Ecologically Sustainable Development
In the Context of Contaminated Land

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Introduction

Ecologically sustainable development (ESD) is a touchstone guiding development of natural resources and use of land. It is particularly applicable in the context of contaminated land, playing roles in the prevention, remediation and management of contaminated land.

This paper will outline the concept of ecologically sustainable development and its application to contaminated land. The discussion will use legislative examples to illustrate the application of ESD principles to contaminated land. Domestically, the primary reference will be to the New South Wales *Contaminated Land Management Act* 1997 whilst internationally, reference is made to Directive 2004/35/CE of the European Parliament and the Council of the European Union on Environmental Liability and Remedying of Environmental Damage because, although it is not legally applicable to Australia, it nevertheless provides useful guidance on how ESD principles can be applied to contaminated land.

Concept of ESD

The original concept of sustainable development articulated in *Our Common Future* is of "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."[1] In Australia, the adjective "sustainable" is qualified by "ecologically" to emphasise the necessary integration of economy and environment.[2]

Ecologically sustainable development involves a cluster of elements or principles. Six are worth highlighting.[3]

First, from the very name itself comes the principle of sustainable use - the aim of exploiting natural resources in a manner that is "sustainable" or "prudent" or "rational" or "wise" or "appropriate".[4] The concept of sustainability applies not merely to development but to the environment. The *Australian National Strategy for Ecologically Sustainable Development* makes this explicit in defining ecologically sustainable development as "development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends".[5]

Secondly, ecologically sustainable development requires the effective integration of economic and environmental considerations in the decision-making process.[6] This is the principle of integration. It was the philosophical underpinning of the report *Our Common Future*. That report recognised that the ecologically harmful cycle caused by economic development without regard to and at the cost of the environment could only be broken by integrating environmental concerns with economic goals.

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[1] WCED, *Our Common Future*, 1987, p 44.
[2] G Bates, *Environmental Law in Australia* (6th ed, Lexis Nexis Butterworths, 2006) p 124 [5.15].
[3] The following discussion derives from *Telstra Corporation Ltd v Hornsby Shire Council* (2006) 146 LGERA 10 at 35-37.
[4] P Sands, *Principles of International Environmental Law* (2nd ed, Cambridge University Press, 2003) p 253.
[5] *National Strategy for Ecologically Sustainable Development* (Australian Government Publishing Service, 1992) p 8.
[6] See the chapeau to the definition of "ecologically sustainable development" in s 6(2) of the *Protection of the Environment Administration Act 1991* (NSW) and in s 10(2) of the *Contaminated Land Management Act 1997* (NSW). See also Principle 4 of the *Rio Declaration on Environment and Development* made at the United Nations Conference on Environment and Development in Rio de Janeiro, Brazil in June 1992.

The principle of integration ensures mutual respect and reciprocity between economic and environmental considerations. The principle recognises the need to ensure not only that environmental considerations are integrated into economic and other development plans, programmes and projects but also that development needs are taken into account in applying environmental objectives.[7]

The principle has been refined in recent times to add social development to economic development and environmental protection. The Plan of Implementation of the World Summit on Sustainable Development held in Johannesburg, 2002, notes that efforts need to be taken to:

> "promote the integration of the three components of sustainable development - economic development, social development and environmental protection - as interdependent and mutually reinforcing pillars. Poverty eradication, changing unsustainable patterns of production and consumption and protecting and managing the natural resource base of economic and social development are overarching objectives of, and essential requirements for, sustainable development".[8]

Thirdly, there is the precautionary principle. There are numerous formulations of the precautionary principle but the most widely employed formulation adopted in Australia is that stated in s 6(2)(a) of the *Protection of the Environment Administration Act* 1991 (NSW). This provides:

> "…If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.
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> In the application of the precautionary principle, public and private decisions should be guided by:
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> (i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and
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> (ii) an assessment of the risk-weighted consequence of various options".[9]

Principle 15 of the *Rio Declaration on Environment and Development*, made at the United Nations Conference on Environment and Development in June 1992 in Rio de Janeiro, Brazil, is expressed in similar terms.

