risks’, and ‘influence’ is a two-way arrow.

Assets have many different definitions. Chambers originally used Sen’s concept of capability (Chambers & Conway 1991), but Scoones chose the narrower economic concept of ‘capitals’ as a ‘metaphor’ (1998, p. 7) for five classes of assets: human or individual; social, natural; physical; and financial. Others use the metaphor of assets as ‘building blocks’, with a livelihood constructed from a combination of these blocks. The number of asset classes is similarly arbitrary. For example, some frameworks include cultural assets (Bourdieu 1973, Throsby 1999) and some include intellectual assets (Marr 2005, Petty & Guthrie 2000).

The ‘five capitals’ version of the SLF is widely used in international development (Hussein 2002). Using that metaphor, a mix of assets helps sustain a livelihood because assets can be ‘converted’. For example, owning cattle (natural) requires skill (human), equipment (physical), and grass (natural); and a pastoral livelihood provides a role (social) and income (financial). However, there are practical difficulties in measuring these interactions or conversions (Bourdieu 1986, Hunter 2004). In addition, many assets overlap categories and have unclear boundaries, there are significant cultural differences between what an asset is and how an asset is valued, and some assets are inherently difficult to define.

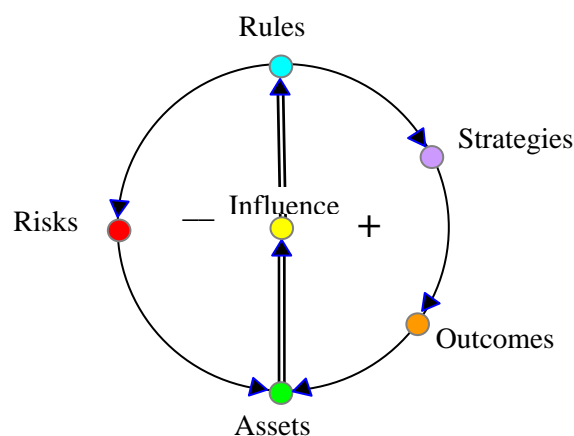
Regardless how assets are defined, the SLF indicates that the way to develop sustainable livelihoods is for people to use their assets to design strategies whose outcomes build those assets, and to learn from their experience to influence rules to improve those strategies. The appropriate role for such a framework is to help people understand pathways to improve their livelihoods, such as systems for greater equity between rich and poor.

In the international development arena, Chambers found that the SLF has primarily met the needs of development organisations for whom it was designed. Outcomes for poor people continue to be constrained by their unequal power relationships with such organisations (Chambers 2004, 2006). For this reason, Chambers recommends that rich and poor learn and change ‘side by side’, beginning with self-analysis by those who are not poor: ‘self-critical awareness, thinking through the effects of actions, and enabling those with power and wealth to experience being better off with less’ (Chambers 2004, p. 3). This type of systems thinking can be considered the main contribution of the sustainable livelihoods approach to poverty reduction.

## A livelihood as a system

The SLF includes the basic characteristics of a system: a boundary, a group of defined and related elements; rules that describe those interactions; and wholes, distinctive properties of a group of related elements that do not exist in each separately (Bertalanffy 1968). In Figure 4 I have redrawn the SLF in order to clarify the positive and negative feedback loops that enable such new properties to emerge as people learn through their livelihood activities, and use what they learn to modify their next set of

activities. For example, a remote Aboriginal group that identifies ‘education’ as a desirable livelihood outcome might use their asset of social cohesion to speak together for a cross-cultural curriculum. Using that asset, they influence the principal to change the rules to increase the number of local adults and elders teaching. The principal agrees and they work together on this strategy. This makes learning more relevant to students and this relevance helps sustain learning outcomes. As learning outcomes are sustained they build assets of skills and social cohesion, which in turn reduce risks such as language loss. In this example of positive feedback, assets build more assets.



**Figure 4: Sustainable livelihoods framework redrawn to clarify feedback loops.**

The critical variables are the community’s use of its assets to influence rules, and the value that the principal places on those assets. If a community’s assets, such as cultural knowledge, are valued by the school they are able to use them to influence school rules. The resulting outcomes benefit the school and community, including the livelihoods of parents, teachers, the principal and elders. Youth may also learn the process of developing their own livelihoods by participating in this process. The emergent ‘whole system’ property is community wellbeing.

An example of negative feedback in this system would be a rule that prevents local people from influencing the school curriculum, such as where a principal does not value the asset of family cohesion or cultural knowledge. Families are then likely to become alienated from the school, and the school loses the contributions of families. Family and school livelihoods then become increasingly separated from each other. The emergent property is social exclusion.

A sustainable system thus requires that participants understand: which elements are within the boundaries of their system, such as the extended family; how rules can significantly change the relationships among those elements, such as valuing that family; and how new relationships among those elements create new wholes with important new properties, such as community wellbeing. A sustainable livelihood is thus an adaptive system in which participants learn from their livelihood activities to change their activities in ways that change their entire system.

## Adapting the SLF to the desert

To explore the usefulness of the SLF for addressing desert livelihood issues, I brought together a cross-cultural Reference Group in the domains of health, land management, education, employment, and economics. The Reference Group recognised that the SLF could be a tool to clarify the different dimensions of equity and facilitate more effective cross-cultural partnership. Table 2 describes the potential values and uses that the group identified within each livelihood element.

Members of the group concluded that the SLF is useful to organise complex livelihood elements. They envisaged that Aboriginal groups might use the SLF to show government how livelihoods emerge from a culturally meaningful system and to identify the types of external support needed to achieve



livelihood benefits. However, the group emphasised that if Aboriginal people were to use the SLF for their own planning, the framework must be modified to ground it in the worldviews and lived experience of Aboriginal people and other people that they interact with, such as government staff. As an overall comment about the SLF, Reference Group members said:

*The SLF can help clarify complexities, and help with future predictions: what a good livelihood looks like; what a healthy community looks like; the building blocks to work from. Good project ⇔ good model*

**Table 2: Examples of applications of the Sustainable Livelihoods Framework identified by Reference Group members, with implications**

