



Research article

The evolution of sustainable remediation in Australia and New Zealand: A storyline

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ABSTRACT

This article describes the 'storyline' of the early and recent growth of sustainable remediation (SR) practice in Australia and New Zealand (ANZ), in order to inform and support other SR stakeholders, and to identify some lessons learned. Achievement of full acceptance and consistency across relevant ANZ regulatory jurisdictions and industry sectors will take time and will require publication of successful examples of SR application. The article describes the respective policy and regulatory contexts for sustainable remediation practice in Australia and in New Zealand; several milestone activities and events in the growth of SR in ANZ; and example SR methodologies and policies produced by stakeholders and remediation practitioners including the Sustainable Remediation Forum of Australia and New Zealand (SuRF ANZ).

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1. Introduction

Several important sustainable remediation (SR) frameworks and practice descriptions have been developed internationally (for example ITRC, 2011; SuRF ANZ, 2011; SuRF UK, 2010), including in Australia and New Zealand (ANZ). An International Standards Organisation (ISO) standard on SR is currently in development (ISO, 2015). However the pace of uptake of SR practice by the remediation industry continues to remain slow, a common experience for many sustainability-based paradigms. Achieving full acceptance and consistency across relevant ANZ regulatory jurisdictions and industry sectors will take time and will require publication of successful examples of SR application. This article aims to describe the 'storyline', i.e. key 'milestones' in growth, of SR practice in ANZ. These include recognition of the regulatory context in Australia and New Zealand, initial policy development for SR practice, and subsequent development of a methodology. It identifies and describes important events and milestones in order to inform SR practitioners, including consultants, regulators and local communities, and to describe some lessons learned.

2. Background: the Australian sustainability context and 'Ecologically sustainable development'

Australia and New Zealand, while distinct international jurisdictions, nevertheless exhibit, and in some instances share, key approaches and policies on contaminated land identification, investigation, assessment and remediation.

2.1. Australia

The Australian Intergovernmental Agreement on the Environment in 1992 adapted international sustainability concepts, originally conceived in the UN-commissioned 'Our Common Future' (WCED, 1987), to Australian environmental practice by defining a concept called 'Ecologically Sustainable Development' (ESD). ESD underpins Australian sustainability-based treaties, unifies its planning and environment protection laws, and is a principle written into Australian state-based environmental protection legislation (NSW EPA, 2007). The Australian National Strategy for Ecologically Sustainable Development in 1992 defined ESD as: 'using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased'.

The Core Objectives of the strategy are:

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- To enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations;
- To provide for equity within and between generations; and
- To protect biological diversity and maintain essential ecological processes and life-support systems.

Australian States have enacted legislation with the objective of promoting these principles of ESD including assurance that contaminated land and groundwater are managed with regard to them.

Australia (NEPM, 2013) has well-established state government-based statutory systems for remediation, principally involving independent third party auditors drawn from the private sector who are delegated, by state government regulatory agencies, to assess the results of investigation and remediation and to formally certify that remediated land is suitable for use. Remediation is carried out in accordance with guidelines issued by regulatory agencies based upon risk-based validation criteria. Australia recently revised its nationally-adopted health-based criteria in the National Environment Protection Measure on Assessment of Contaminated Land (1999) – the ‘NEPM’ (NEPM, 2013). A national Australian Framework for Management of Contaminated Land is currently under development with input from state regulators.

Existing Australian remediation guidelines are well developed in terms of specifying risk based criteria although, in practice, conservative tier 1 screening criteria are adopted for many projects where the benefit (e.g. reduced cost of clean up) is not sufficient to justify the additional cost and time taken to develop the risk-based criteria. The audit system is compatible with the application of sustainability principles and can, for example, allow for a range of remediation options, including the option of contamination remaining on site where it can be safely managed. In Australia there is general support for a tiered (staged) approach i.e. initially applying a simple approach – only progressing to a detailed approach if needed, and the assessment process outlined in the NEPM (2013) is based on this approach.