Fourthly, there are principles of equity. There is a need for inter-generational equity - the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.[10]

There is also a need for intra-generational equity. This involves considerations of equity within the present generation, such as use of natural resources by one nation-

[7] See P Sands, n 4, p 253.
[8] At paragraph 2.
[9] See also s 10(2) of the *Contaminated Land Management Act 1997* and s 3.5.1 of the *Intergovernmental Agreement on the Environment* 1992.
[10] See s 6(2)(b) of the *Protection of the Environment Administration Act 1991*; s 10(2) of the *Contaminated Land Management Act 1997*; s 3.5.2 of the *Intergovernmental Agreement on the Environment*; and Principle 3 of the *Rio Declaration on Environment and Development*.

state (or sector or class within a nation-state) needing to take account of the needs of other nation-states (or sectors or classes within a nation-state).[11] It involves people within the present generation having equal rights to benefit from the exploitation of resources and from the enjoyment of a clean and healthy environment.[12]

Fifthly, there is the principle that conservation of biological diversity and ecologically integrity should be a fundamental consideration.[13]

Sixthly, ecologically sustainable development involves the internalisation of environmental costs into decision-making for economic and other development plans, programmes and projects likely to affect the environment. This is the principle of the internalisation of environmental costs. The principle requires accounting for both the short-term and the long-term external environmental costs. This can be undertaken in a number of ways including:

(a) environmental factors being included in the valuation of assets and services;

(b) adopting the polluter pays (or user pays) principle, that is to say, those who generate pollution and waste should bear the costs of containment, avoidance or abatement;

(c) the users of goods and services paying prices based on the full life cycle of the costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste; and

(d) environmental goals, having been established, being pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.[14]

These principles do not exhaustively describe the full ambit of the concept of ecologically sustainable development, but they do afford guidance in most situations.

Principle of sustainable use

Land is, for practical purposes, a finite resource. The contamination of land reduces the supply of the resource. High-level contamination may exclude altogether productive use of land (eg sterilisation of land by radioactive fallout from the Chernobyl diaster) while lesser levels of contamination may reduce the range of productive uses (eg preclude uses that involve an increased exposure and risk to human health). Either way, development of the land that is contaminated is less sustainable. Hence, the principle of sustainable use entails that land should be

[11] P Sands, n 4, p 253 and E Brown Weiss, "Intergenerational Equity: a legal framework for global environmental change" in E Brown Weiss (ed), *Environmental Change and International Law: New Challenges and Dimensions* (UN University Press, 1992) p 385 at pp 397-398.

[12] B Boer, "Institutionalising Ecologically Sustainable Development: The Role of National, State and Local Governments in Translating Grand Strategy into Action" (1995) 31 *Willamette Law Review* 307 at 320.

[13] s 6(2)(c) of the *Protection of the Environment Administration Act 1991*; s 10(2) of the *Contaminated Land Management Act 1997*; s 3.5.3 of the *Intergovernmental Agreement on the Environment 1992*; and *Bentley v BGP Properties Pty Ltd* (2006) 145 LGERA 234 at 243-244 [58]-[63].

[14] See s 6(2)(d) of the *Protection of the Environment Administration Act 1991*; s 10(2) of the *Contaminated Land Management Act 1997* and s 3.5.4 of the *Intergovernmental Agreement on the Environment* 1992.

developed and used in a manner which prevents the sterilisation of land or the reduction in the range of productive uses of land.

The concept of sustainability, however, applies not merely to development but also to the environment. Land (including waters) is the foundation of life. Maintaining ecological processes on which life depends is fundamental to achieving sustainability.

Hence, the principle of sustainable use also entails that land should be developed and used in a manner which maintains the ecological processes on which life depends.