SLF Element	Examples and implications
<b>Assets</b>	Build a local economy based on Aboriginal values of helping, relationship, food and shelter, not just work and income. <ul style="list-style-type: none"> <li>Identify the professional value of existing knowledge and strong traditional skill.</li> <li>Show the value of desert flora and fauna, and knowledge of biodiversity hotspots, to show the benefits of conservation.</li> </ul>
<i>Implication</i>	<b>Livelihoods planning needs to include Aboriginal categories of land, law, language, spirituality, family, plants and animals.</b>
<b>Strategies</b>	<ul style="list-style-type: none"> <li>Identify strategies that can produce outcomes for families who are landowners.</li> <li>Identify services that remote families are motivated to provide sustainably.</li> </ul>
<i>Implication</i>	<b>Livelihood strategies need to emerge from people and land.</b>
<b>Outcomes</b>	Identify the Aboriginal contribution to the economy. <ul style="list-style-type: none"> <li>Identify the effectiveness of remote communities in terms of health, wellbeing, and local economies.</li> <li>Identify locally meaningful indicators of success.</li> <li>Develop methods to track measures of key outcomes in order to provide evidence for policy and funding.</li> </ul>
<i>Implication</i>	<b>Aboriginal groups need to measure outcomes for their own purposes, and to show the value of their strategies to others.</b>
<b>Rules</b>	<ul style="list-style-type: none"> <li>Help government think holistically, and use a decentralised service model</li> <li>Help communities get over administration hurdles such as paperwork, and increase capacity.</li> <li>Help communities develop long-term and a short-term visions, and sustain good programs and models.</li> <li>Enable communities to identify the different costs and regularly analyse them.</li> </ul>
<i>Implication</i>	<b>Rules need to link the local level with government levels, Aboriginal cultures with government cultures, and short with long time periods.</b>
<b>Risks</b>	<ul style="list-style-type: none"> <li>Illustrate how the lack of governance, planning and training in communities limits the impact of livelihoods.</li> <li>Knowledge developed by communities using the livelihood framework may be misused by government in ways that backfire on communities.</li> </ul>
<i>Implication</i>	<b>Risk needs to focus on interactions among levels, local to national.</b>
<b>Influence</b>	Share understanding of different values to change ways of thinking. <ul style="list-style-type: none"> <li>Enable traditional and contemporary, cultural and western systems to be in balance.</li> <li>Work together and respect differences in coordinating partnerships.</li> <li>Use the language of sustainable livelihoods to give local people a stronger voice.</li> </ul>
<i>Implication</i>	<b>Influence needs to increase Aboriginal participation in rule design and increase the influence of Aboriginal values on rules, both of which are needed.</b>

The group emphasised that SLF elements need to be based in Aboriginal experiences and values, and used to bridge cultures and sectors. They noted that, as a framework, the SLF can help organise complex interactions into a model, but that every framework has limitations. Limitations identified by the Reference Group are shown in Box 1. Accordingly, they said that the SLF diagram needs to be supplemented by examples, personal communication, stories, locally developed frameworks, and much discussion.

**Box 1: Limitations of the SLF identified in Reference Group analysis**

- The framework is good for showing 'linkages' to government but it needs specific examples of how it has worked, and how it accounts for ownership of assets.
- To be useful and increase community ownership of the process it needs both community and government engagement. A diagram might help that process as a starting point or method, but not as a communication tool.
- We need two-minute messages. It is potentially more effective to tell stories – everyone relates to stories. Even Government people understand stories and need to have ownership.
- Local people should be able to come up with their own framework to show how everything is together. The model is good one for Australia but not for the Indigenous clan.

Development organisations regularly face the challenge of adapting frameworks to cultural contexts. However, the SLF has only recently been used in Australia and so there is little experience of adaptation to desert Australian cultures. Uses of the SLF include:

- Fisher (2001) proposed that the SLF be used to link macro- and micro-analyses by field practitioners in remote Aboriginal communities to gauge the impact of higher-level changes on local circumstances. 'In this way, it generates a case for policy advocacy, or at least a policy dialogue' (Fisher 2001, pp. 13–14)
- Moran et al. (2007) used the SLF over 18 months with the Engawala community, and found it did not explain or predict resource flows or community dynamics. They modified the SLF to emphasise the local cultural context and used it as a participatory model that can facilitate cross-cultural knowledge and sharing.
- Davies et al. (2008) synthesised three desert studies and found the SLF has 'strong potential to provide a sound framework for identifying effective pathways that will impact positively on Aboriginal disadvantage and for monitoring change, provided it is applied flexibly and collaboratively' (Davies et al. 2008, p. 55).
- Stafford Smith et al. (2008) used the SLF asset pentagon to characterise differences in capital assets among cities, pastoral, mining and Aboriginal settlements. They found that government services, definitions of viability and assumptions about mobility based on 'city' characteristics are inappropriate for remote populations.
- Sithole (2007) focused on categorising capital asset criteria and indicators in the Top End to help multiple stakeholders with different interests in Aboriginal land management 'know what outcomes to expect, when to expect them and be aware of other areas where their investment may be producing outcomes' (p. iii).

The simplicity of the SLF enables flexibility. Its set of relationships can be expressed as stories, lists, tables, causal loops, diagrams or other narrative and visual formats. While it is often modified, all modifications maintain the robust relationships among the six types of elements. This enables comparison of livelihood systems across cultures (e.g. Vogel & Smith 2002).

# Frameworks for sustaining desert diversity

All land-based livelihoods depend on the specific characteristics of their environments, and desert biophysical systems behave differently from those of other biomes. Interactions with their environments cause desert organisms – including people – to develop distinctive physiological, morphological and behavioural traits (Reynolds & Stafford Smith 2002, Reynolds et al. 2007). Social–ecological systems in the central Australian desert are characterised by local diversity and unpredictability (e.g. Stafford Smith 2008). This unpredictability requires that we avoid consensus solutions, and ‘create the conditions under which genuine experiments to discern the most appropriate local solutions to local problems can be nurtured and sustained’ (Pritchett & Woolcock 2002, p. 31).

The value of developing a desert variant of the SLF to facilitate the design of desert-specific livelihoods is suggested by, for example, the adaptations of human settlements to arid lands, their differences from settlements in other biomes (Veth 2004), and the need to better understand the impact of management practices on highly variable arid lands to reduce declines in biodiversity (e.g. Bastin et al. 2009). A desert livelihood framework may enable diverse cultures (e.g. pastoral, scientific, governmental, industrial, Aboriginal) to integrate their expertise and experiment together to design livelihoods that support the self-determination of desert towns, communities, stations and settlements in changing conditions.

## Desert factors

Recent reviews on desert regions, their ecology and livelihoods present various factors that influence the sustainability of desert social–ecological systems. These factors have been termed assertions (Reynolds & Stafford Smith 2002), themes (Veth 2004), drivers (McAllister & Stafford Smith 2006; Stafford Smith et al. 2007), principles (Reynolds et al. 2007), trends (Foran 2007), issues and findings (Bastin et al. 2008), a syndrome (Stafford Smith 2008), and propositions (Morton et al. forthcoming). Table 3 considers the implications of these factors for sustainable livelihoods. Column 2 summarises a set of neutral factors. Livelihoods can systemically respond to those factors in ways that reduce or increase sustainability. Column 2 describes common livelihood responses to those factors that reduce sustainability. Column 3 presents some livelihood responses to those factors that increase sustainability. While the examples of sustainable practices in column 3 are not exhaustive, they do indicate a set of system characteristics associated with sustainability that are consistent across culturally different livelihoods. These characteristics are summarised in Column 4.

