

Applying ‘resilience thinking’ for sustainable development



Ungrazed rangeland covered with native grass (left) compared to heavily grazed rangeland showing woody shrub dominance (right). McAllister, CSIRO

The transition to more sustainable development is requiring fundamental changes in thinking about our complex environment. As **Dr Leonie Pearson** explains, we need to better understand that nature and humanity are dynamic and co-evolving, and that achieving sustainability is not the single goal of decreased consumption, but rather of increasing our adaptive capacity to external shocks and challenges.

‘Resilience thinking’ and complexity theory draw attention to the dynamic nature of social and natural systems, and the way accumulated changes can shift systems from one state to another. This contrasts with dominant approaches to resource management and economic development that implicitly assume these systems are near equilibrium, or only evolve in gradual and predictable ways.

A resilient dynamic system can provide the capacity to absorb shocks while still maintaining, say, our desired lifestyle or long-term development plans. When crises occur, such as floods or fire, there is potential for recovery and for re-organisation, actually creating opportunities for development, novelty and innovation.

The alternative of a resilient system is a vulnerable system: when a system loses resilience it becomes precarious, or fragile to change effects, and

even small influences can have disastrous effects.

Complex systems

Humans depend on ecosystems for life, therefore social and ecological systems are linked. Natural systems are known to be dynamic and complex, but it has too often been assumed that they respond to change in a gradual or smooth process. In fact, growing evidence from rangelands, coral reefs, forests, lakes and oceans shows that drastic changes to the state and function of ecosystems can occur relatively quickly. An example could be rangelands – the large swathes of open country that are seen across Australia’s interior – shifting their vegetation from grasses to predominantly shrubs because of human and environmental influences.

Rangelands can change between grass and (woody) shrub dominance, driven by fire and grazing pressure

under highly variable rainfall. Continuous stock grazing pressure changes the land by encouraging the growth of woody plants and shrubs and precluding wildfire (which normally spurs grass growth); even if grazing animals are removed, there is then insufficient grass to fuel a fire and the rangeland stays in the less cattle-productive state dominated by woody shrubs.

Dr Brian Walker, Scientific Director of the Resilience Alliance, Senior Fellow with CSIRO and author of the book *Resilience Thinking*, pioneered the research on the sustainability of rangelands showing that they can change between grass and (woody) shrub dominance, driven by fire and grazing pressure under highly variable rainfall.

The increase in social and economic vulnerability in Australia’s rangelands is a consequence of reduced *resilience* through over-grazing

‘To achieve sustainable development we need to be flexible, dynamic and adaptable... we need Resilience Thinking’

DR BRIAN WALKER

the system. The long-term sustainability of rangelands as grazing systems was undermined by short-term gains in productivity. Therefore, loss of resilience (increased vulnerability) resulted directly in losses of livelihood.

Similar scenarios in many countries can trigger tension and conflict over critical resources such as freshwater or food.

Managing resilience for sustainability

Broadly, there are four ways that policy and individuals can adopt *resilience thinking*: (i) learn to live with change and uncertainty of complex socio-ecological systems; (ii) nurture diversity and adaptive capacity in all systems; (iii) enact flexible decision processes and institutions to act on opportunities; and (iv) enable complex systems to self-organise rather than being kept in particular, preferred states through human control.

It’s through these approaches that our ability to manage the resilience of the complex systems on which we depend is determined.

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More information:

Walker BH and Salt D (2006). *Resilience Thinking: Sustaining Ecosystems and People in a Changing World*. Island Press, Washington, DC.

The Resilience Alliance: <http://www.resalliance.org>