Where land has already been contaminated, the principle of sustainable use entails that the land should be remediated so as to improve both the range of productive uses of the land as well as its capacity to maintain ecological processes. Remediation to a standard of multi-functionality, that is removal of all contamination to the extent that land can be used for any purpose in the future, in theory maximises the potential of the land for sustainable use.

However, multi-functionality may be "neither technically feasible nor economically viable in the short term".[15] This is particularly the case with "brownfield" sites (areas of land that have been abandoned or are contributing to urban blight) and orphan sites (sites where the persons responsible for contamination no longer can be identified or exist or are able to undertake remediation). Requiring remediation to the standard of multi-functionality may, therefore, be counter-productive. The remediation may not be undertaken and the land may be may be left in its sterilised or under-productive state.

The alternative is to require remediation to a standard that is appropriate to enable particular proposed land uses, employing site-specific risk assessment. The less onerous and expensive nature of this standard may provide the necessary incentive for remediation of the land to be undertaken. Redevelopment of brownfields and orphan sites is encouraged. In this way, the land's capacity for sustainable use is improved.

Principle of integration

The principle of integration requires that both development and environment considerations are taken into account in the decision making process. This is a two way street: environmental considerations are integrated into development objectives and development needs are taken into account in applying environmental objectives.

Environmental considerations can be integrated into development decision-making through land-use planning processes that deal with future uses of land. Land use planning processes embrace a preventative philosophy at two stages.

First, for land that is not yet contaminated, the regulatory requirements under planning[16] and pollution[17] statutes for prior approval before carrying out development, enable control of development that is likely to cause contamination by imposition of conditions of approval designed to prevent contamination as well as

[15] S Christie and R M Teeuw, "Contaminated Land Policy Within the European Union" (1998) 8(1) *European Environment* 7 at 12.
[16] Such as the *Environmental Planning and Assessment Act 1979* (NSW).
[17] Such as the *Protection of the Environment Operations Act 1997* (NSW).

remediation if contamination nevertheless does occur. Conditions could include measures to prevent deliberate or accidental contamination, soil protection guidelines, and restrictions on particular activities, processes or substances.

Secondly, for land that might be contaminated, land use planning processes aim to prevent land being put to a use that might be inappropriate having regard to its land use history.[18] The processes involve identification and investigation of contamination early in the environmental planning and assessment process and the integration of the requirement for any necessary remediation into any redevelopment or rezoning. The planning processes, however, necessarily operate at a level of generality and requirements for remediation imposed through the planning processes need to be supplemented by site-specific, institutional controls governing the future use and management of sites that have contamination deliberately left behind. Such institutional controls can involve enforceable legal instruments, binding on owners, occupiers and their successors in title.

In New South Wales, land-use planning processes include measures to ensure that:

(a) planning authorities (general local councils but increasing State government authorities for State significant projects) consider contamination issues when they are making rezoning decisions under Pt 3 of the *Environmental Planning and Assessment Act* 1979 ('EPA Act') and development decisions under Pt 4 (and Pt 3A) of the EPA;

(b) local councils provide information about land contamination on planning certificates that they issue to owners and prospective owners and developers under s 149 of the EPA Act;

(c) land remediation is facilitated and controlled through a particular environmental instrument, State Environmental Planning Policy No 55 – Remediation of Land, made under the EPA Act; and

(d) for sites where contamination presents a significant risk of harm to human health or some other aspect of the environment, remediation and management is promoted through the processes in the *Contaminated Land Management Act* 1997 (NSW). [19]

In the contaminated land context, the requirement of taking development needs into account in applying environmental objectives involves consideration of the appropriate future use of contaminated land and the cost-effectiveness of various remediation options.