**Table 3: Key characteristics of effective livelihood responses to desert factors**

No.	Desert factors <sup>a</sup>	Responses to desert factors which reduce sustainability <sup>a</sup>	Responses to desert factors which increase sustainability	System characteristics
1	Desert cultures are distinctive.	Those who hold local ecological knowledge of fundamental desert principles, and practical skills based on those principles such as ways to live within biophysical constraints and share responsibilities for country, are largely segregated from scientists who are examining similar issues.	Local and scientific knowledge is engaged in designing sustainable livelihoods (Gill 2003, Davies et al. 2008); for example Aboriginal groups want to conserve a wide range of plant and animal species (Goodall 2001).	Practising holistically Communicating meaning Caring for biodiversity Living within limits
2	Desert human–environment interactions are different from those in other zones	Livelihoods and their underlying frameworks that were developed in other cultures and biomes are imposed on desert people. They are not critically assessed to identify relevant differences, and the evidence of successful desert livelihoods remains anecdotal and largely inaccessible.	Rules and resources build local capacity to design desert-specific livelihoods, such as family-based pastoral or Aboriginal community enterprises; communication organisations that enable influence on distant entities; and networks that link cultural skills to develop a critical mass (e.g. Jones & James 2006; Rea, Messner & Gipey 2008).	Knowing your land Practicing holistically Relating equitably Communicating meaning

No.	Desert factors <sup>a</sup>	Responses to desert factors which reduce sustainability <sup>a</sup>	Responses to desert factors which increase sustainability	System characteristics
3	The desert system is characterised by human sparseness, spatial patchiness, and temporal-spatial variability	Communication between governments and people in remote settlements is limited, effective land management practices are not widely shared, local ecological monitoring data is not analysed and available for use, responses to change are not crafted across appropriate scales, and associated livelihood opportunities remain unrealised.	Livelihoods are built around strengthening communication to share knowledge of new economic opportunities, to build skills for reducing risk, and to develop cross-cultural links that can be engaged to coordinate large-scale responses (Abolhasan & Eyers 2007; Long & Memmott 2007).	Communicating meaning Practicing holistically Knowing your land
4	There are only a few important processes at any scale and level	Many complicated and interacting issues across levels and sectors contribute to designing 'band-aid' strategies that avoid addressing more fundamental but 'wicked' problems (e.g. Rittel and Webber 1973).	Analysis focuses on identifying the fundamental changes needed at each scale and level to design livelihoods that are likely to reduce long-term risk. Examples: Yuendumu Mt Theo program (WYDAC 2008); ACRIS (Bastin et al. 2008).	Living within limits Knowing your land Practising holistically
5	Slowly changing variables determine system dynamics and thresholds between system states	Many groups have few ways to detect the effect of slow-changing variables (e.g. climate, demographics, life expectancy, median income, landscape function) on local system states, and have no effective responses to avoid crossing thresholds into undesirable states (e.g. land degradation, youth unemployment).	Investments provide skills, people, influence and funds toward developing early indicators of change in the key variables, and many possible strategies to address those changes, all aimed at increasing the resilience of desirable system states. Examples: Remote Learning Partnership Agreements (DET 2008); Linked Business Networks Project (Desert Knowledge Australia 2008).	Practising holistically Living within limits Communicating meaning
6	Degradation of the environment can begin in the social or ecological domains, but grows to affect the entire system	Poor feedback between and among sectors and levels results in poor response to drivers such as stocking rate and market responses to drought. Rules are inadequate to ensure stable governance of resources in systems that extend across levels and domains..	Desert livelihoods are nodes in a cooperative network rather than competitors, and hence build critical mass and influence (McAllister et al. 2006, 2008). Strategies <i>adapt to</i> desert resource constraints and are exported to other regions with high rates of net resource depletion (Yates & LaFlamme 2008, Kull & Rangan 2008).	Equitable relationships Practising holistically Living within limits
7	Biodiversity is declining and introduced organisms are permanently altering ecosystems	Most non-Aboriginal settlers have little detailed knowledge of desert ecosystems. Some livelihoods introduce new organisms with no knowledge of their effect, while other livelihoods focus on managing the adverse impacts of such organisms.	Livelihoods develop knowledge of the functions of native biota within ecological communities and their contribution to the wellbeing of people and ecosystems. Many examples under DEWHA Caring for our Country (e.g. Gilligan 2006; DEWHA 2008).	Caring for biodiversity Knowing your land Communicating meaning
8	Managing diverse, patchy environments depends on local knowledge	People with local knowledge (e.g. Aboriginal, pastoral or scientific elders) do not have appropriate influence in government natural resource management decision-making; strategies do not prioritise development of local ecological knowledge.	Strategies increase partnerships among scientists and Aboriginal elders in NRM decision-making positions (e.g. Baker and Mutijulu 1992; Davies 2007), and frame problems to be tractable using place-based knowledge (e.g. Sallur et al. 2007; Robinson et al. 2003)	Knowing your land Practicing holistically Caring for biodiversity
8	Rules are not linked across levels, and higher-level decision-making is often spatially distant and more powerful.	Distant decision-making is largely by people outside the desert with no desert experience. Rules (such as markets) designed in these other contexts increase risk when applied to desert systems.	Local leadership groups are developed to increase influence on decisions in distant centres, to design and advocate for appropriate livelihoods (e.g. Hunt 2003; Desert Knowledge Australia 2008; Maru & LaFlamme 2008)	Equitable relationships Communicating meaning Living within limits

No.	Desert factors <sup>a</sup>	Responses to desert factors which reduce sustainability <sup>a</sup>	Responses to desert factors which increase sustainability	System characteristics
10	Managing drivers across levels and sectors requires cross-cultural collaboration	Conflicts of interest and of cultural meanings among different desert groups increase the need for collaborative adaptive management.	Long-term partners from government, pastoral, business and Aboriginal cultures are brought together at the earliest stages of livelihood design, and livelihoods emerge from their equitable interactions. (e.g. Gilligan 2006; Moran et al. 2008; Jones & James 2006).	Equitable relationships Living within limits Practicing holistically

a. Reynolds & Stafford-Smith 2002, Veth 2004, McAllister & Stafford Smith 2006; Foran 2007; Reynolds et al. 2007, Stafford Smith et al. 2007, Bastin et al. 2008, Stafford-Smith 2008, Morton et al. forthcoming.

## System characteristics of desert livelihoods

As described in Table 3, livelihoods that increase desert sustainability share a handful of characteristics, or ‘systems of practices’ (e.g. Shove & Walker 2007). Each of these characteristics is developed through direct interaction with desert environments, is practiced within a community, and develops social–ecological feedbacks that increase learning and the likelihood of sustainability (Wilson & Woodrom 2009). Each thus enables an ongoing process of adaptive management (Holling 1978; Berkes et al. 2000) to engage with the ‘wicked problem’ (Rittel & Webber 1973) of desert sustainability. They are described below in greater detail, with their relevant set of quantifiable measures used to identify change (or a few ‘rules of thumb’).