Protection of “beneficial uses” (for air, soil, water, habitat) or environmental values is an essential regulatory consideration in Australia (NEPM, 2013), deviation from which generally only occurs when it can be formally demonstrated that complete protection of uses is not achievable in practice and that the resulting level of risk is low and acceptable. The success of a remediation project is dependent on the acceptability of the risk to stakeholders – both the risk that implementing the remedial method presents, and the risk that is associated with the final outcome. Proponents will also require the financial viability of a site development to be confirmed, although where contamination poses an unacceptable risk, remediation can be required to reduce the risk irrespective of profitability.

It is important to recognise that Australia has adopted a single level for the risk to human health that must be achieved; for example, in the case of carcinogenic contaminants, this corresponds to an additional risk of cancer over a lifetime of $1 \text{ in } 10 \text{ E}^{-5}$ (NEPM, 2013). There is no provision to accept a level of risk (such as $1 \text{ in } 10 \text{ E}^{-4}$) as a threshold above which remediation is required, or which could be invoked in the case where less sensitive land use (such as industrial) is involved. In this sense, Australia is less flexible than some other international jurisdictions where such an approach is adopted.

In practice, a number of state jurisdictions in Australia allow flexibility in the time taken and extent to which the restoration of beneficial uses is achieved, and apply considerations such as ‘clean-up to the extent practicable’ (‘CUTEP’). Relevant regulatory guidance in Australia includes the following concepts:

- Clean up to the extent practicable (‘CUTEP’) (EPA Victoria, 2014);
- Technical impracticability – requirement to do what is possible to the extent reasonable (EPA South Australia (2014));
- Auditing of risk to beneficial uses (EPA Victoria, 2006)
- Acceptance of monitored natural attenuation as a risk management measure (CRC CARE, 2010).

These are areas where, subject to different state governments’ policies and requirements, existing guidance takes into account alternatives to strict compliance at all times. This allows avoidance of the situation where continued remediation and consumption of resources is not required if it will not materially reduce the risk or provide benefit.

An effects-based approach to remediation under the Resources Management Act (1991) in New Zealand (see below), and a similar risk-based approach in Australia coupled with “Clean-up to the Extent Practicable” in some jurisdictions have resulted in regulatory acceptance of partial remedial solutions due to a practical inability to achieve complete clean up.

With respect to consideration of the principles of sustainability, Australian regulatory jurisdictions do acknowledge sustainability. For example the concept of “Ecologically Sustainable Development” is formally defined and considered in legislation, although the extent to which this can be seen in formal published guidance is limited. This is changing, with some recently published state regulatory guidance referring to application of the principles of sustainability in the remediation and management of contaminated sites, such as:

- New South Wales EPA in July 2015 published revised Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997 identifying that the Objects of the Act include ensuring ‘that contaminated land is managed with regards to the principles of ecologically sustainable development’.
- Western Australian DER in December 2014 published Assessment and Management of Contaminated Sites- Contaminated Sites Guidelines, which referenced the SuRF Australia 2011 ‘Framework for Assessing the Sustainability for Soil and Groundwater Remediation’.

2.2. New Zealand

In New Zealand, reflecting a national (not state-based) government system, there is over-arching national legislation for environmental regulation. Management of contaminated land is administered by regional and district councils under independent planning rules and national guidance documents and there is a National Environmental Standard for contamination investigation.

As mentioned above, an effects-based approach to remediation under the Resources Management Act in New Zealand (RMA, 1991), similar to the risk-based approach in Australia, has resulted in examples of partial regulatory acceptance of remedial solutions due to a practical inability to achieve complete clean up.

The New Zealand Environment Act (NZE, 1986) seeks assurance that, in the management of natural and physical resources, full and balanced account is taken of:

- the intrinsic values of ecosystems; and
- all values which are placed by individuals and groups on the quality of the environment; and
- the principles of the (governance-defining) Treaty of Waitangi; and
- the sustainability of natural and physical resources; and

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