A live debate in contaminated land policy is what ought to be the aim of remediation of contaminated land. Multi-functionality involves remediation of land by removing all contamination to the extent that the land can be used for any purpose in the future. However, multi-functionality may be neither technically feasible, nor economically viable in the short term.[20] An alternative is to make the site as clean as is necessary for the current or proposed land use, employing site-specific risk assessment. For example, an industrial site proposed to be redeveloped for another industrial use

[18] See National Environment Protection Council, National Environment Protection (Assessment of Site Contamination) Measure 1999, s 6(5), p 5.
[19] Department of Environment and Conservation (NSW), "A review of the Contaminated Land Management Act 1997", October 2003, Sydney, p 2.
[20] Christie and Teeuw, n 15, p 12.

would not be remediated to the same standard as one proposed to be used for housing.[21]

Precautionary principle

The application of the precautionary principle and the concomitant need to take precautionary measures is triggered by the satisfaction of two conditions precedent: a threat of serious or irreversible environmental damage *and* scientific uncertainty as to the environmental damage.[22]

As to the first condition precedent, it is not necessary that serious or irreversible damage actually occur - it is the *threat* of such damage that is required.

The environmental damage threatened must attain the threshold of being *serious or irreversible.* The threat of serious or irreversible damage must be adequately sustained by scientifically plausible evidence. This condition will be fulfilled when empirical scientific data (as opposed to simple hypothesis, speculation or intuition) make it reasonable to envisage a scenario, even if it does not enjoy unanimous scientific support.

If there is no threat of serious or irreversible environmental damage (the first condition precedent is *not* satisfied), there is no basis on which the precautionary principle can operate.

As to the second condition precedent, the lack of full scientific uncertainty is in relation to the likelihood, nature and scope of the threat of environmental damage.

The degree of scientific uncertainty that needs to exist in order to trigger application of the precautionary principle varies depending on the magnitude of environmental damage used in the formulation of the first condition precedent of the precautionary principle. Where the relevant degree or magnitude of potential environmental damage is greater, the degree of certainty about the threat that is required is lower. For the formulation of “serious or irreversible environmental damage”, the correlative degree of certainty about the threat is “highly uncertain of threat” or “considerable scientific uncertainty”. This would contrast with a formulation of the precautionary principle which sets a lower degree of potential harm such as “potential adverse effects”, where the correlative degree of certainty about the threat would be higher, namely “highly certain of threat”.[23]

If there is not considerable scientific uncertainty (the second condition is *not* satisfied) but there is a threat of serious or irreversible environmental damage (the first condition precedent *is* satisfied), the precautionary principle will not apply. Measures will still need to be taken but these will be *preventative* measures to control or regulate the relatively certain threat of serious or irreversible environmental damage, rather than *precautionary* measures which are appropriate in relation to uncertain threats.

If both of the conditions precedent are satisfied, the precautionary principle will be activated. There will then be a shifting of the evidentiary burden of proof. A decision-maker must assume that the threat of serious or irreversible environmental damage

[21] Christie and Teeuw, n 15, p 11.
[22] The following discussion derives from *Telstra Corporation Ltd v Hornsby Shire Council* (2006) 146 LGERA 10 at 38-50.
[23] MC Cordonier Segger and A Khalfan, *Sustainable Development Law: Principles, Practices and Prospects* (Oxford University Press, 2004) pp 145-146.

is no longer uncertain but is a reality. The burden of showing that this threat does not in fact exist or is negligible effectively reverts to the proponent of the development plan, program or project.

The activation of the precautionary principle results in the taking of measures to prevent environmental damage without having to wait until the reality and seriousness of the threats of environmental damage become fully known. This is the concept of preventative anticipation.

A zero risk precautionary standard is inappropriate. Not every risk is unacceptable and needs to be prevented. The type and level of precautionary measures that will be appropriate will depend on the combined effect of the seriousness and irreversibility of the threat and the degree of uncertainty. This involves assessment of risk in its usual formulation, namely the probability of the event occurring and the seriousness of the consequences should it occur. The more significant and the more uncertain the threat, the greater the degree of precaution required.