- **Knowing your land [land]** The responsibility for and deep familiarity with a place; time to gain detailed, cross-scale knowledge and to experiment with plural methods to effectively manage a diverse, patchy and unpredictable desert land. Change is identified using measures of adaptive management (e.g. intended versus actual results).
- **Living within limits [limits]** The willingness to understand the fundamental principles or laws of desert material/energy flows and their interactions with social–ecological systems, and to live within those limits and without excess system disturbance. Change is identified using measures of ecosystem resilience (e.g. change before/after disturbance).
- **Communicating meaning [communication]** The capability to gain and manage information about important current relationships among desert lands, climates, peoples, plants and animals, and to share that knowledge. Change is identified using measures of information flow (e.g. data gaps).
- **Practising holistically [practices]** The hands-on skills for groups to creatively manage desert systems as wholes that link different lands, cultures, sectors, levels and types of information across scales, and to respond systemically to subtle signals of change. Change is identified using measures of knowledge management (e.g. skill gaps).
- **Relating equitably [relationship]** Membership in an equitable, demographically representative group with shared ideas and values, which is able to influence political, economic and other decisions at higher levels; and to work with that group to maintain balance among the needs of different peoples and ecosystems. Change is identified using measures of social, political and economic influence (e.g. influence map).
- **Caring for biodiversity [biodiversity]** The need to increase the resilience of all native species (biodiversity) and their habitats (geodiversity) to climate, water balance, pest species, agricultural users and other pressures, to sustain the vital ecosystem functions we depend on. Change is identified by monitoring species diversity and habitat heterogeneity (e.g. biological integrity).

Within each of these systems, practitioners build their understanding through interactions with their environments. Sustainability is thus ‘a measure of the relationship between the community as learners and their environment, rather than an externally designed goal to be achieved’ (Sriskandarajah, Bawden & Packham 1991).

These characteristics are also identifiable in recent frameworks for sustainable pastoral and environmental management. These include the *National Principles and Guidelines for Rangeland Management* (ANZECC & ARMCANZ 1999), Meat & Livestock Australia's *Natural Resource Management Workshops* in its *EDGE network* (MLA 2008), the Desert Knowledge *21<sup>st</sup> Century Pastoralism Project* (e.g. Fisher & Kain 2008), and the criteria for the Landcare Australia *National Landcare Awards* (Landcare Australia 2008). They are also consonant with Australia's *National Strategy for Ecologically Sustainable Development* that provides strategic direction for government policy (ESDSC 1992).

## Characteristics of Aboriginal sustainability

The system characteristics that various desert Aboriginal groups have long recognised as important for sustainability of people and country are also very similar:

- MK Turner's (Eastern Arrernte) framework *Everything Comes from the Land* (Turner 2005a) presents land at the centre of a system of relationships that include people of the land, kinship, ceremonies, ancestor spirits and plants and animals. Turner says (Turner 2005b): *People, food, water, animals and our spirit, it all comes from the land. Our healing, our songs, our dances all come from it. Our people are from the land. Hunting and gathering and fire – it all comes from the land. Most important is our spiritual life, it is connected to the land and that's why we call it pmere, our country.*

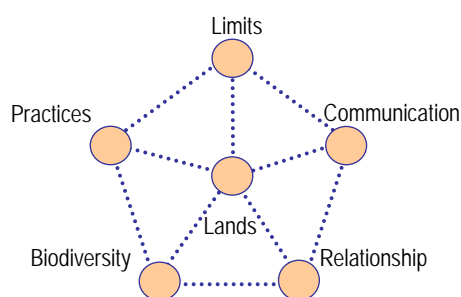


Figure 5: System of desert livelihood characteristics

- The *ngurra-kurlu* ('people-in-country-in-people') Warlpiri framework presents a system that links the characteristics of land/country, Law/*tjukurrpa*, language, ceremony, and kinship/family/skin group. This system is used in decision-making by placing what is being examined at the centre of that system, as if 'in the cross hairs of a rifle scope. It becomes the centre of attention and then one can work around the outside of it, through Language, Law, Ceremony, Skin, and Country (including ecology), to gain a complete Warlpiri perspective of that entity' (Pawu-Kurlpurlurnu et al. 2008, p. 26).
- A Pitjantjatjara framework links *tjukurpa* (Law), *walytja* (family), *ngurra* (land), *kurunpa* (spirit) and *kanyini* (connectedness) (Bob Randall in Hogan 2006).

These characteristics are also reflected in desert Aboriginal people's description of their strength of connection to country under the terms of the *Aboriginal Land Rights (Northern Territory) Act 1976* (Cwlth). Aboriginal claimants have regularly cited their social organisation (e.g. exogamous patrilineal clan), land tenure system (e.g. heartland areas and dreaming tracks, knowledge of land and law, and its transmission; spiritual responsibilities such as men's and women's business, ceremonies, and preservation of ancestral continuity, and foraging rights to the land through knowing sites and songs (Aboriginal Land Commissioner 1999).

Anthropological accounts and Aboriginal paintings also consistently focus on the elements of kinship, ceremony, plants and animals, Dreamings, proper language, and the different elements of a place (soils, minerals, water, air). Each of these interacts in a web of relationships under customary law (e.g. Sutton 1988; Myers 1991; Rose 1992, 1996; Bardon & Bardon 2004).

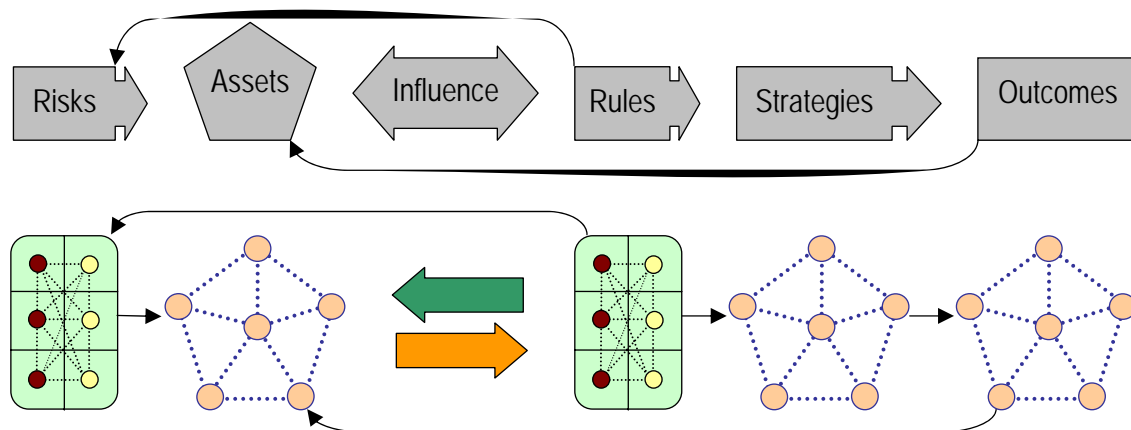
**Table 4: Comparing characteristics across disciplines and cultures**

Desert Livelihood	Arrernte <sup>a</sup>	Warlpiri <sup>b</sup>	Pitjantjatjara <sup>c</sup>	Pastoral <sup>d</sup>
Knowing your land	Country ground	Land	Land	Knowing a property's history, landscape, natural resources, and native/domestic species
Living within limits	Ancestor spirits	Law	Law	Recognising the carrying capacity of a property; limiting stocking rates; seeking off-farm income;
Communicating meaning	People of the Land	Language	Connectedness	Developing a conceptual and monitoring framework to link local and regional knowledge
Practising holistically	Ceremonies	Ceremony	Spirit	Proven and practical sets of best practices that sustain land condition, and are intrinsically motivating
Relating equitably	Relationship network	Kinship	Family	Equitable relationships among pastoralists, scientists, government agencies and Aboriginal groups
Caring for biodiversity	Plants and animals	Land	Land	Understanding and being responsible for biodiversity, and for the integrity of the ecosystem

a. Turner 2005a; b. Pawu-Kurlpurlurnu et al. 2008; c. Hogan 2006; d. ANZECC & ARMCANZ 1999; Bastin et al. 2008; MLA 2008.

Six system characteristics of desert sustainability are correlated across different cultural contexts, as illustrated in Table 4. At a general level, they characterise some basic principles of sustainability. However, their value for desert Australia is that they emerge out of the very diverse practices of Aboriginal, government, pastoral and scientific cultures. They provide an important focus for the cohesive network of relationships that is necessary to better understand, make good decisions for, and ultimately sustain our vast lands. Figure 5 illustrates this network using a diagram similar to the SLF pentagon and to Aboriginal iconography.

## A Desert Livelihood Framework



**Figure 6: Comparison of sustainable livelihood framework (top) and desert livelihood framework**

The Sustainable Livelihood Framework (Figure 6, top level) was created by international aid organisations to operationalise the concept of sustainability and create a planning tool for stakeholders to clarify typical relationships among the factors that affect poor peoples' livelihoods. It has consistently proven its utility in many regions of the world (e.g. Ashley & Carney 1999; Farrington 2001), but has several limitations due to its focus on:

- individual household livelihoods, and not linked households
- poor people, and not the sustainability of poor and high-consuming rich livelihoods
- livelihoods in isolation, and not the effect of one livelihood on another
- sustainability, and not other important qualities.

These limitations apply to desert Australia where there are strong interactions among people with different livelihoods, kinship structures, cultural values, economies and amounts of political power. Many groups have developed alternative SLF frameworks (e.g. Carney 2004). Here a Desert Livelihood Framework (DLF) is proposed that retains the SLF elements and their relationships, but modifies each element in the framework to more closely fit desert environments and livelihood characteristics (Figure 6, bottom level).

The desert characteristics described in Table 3 draw attention to the interrelationships among desert peoples and lands that are important for sustainability, and the DLF is a tool to help understand that system. The changes made to adapt the SLF to a desert context are to recognise that:

- Assets, strategies and outcomes are a closely related subsystem, such that the same icon is used for all three of these components of a livelihood system.
- Rules and risks are also a closely related subsystem, such that the same icon is used to for both components in the livelihood system.
- Influence is critically important as the central link between those two subsystems above.

The purpose of the DLF is to enable individuals or groups to envision general characteristics of sustainable desert natural–cultural systems, and to develop specific strategies in community with others to increase the impact of their efforts.

The keynote speaker of the 2008 Desert Knowledge Symposium, Margaret Wheatley, emphasised that 'the world doesn't change one person at a time. It changes as networks of relationships form among people who discover they share a common cause and vision of what's possible' (Wheatley & Frieze 2008). Sustainability can be described as a 'common cause' for desert groups, and the six livelihood characteristics a 'vision of what is possible'. For example, when culturally different efforts are



networked in a ‘community of practice’, the resulting increases in knowledge and skill build the confidence and influence of individual members.

## Desert assets/strategies/outcomes

The SLF builds on ‘people’s strengths (assets or capital endowments) and how they endeavour to convert these into positive livelihood outcomes. The approach is founded on a belief that people require a range of assets to achieve positive livelihood outcomes’ (DFID 1999). In the DLF, we return to the livelihood concept of capability and emphasise the capability to sustain the systems we depend on. The six characteristics of sustainability are descriptions of those capabilities as networks of relationship. They support each other, so that the knowledge, skills and influence of a group of people in a place continue to be developed through membership in their network. Assets, strategies and outcomes are thus the group’s ownership of that capability, their ability to develop that capability, and the evidence of that capability. Reference Group members also pointed out that ‘strategies are *in* assets’. Table 5 gives examples for each of the six characteristics as assets, strategies and outcomes.

This framework values capital assets differently – such as infrastructure, transport, and technology – by including them as tools to achieve the outcomes of each characteristic. This maintains an emphasis on the network rather than on its individual elements. Table 6 gives some cross-cultural examples of livelihood outcomes desired by desert Aboriginal groups, pastoral and other land-based groups. It shows the intersection between the asset classes typically used in SLF analysis and the outcomes for each of the six characteristics of the DLF discussed above. Reading horizontally illustrates how each SLF capital may be engaged to support outcomes for each characteristic. Reading vertically illustrates how each sustainable desert livelihood characteristic integrates all of the SLF capitals.

**Table 5: Examples of assets, strategies, outcomes and measures for each DLF characteristic**

Characteristic	Asset	Strategy	Outcome	Measures
Responsibility for land	Long familiarity with a place; cross-scale knowledge; plural management methods	Adaptive management of a place; experimentation with diverse methods; time on country	An effectively managed, diverse, patchy and unpredictable local ecosystem	Ecosystem management
Living within limits	Willingness and capability to live within the limits of local resources and ecological constraints	Designing ongoing experiments to identify methods for living within local ecological constraints	Resource use and activities maintained within the constraints of desert ecosystems	Resource sustainability
Communicating meaning	Ownership of an information management system that is part of a larger network	Capability to gain and manage information about current relationships in desert systems	Efficient access to important knowledge when needed	Information flow
Practicing holistically	Membership in a community of practice with diverse skills and the ability to design new skills	To develop and to share skills to enable early response to signals of change	Skills are readily available to address system changes	Knowledge management
Relating equitably	Membership in an equitable, representative group with shared values that influences decisions at other levels	Developing shared ideas and values, demographic representation, and equity within an influence group	Ability to influence decisions at other levels to maintain balance among desert peoples and ecosystems	Social, political and economic influence
Caring for biodiversity	Functionally sustainable ecosystem	Capability to respond to environmental changes	An ecosystem that maintains species, functional and habitat diversity	Ecosystem resilience

**Table 6: Examples of potential outcomes for six DLF characteristics by five SLF asset classes**

	Land	Law	Communication	Practice	Relationship	Biodiversity
<b>Human</b>	Knowledge of desert lands is increased	Livelihoods are practised within ecological limits	Local knowledge is shared in a regional network	Livelihood 'best practices' are developed	Cultural affiliation and identity with land is strengthened	Knowledge of methods to care for species in ecosystem
<b>Social</b>	Networks of families look after lands	Principles are socially debated and practiced	Systems knowledge is shared inter-generationally	Youth skills contribute to community	People in network have equal access to power	Knowledge from studying plants and animals
<b>Financial</b>	Income is limited by land	Living with laws increases income security	Knowledgeable people are highly valued	Local skills are highly valued	Equity of capability is prioritised	Many plants and animal products are valued
<b>Physical</b>	People have access to important places	Focus on high-quality, essential infrastructure	Centres archive and disseminate knowledge	Desert-specific technology is developed	Infrastructure is equitably maintained	Technology enables rapid monitoring and assessment
<b>Natural</b>	Land produces domestic and native species	Working knowledge of desert principles	Ecological relationships are widely known	Cultural practices on country increase	Desert lands are accessible to all responsible partners	Degraded habitats and populations are restored