Prudence also suggests that some margin for error should be retained until all the consequences of the decision to proceed with the development plan, program or project are known. This allows for potential errors in risk assessment and cost-benefit analysis. Potential errors are weighted in favour of environmental protection. Weighting the risk of error in favour of the environment is to safeguard the ecological space or environmental room for manoeuvre. One means of retaining a margin for error is to implement a step-wise or adaptive management approach, whereby uncertainties are acknowledged and the area affected by the development plan, program or project is expanded as the extent of uncertainty is reduced.

The precautionary principle embraces the concept of proportionality. In applying the precautionary principle, measures should be adopted that are proportionate to the threats. Considerations of practicability need to be taken into account. There must be a proportionality of response or cost effectiveness of margins of error to show that the selected precautionary measure is not unduly costly.

The precautionary principle, when triggered, does not necessarily prohibit the carrying out of a development plan, program or project until full scientific certainty is attained.

The precautionary principle should not be viewed in isolation, but rather as part of the package of principles of ecologically sustainable development. Precautionary measures selected should not only be appropriate having regard to the precautionary principle itself, but also in the context of the other principles of ecologically sustainable development.

In the context of contaminated land, the precautionary principle can operate in at least two ways: first, to prevent contamination of land in the first place and second, to remediate and manage contaminated land.

In the first way, the precautionary principle can operate to require the taking of measures to prevent environmental damage notwithstanding scientific uncertainty as to the likelihood, scope and nature of the threat of environmental damage.

A regulatory authority can impose conditions of approval requiring the taking of measures to prevent environmental damage without having to wait until the reality and seriousness of threats of environmental damage become fully known. The

granting of such conditional approval and the taking of preventative measures as required under the conditions, implement the concept of preventative anticipation.

Under the Directive 2004/35/CE of the European Parliament and the Council of the European Union on Environmental Liability with Regard to the Prevention and Remedying of Environmental Damage[24] the operator is required, without delay, to take the necessary preventative measures "where environmental damage has not yet occurred but there is an imminent threat of such damage occurring".[25]

"Environmental damage" refers to measurable adverse change to the environment that attains the threshold of being significant. "Environmental damage" means:

(a) "damage to protected species and natural habitats, which is any damage that has significant adverse effects on reaching or maintaining the favourable conservation status of such habitats or species…";

(b) "water damage, which is any damage that significantly adversely affects the ecological, chemical and/or quantitative status and/or ecological potential…of the waters concerned…" ; and

(c) "land damage, which is any land contamination that creates a significant risk of human health being adversely affected as a result of the direct or indirect introduction, in, on or under land, of substances, preparations, organisms or micro-organisms".[26]

"Damage" in this context means "a measurable adverse change in a natural resource or measurable impairment of a natural resource service which may occur directly or indirectly".[27]

An "imminent threat of damage" means "a sufficient likelihood that environmental damage will occur in the near future".[28]

Together, these provisions describe the first condition precedent for application of the precautionary principle, of there being a threat of serious or irreversible ("significant") environmental damage. If the threat of environmental damage is relatively certain ("there is an imminent threat of such damage occurring"), the operator is required to take preventative measures, being "measures taken in response to an event, act or omission that has created the imminent threat of environmental damage, with a view to preventing or minimising that damage".[29]

Strictly speaking, the precautionary principle is not invoked here – it is simply the principle of prevention at work, requiring the taking of measures to prevent a relatively certain threat of environmental damage. But even if the threat is sufficiently likely, there still could be considerable scientific uncertainty about the nature and scope of the environmental damage. In this situation, the precautionary principle could operate to deem the nature and scope of the threat of environmental damage to be no longer uncertain unless the operator can establish that the threat of environmental damage does not in fact exist or is negligible. If this burden is not

[24] Directive 2004/35/CE of 21 April 2004 as amended by Directive 2006/21/EC of 15 March 2006.
[25] Article 5(1).
[26] Article 2(1).
[27] Article 2(2).
[28] Article 2(9).
[29] Article 2(10).

discharged, the operator is required to take the preventative measures. In both situations, therefore, preventative measures need to be taken.

In the second way, the precautionary principle can operate to require an operator to take remedial measures to remediate and manage contaminated land.

The Directive on Environmental Liability provides that where environmental damage has occurred, the operator, without delay, is not only to inform the competent authority of all relevant aspects of the situation, but also to take:

"(a) all practicable steps to immediately control, contain, remove or otherwise manage the relevant contaminants and/or any other damage factors in order to limit of to prevent further environmental damage and adverse effects on human health or further impairment of services, and

(b) the necessary remedial measures in accordance with Article 7."[30]

Article 7 provides the mechanism for determination of the necessary remedial measures. The decision is made by the competent authority following the framework in Annex II and with the co-operation of the operator.[31] "Remedial measures" means "any action, or combination of actions, including mitigating or interim measures to restore, rehabilitate or replace damaged natural resources and/or impaired services, or to provide an equivalent alternative to those resources or services foreseen in Annex II".[32]

There is, in this situation, no longer a threat of environmental damage – it has occurred. However, there may be scientific uncertainty as to the nature, scope and effectiveness of remedial measures. The precautionary principle demands that such uncertainty is not to be used as a reason to postpone taking remedial measures. It operates to assume that remedial measures will be appropriate and effective unless the operator discharges the burden of establishing their inappropriateness and ineffectiveness.

Under the *Contaminated Land Management Act* 1997 (NSW), the competent authority under that Act, the Environment Protection Authority, may take various actions if it "has reasonable grounds to believe that land is actually or possibly contaminated in such a way as to present a significant risk of harm".[33]

"Harm" means "in relation to the contamination of land, harm to human health or some other aspect of the environment (including any direct or indirect alteration of the environment that has the effect of degrading the environment), whether in, on or under the land or elsewhere".[34] "Risk" includes "a long term risk".[35]

The first precondition of the precautionary principle is therefore satisfied: there is a significant risk of harm.

The second precondition may also exist. There may be uncertainty in relation to whether the land is contaminated (whether "actually or possibly contaminated") and in relation to the nature, scope and effectiveness of the investigation, remediation

[30] Article 6(1).
[31] Article 7(2).
[32] Article 2(11).
[33] Section 7.
[34] Section 4.
[35] Section 4.

and other measures that could be directed under s 7 and Pt 3 of the Act. The Environment Protection Authority is required in exercising its functions, including in determining whether land is contaminated in such a way as to present a significant risk of harm under s 7, and in determining the investigation, remediation and other measures that should be directed under s 7 and Pt 3, to apply the precautionary principle.[36]

Once the precautionary principle is activated, preventative measures are to be taken. The determination of the type and extent of preventative measures involves an assessment of the risk-weighted consequences of various options.

The concept of risk-weighted consequences involves "an attempt to undertake a semi-quantitative analysis, and determine the likelihood of irreparable damage or an undesired or adverse outcome arising from a particular development or activity".[37]

The options will vary, of course, depending on the problem at hand, including whether the goal is prevention of contamination or remediation of contaminated land.

The Directive on Environmental Liability illustrates the approach of assessing the risk-weighted consequences of options. The Directive proposes different measures for remediation of damage to water or protected species or natural habitats than for remediation of land damage. Remedying environmental damage to water or protected species or natural habitats is achieved through the restoration of the environment to its baseline condition by way of primary, complementary and compensatory remediation. These terms mean:

> "(a) 'Primary' remediation is any remedial measure which returns the damaged natural resources and/or impaired services to, or towards, baseline condition;
>
> (b) 'Complementary' remediation is any remedial measure taken in relation to natural resources and/or services to compensate for the fact that primary remediation does not result in fully restoring the damaged natural resources and/or services;
>
> (c) 'Compensatory' remediation is any action taken to compensate for interim losses of natural resources and/or services that occur from the date of damage occurring until primary remediation has achieved its full effect".[38]

The Directive notes "where primary remediation does not result in the restoration of the environment to its baseline condition, then complementary remediation will be undertaken. In addition, compensatory remediation will be undertaken to compensate for the interim loss".[39]