## Desert rules and risk

As illustrated by the livelihood framework (Figure 6), effective rules help people reduce uncertainty and risk. They reduce uncertainty by guiding the design of livelihood strategies that are likely to increase outcomes and assets, and they reduce the likelihood of risks that impact assets. For example, on desert gravel roads there is a rule that cars pull over to the side and stop when road trains (trucks pulling two to four trailers) pass to reduce the risk of collisions from cars that may be hidden in their road dust. Aboriginal kinship rules allocate different responsibilities for children's development to their extended family members in order to increase the likelihood children grow up healthy, culturally knowledgeable and self-disciplined to survive in our unpredictable desert.

## Rules

As groups learn from desert social–ecological systems, they can apply that learning to design rules that better sustain those systems. Rules can be treated as testable hypotheses in which their effectiveness can be confirmed through empirical experience. Rules, when formally constructed, consistently have a number of components that form a 'grammar of institutions:'

1. the attributes of a participant, who
2. may, must or must not
3. take an action or produce an outcome
4. under what conditions (e.g. when, where, and how), and
5. the consequences for not following that rule (Crawford & Ostrom 2005).

Examples include rules for stocking cattle or for burning country that have consequences in reduced productivity. Other institutions that govern human behaviour, such as 'norms' contain the first four and lack social consequences, and 'shared strategies' omit the second and fourth to focus on conditions for acting (Ostrom 2005, p. 178). These two institutions have advantages over formal rules in that they enable choice while engaging other types of consequences. For example, social norms can be informally enforced by other members, and a strategy (e.g. where to hunt today) that violates ecological conditions (drought attracts animals to waterholes) can result in the consequences of not eating. In the DLF, the term 'rules' includes all of the institutions, whether formally prescribed or derived from the behavioural patterns of people and other living things, that we use in our daily lives.

In his 2005 Garma address, Warlpiri leader Wanta Pawu-Kurlpurlurnu (Steven Jampijinpa Patrick) used a story to present a norm for cultural wellbeing (Patrick 2006):

*This story is a Jukurrpa, a Dreamtime story, about a certain rain cloud. In the story, smoke from clearing fires rises and mixes with small clouds. This causes huge rain clouds to be formed. These rain clouds give out lightning and thunder and cause violent rains to sweep the desert. Out of the violent meeting of rising hot air and falling cold air, and the following display, comes life-giving rain. This rain transforms the sun-baked desert into a place of lush and abundant life. This story is a metaphor about the meeting of Warlpiri and mainstream cultures and people groups. In the past we had our violent meeting, and our cultures were all mixed up, but there is hope for a life-giving future for us all.*

This story, analysed using the Crawford and Ostrom (2005) grammar of institutions illustrates how the Law of the water cycle (told by a custodian of the Water Dreaming) is a metaphor that contains a formal rule:

1. Warlpiri and mainstream cultures
2. Must
3. Come together and meet
4. As groups of people in a way that keeps cultures distinct
5. Or neither of us will have a life-giving future.

This cultural rule is observed in the behavioural patterns of many living things, which is one reason Aboriginal people call it ‘Law’. Recent literature confirms this pattern: that parity between mainstream and Aboriginal governments is required for the legitimacy of both (Hunt et al. 2008), and parity is necessary to successfully govern desert Australia (Dillon & Westbury 2007, Desert Knowledge Australia 2008).

## Risks

Risks in desert Australia link many domains through our common context of desert lands, and therefore require collaboration in their design. For example, environmental variables include an unpredictable climate, patchy resources and feral species, while socio-political variables include remote business and political centres, localised cultural knowledge, and lack of economic control.

Livelihood responses to the complex factors that characterise desert social–ecological systems need to be managed through rules that ‘take advantage of this reality, not fight against it’ (Stafford Smith 2008, p. 12). However, rules that are developed outside desert regions impact desert livelihoods. Culturally inappropriate, centralised, simplistic or exploitative rules increase risk by limiting human responses to culturally different, complex and changing conditions (Pawu-Kurlpurlurnu et al. 2008; Ostrom 1999; Armitage et al. 2009). Two recent studies of significant risk to desert Aboriginal and pastoral residents illustrate how inappropriate rules increase risk to those groups and to desert ecosystems.

The Australian Indigenous Doctor’s Association conducted a health impact assessment of the rules associated with the Northern Territory Emergency Response (AIDA 2008). They found those rules increased risks to many types of desert assets:

- to wellbeing, because actions invoked the trauma associated with forced removal of people from their lands
- to the respect and integrity of local rules, including customary law, when government rules are imposed on local rules
- to communication when there is no explanation of the rationale for overriding local rules
- to family relationships when youth follow non-Aboriginal cultural rules
- to biodiversity when medicinal plants are not valued in Aboriginal health.

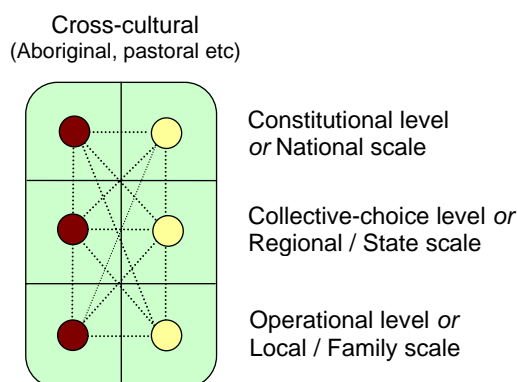
Stafford Smith et al. (2007) analysed seven major degradation episodes in Australian rangelands and their effects on pastoralists, lands and markets. In this situation, ‘the major management issue is managing stock numbers to maintain desirable perennial forage given variability and changes in climate, commodity prices and costs of production, government policy, financial pressures, and technological capability’ (p. 20695). They found that significant disconnections among cultural groups (pastoralists, scientists and governments), and between local and higher-level rules are responsible for environmental degradation. Culturally inappropriate rules, and governing factors such as how knowledge is learned and communicated, constrain responses to slow-changing ecological risks such as drought. They recommend ‘creating a context of regional institutions and knowledge support’ so that decision making would be responsive to the knowledge that is being generated in the desert about managing environmental risk (p. 20691).

For rules to be effective, people need to be able to get clear signals about the impact of their strategies on the outcomes they are seeking. To promote sustainability of desert social–ecological systems and associated livelihoods, those rules need to enforce those strategies that support sustainability and to adapt those rules to the changing realities of desert social-ecological systems. As Ostrom (2005, p. 254) points out ‘one cannot create the perfect set of rules’ and ‘policy analysis can never find ‘the’ answer’. Rather, the way forward lies in the co-adaptation of continually-changing human and biophysical systems. This requires ‘environmental knowledge that integrates local management and policy experience with science-based knowledge, all of which must be mediated through an effective institutional framework’ (Reynolds et al. 2007).

Co-adaptation has proved very difficult in many desert situations due to knowledge and power asymmetries, such as in the two examples above. In other situations, desert people have shown their capacity to craft rules appropriate to sustainable use of desert resources. For example, people in Australian desert communities typically lack real influence on rules for allocating water, and there are inadequate rules to manage the real risks of towns pumping groundwater at unsustainable rates (Smagil et al. 2009). However, analysis of an Alice Springs community decision-making process around water allocation found that participants did have the capability to design rules that more effectively managed risk of over-use of water than the rules that had been made at a distance to govern water use (Maru & LaFlamme 2008).

The rules that apply in desert Aboriginal societies have characteristics that promote sustainability of desert social–ecological systems, as has been discussed above. These rules have been shaped by natural–cultural relationships that link the local to the regional levels, as illustrated by the network of desert Dreaming Tracks (e.g. Bardon & Bardon 2004). Contemporary Aboriginal organisations also reflect traditional values. However, rules imposed from outside on Aboriginal organisations rarely work effectively together to support development of sustainable livelihoods. Reasons include Aboriginal capacity to influence the wider governance environment, poor linkages between governmental and local organisations, power asymmetries that inhibit efforts toward cultural congruence, and a lack of resources to strengthen local governance to enable effective adaptation (Hunt & Smith 2006, Altman 2008).

## Interactions across levels and cultures



**Figure 7: Desert livelihood framework Rules and Risks link cultures, levels and scales**

The diverse cultural environment of the desert, as well as the presence of diverse locally authoritative institutions (e.g. scientific data; Aboriginal customary law; pastoral local knowledge; political judgment) means it is critically important to consider power asymmetries and their affect on negotiations between different authority structures under which rules are made (Stafford Smith 2008; Hunt & Smith 2006).

For example, a recent analysis of decision-making on the sustainability of water in outback Australian towns found that our ‘colonial past has contributed to a top-down approach’, and that low population densities contribute to centralised decision-making (Smajgl et al. 2009, pp. 4–5). Communities were frustrated that they provided significant local information but ‘must rely on the goodwill of higher tiers of governance to be able to genuinely participate in decision-making’.

In Aboriginal settlements, Moran found that cross-cultural decision-making occurs in a complex and politically plural ‘interethnic field’ but that prevented many people from engaging in decision-making despite mutual interest (Moran 008). Hunt and Smith (2006) also found that Aboriginal organisations operated across two enmeshed ‘worlds of governance’ (p. 56) and needed to provide clear, culturally informed communication to their community while addressing government’s emphasis on risk, finance and compliance.

To illustrate the cultural interactions among rules and risks, the DLF uses the same icon for both (Figure 7). Two vertical columns represent the different understanding of rules and risks by cultures such as Aboriginal, pastoral or government agency staff. Three horizontal levels illustrate the linkages between three levels of action found in many analyses (e.g. Kiser & Ostrom 1982, Ostrom 1999):

1. **Operational.** This may be commonly described as the level of *practices* and implementation. These flexible, day-to-day rules structure how people act in the world. Practical decisions at this level can change rapidly in response to local conditions, and the rules for the changing formal or informal operational-level rules are made at the collective choice level. In government, these actions are often at the community level.
2. **Collective-choice.** This may be commonly described as the level of *policies* and management. They determine who can participate in operational-level activities and how to change those rules, such as to make activities more sustainable. Policies typically change more slowly than practices, and a single policy can guide many practices. In government, these actions are often at the agency level.
3. **Constitutional.** This may be commonly described as the level of *laws* and governance. It provides a stable foundation of rules for designing coherent policies that are likely to be

sustainable. Rules at this level change very slowly. In government, these actions are often at the legislative level.

The number of levels and the terms used for them are somewhat arbitrary, but distinct levels often emerge in practice, as illustrated by Fred Chaney's closing summary of the 2002 Indigenous Governance Conference (Chaney 2002):

*The compelling evidence presented to us from local experience as well as from our friends from overseas shows that sustained and measurable improvements in the social and economic wellbeing of Indigenous people only occurs when the real decision-making power is vested in their communities, when they build effective governing institutions, and when the decision-making processes of those institutions reflect the cultural values and beliefs of the people.*

In Chaney's summary, the activities that lead to people's wellbeing occur at the operational level. Policies for managing those activities are decided at the collective-choice level. Those policies are sustained by governing institutions at the constitutional level, and the cultural values and beliefs that guide governance are articulated at a meta-constitutional level.

Aboriginal law is characterised by stability at this meta-constitutional level because it is based on established patterns in social and natural systems. This is why Aboriginal leaders often say that their law never changes, while frequent government policy changes create confusion. Tangentyere Council General Manager William Tilmouth said in his address to the 2002 Australasian Institute of Judicial Administration, 'We live under two laws – a cause for both celebration and grief'. He described Aboriginal law as 'the table, the solid structure underneath. Whitefella law is like the tablecloth that covers the table, so you can't see it, but the table is still there' (Tilmouth 2002).

This institutional pluralism enables adaptation to changing conditions. An international review found that 'normative conflict among multiple, overlapping legal systems is unavoidable and might even sometimes be desirable, both as a source of alternative ideas and as a site for discourse among multiple community affiliations' (Berman 2007, p. 1155 ). Thus, pluralism may not stifle conflict but may enable the ongoing development of difference.

## **Example: Biodiversity**

Biodiversity conservation provides examples of diverse institutional interactions between cultures and levels. As a consequence of disobeying fundamental biophysical laws (Tilmouth's 'table'), Australia leads the developed world in mammal extinctions and near extinctions, and is experiencing significant losses of bird and mammal species and populations. This is a major cross-cultural concern. Our shared conservation values and beliefs are articulated by our central environmental law, the *Environment Protection and Biodiversity Conservation Act 1999*. Objects of the Act include cooperation among governments, communities, landholders, and Aboriginal and Torres Strait Island peoples. Policy statements under that Act provide guidance on the implementation of the Act, such as to protect Matters of National Environmental Significance that include threatened species and ecological communities, some of which were targeted by the prime minister as promises in the 2007 election.

In the new government, these targets became strategic priorities for funding under the new Caring for our Country program. That program awarded funding to pastoral, Aboriginal, landcare, school, non-government organisation, agency, and scientific groups and individuals for projects that were meaningful ecologically, culturally and personally.

Within Caring for our Country, the Working on Country program developed Indigenous-specific policies to achieve both national and Indigenous goals. Organisations received funding to meet multiple goals, such as to protect culturally important and threatened species, to revitalise traditional land management practices, or to enable traditional owners to conduct mainstream management activities on their country.

The funded projects provide opportunities for practitioners across cultures to develop the six desert sustainability characteristics: responsibility for land; understanding of its ecological limits; participation in an information network; structure for learning learn skills; membership in an influential group; and improved species and habitat diversity. The projects address national targets and also enable local groups to achieve their own culturally different goals. Supporting differences between cultures who are working together requires strategies of ‘governance for difference’ (Altman 2008), and they are explicitly allowed in Working on Country.

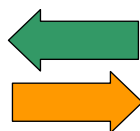
However, it is important that top-down direction is complemented by bottom-up influence so that actions at the operational level are able to influence policy. Within the Caring for our Country program this occurs through the agency process of reporting, evaluating and planning, with agency liaisons and Aboriginal representatives in brokering roles. This is illustrated by the adaptive governance of the IPA program, which responded to participant reports of triple-bottom-line outcomes by modifying its program to support those results.

As this example illustrates, institutional levels provide a useful conceptual framework to analyse interactions among levels. When rules are coherent across levels, a system is able to learn from how people respond to the empirical ‘lower-level’ rules. In Australian environmental agencies, this learning is occurring through highly personal processes of consultation, reporting, and evaluation that include participants’ stories of significant change on video (e.g. Davies & Dart 2005). However, we lack detailed evaluation of the effectiveness of these diverse cross-level and cross-cultural institutions in reversing our declining biodiversity.

## Desert influence

Influence, or control, is central to sustainability and to the DLF. Control is largely determined by the opportunities a person receives to develop the skills, resources and information needed to influence their environment. The amount of these opportunities one receives is related to social structures: having been taught problem-solving skills and having the confidence to apply them (Syme 2008).

The DLF uses the icon in Figure 8 to illustrate this two-way process: people need opportunities and capabilities to design rules, and those rules must give then opportunities to develop their most important capabilities or assets. For many desert groups, they are the knowledge, skills, social cohesion and other characteristics of sustainability. For example, a group may have the knowledge and skills to design effective rules but have no opportunity for self-governance; or it may have the opportunity for self-governance but lack the knowledge and skills to design effective rules. However, they are both developed in the gradual process of designing structures such as schools, clinics or police to be more effective than those designed by outsiders.



**Figure 8: Desert livelihood framework access and influence**

Government agencies dominate decision-making in desert Aboriginal communities, which inhibits development of local control and governance abilities. A senior Northern Territory official said to me, ‘You can’t have self-determination if government funds everything and holds all the information for decision-making’. While junior agency managers wanted the achievement of managing Aboriginal affairs, he and other experienced government officials recognised that long-term sustainability requires that communities manage their affairs to strengthen their capabilities. A Warlpiri representative to government described to me the impossibility of external management, ‘They put all *Yapa* [Aboriginal people] into one bucket. But every community has its own *jukurra!* [dreaming]’.

## Conclusion: A cross-cultural framework for desert sustainability

Sparse desert populations require collaboration to address risks to biocultural diversity, whether those cultures are pastoral, Aboriginal, scientific or governmental. Working together requires links across levels, whether those levels are concepts, actions based on those concepts, or organisations that link those actions. This paper builds on international research to present a flexible framework for strongly autonomous and culturally diverse desert people to think, act and organise to sustain people and country together.

Worldviews and their constituent conceptual frameworks are developed through group experiences within their environments. People use those frameworks to interpret their experiences and to solve problems in those environments. Aboriginal, pastoral, environmental, scientific and other worldviews that have been shaped by long experience in desert Australia share a similar set of characteristics that people use to solve problems.

Australia has a national demand to solve the problem of cultural, social and ecological sustainability. In desert Australia, widely dispersed and culturally different desert groups must work equitably together if we are to sustain our threatened biological and cultural diversity. These groups include Aboriginal and non-Aboriginal residents of remote communities, pastoral and Aboriginal landholders, and multicultural residents of towns that provide services.

The internationally proven Sustainable Livelihood Framework (SLF) helps people coherently analyse and discuss the important factors that affect livelihoods, and how those factors interact and feed back to create a sustainable system. It illustrates how assets (what a group has) that are valued by a social group can influence the design of rules (who can do what with assets) to improve strategies (what that group does with assets) and enable outcomes to emerge (what that group gets) that in turn strengthen those assets and reduce risks (threats to what that group has).

The Desert Livelihood Framework (DLF) is a bioregional adaptation of the SLF and retains its general elements and structure. It is a planning tool for groups to identify the desert-specific elements that must be sustained to enable livelihoods to emerge.

The DLF characterises assets, strategies and outcomes as six sets of practices that are central to sustainability in desert environments:

- **Knowing your land:** The responsibility for and knowledge of a place needed to effectively manage a diverse, patchy and unpredictable desert land.
- **Living within limits:** The willingness to live within the limits of desert material and energy flows and without excessively disturbing that system.
- **Communicating meaning:** The capability to gain, manage and share information about the important relationships among desert lands, climates, peoples, plants and animals.
- **Practising holistically:** The skills to creatively manage desert systems as wholes that link lands and cultures across scales, and to respond systemically to change.
- **Relating equitably:** Membership in an equitable and representative group that is able to influence political, economic and other decisions at higher levels
- **Caring for biodiversity:** The need to increase the resilience of native species and their habitats to pressures, to sustain the ecosystem functions we depend on.

Each of these characteristics are social–ecological systems that enable a wide variety of practices to emerge that can sustain desert lands and people together in a context of frequently changing occupations and desired outcomes.



DLF rules are generally derived from cultural values, and negatively or positively constrain activities, policies or laws to better align them with those values. They can have a formal or informal structure and interact across levels of organisation.

DLF risks result from inappropriate rules in the system; those rules either create risks, such as poor policies, or exacerbate risks, such as climate change by limiting appropriate responses.

Because desert values are diverse and rules are often made by external entities, rules play a major role in exacerbating existing risks from desert drivers of sparseness, patchiness and variability. Risks frequently result from higher-level rules that do not respond to lower-level needs; from small-scale processes that cannot respond to large-scale drivers; or from patterns of dominance and resistance between scientific, Aboriginal, pastoral, governmental or industrial cultures. A diversity of locally designed rules can contribute to building local capabilities to reduce these risks and to increase overall wellbeing.

Influence links rules and risks and is thus a central variable for determining if a system can adapt its rules to increase sustainability and reduce risk. In the desert, however, influence is centralised, and this 'hub-and-spoke' configuration limits the opportunities for local desert groups to network and develop their adaptive capabilities. Centralised power also enables rules that privilege a few interests over those of the whole system, and increase risk to sustainability.

The DLF emphasises the feedback cycles that link these separate elements into a whole with properties of its own that cannot be predicted. The DLF is thus intended as a catalyst for groups to identify ways to equitably work together to value and build the assets that can give them influence over the sustainability of their whole system. The extent and strength of equitable relationships in that network enables diverse livelihoods to more easily emerge and to develop.

This emergence begins with the commitment to sustain a strategy long enough to strengthen the underlying assets. Every community, settlement, and station has committed people who need partners. Sustaining livelihoods across the desert requires that partners identify and support each other in collaborations to benefit the country as a whole.

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