Within each of these types of remediation measures, options will exist. The Directive requires identification of these options and assists in choosing between the remedial options by the specification of evaluative criteria:

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[36] Section 10(1) and (2).
[37] Commonwealth of Australia, *Draft National Strategy for Ecologically Sustainable Development: A Discussion Paper*, June 1992, AGPS, Canberra, 1992, Glossary approved in *Conservation Council of South Australia Inc v Development Assessment Committee and Tuna Boat Owners Association (No 2)* [1999] SAERDC 86 (16 December 1999) at [18].
[38] Annex II, s 1.
[39] Annex II, s 1.

"The reasonable remedial options should be evaluated, using best available technologies, based on the following criteria:

- The effect of each option on public health and safety,
- The cost of implementing the option,
- The likelihood of success of each option,
- The extent to which each option will prevent future damage, and avoid collateral damage as a result of implementing the option,
- The extent to which each option benefits to each component of the natural resource and/or service,
- The extent to which each option takes account of relevant social, economic and cultural concerns and other relevant factors specific to the locality,
- The length of time it will take for the restoration of the environmental damage to be effective,
- The extent to which each option achieves the restoration of site of the environmental damage,
- The geographical linkage to the damaged site."[40]

For remediation of land damage, the Directive provides:

"The necessary measures shall be taken to ensure, as a minimum, that the relevant contaminants are removed, controlled, contained or diminished so that the contaminated land, taking account of its current use or approved future use at the time of the damage, no longer poses any significant risk of adversely affecting human health. The presence of such risks shall be assessed through risk-assessment procedures taking into account the characteristic and function of the soil, the type and concentration of the harmful substances, preparations, organisms or micro-organisms, their risk and the possibility of their dispersion. Use shall be ascertained on the basis of the land use regulations, or other relevant regulations, in force, if any, when the damage occurred."[41]

For remediation of contaminated land, there is typically a hierarchy of options. The National Environment Protection (Assessment of Site Contamination) Measure 1999 provides that the preferred hierarchy of options for site clean up and/or management is as follows:

"• if practicable, on-site treatment of the contamination so that it is destroyed or the associated risk is reduced to an acceptable level; and

[40] Annex II, s 1.3.1.
[41] Annex II, s 2.

- off-site treatment of excavated soil, so that the contamination is destroyed or the associated risk is reduced to an acceptable level, after which soil is returned to the site; or,

if the above are not practicable,

- consolidation and isolation of the soil on site by containment with a properly designed barrier; and

- removal of contaminated material to an approved site or facility, followed, where necessary, by replacement with appropriate material;

or,

- where the assessment indicates remediation would have no net environmental benefit or would have a net adverse environmental effect, implementation of an appropriate management strategy.

In cases where no readily available or economically feasible method is available for remediation, it may be possible to adopt appropriate regulatory controls or develop other forms of remediation".[42]

The assessment of the risk-weighted consequences of various options also involves consideration of the concept of proportionality. Remedial measures adopted should be proportionate to the threats and be cost-effective. Remedial measures should also not cause more environmental degradation than the contamination of the land. The Directive on Environmental Liability embraces the concept of proportionality. For example, it provides:

"1.3.2 When evaluating the different identified remedial options, primary remedial measures that do not fully restore the damaged water or protected species or natural habitat to baseline or that restore it more slowly can be chosen. This decision can be taken only if the natural resources and/or services foregone at the primary site as a result of the decision are compensated for by increasing complementary or compensatory actions to provide a similar level of natural resources and/or services as were foregone. This will be the case, for example, when the equivalent natural resources and/or services could be provided elsewhere at a lower cost. These additional remedial measures shall be determined in accordance with the rules set out in section 1.2.2.

1.3.3 Notwithstanding the rules set out in section 1.3.2, and in accordance with Article 7(3), the competent authority is entitled to decide that no further remedial measures should be taken if:

(a) the remedial measures already taken secure that there is no longer any significant risk of adversely affecting human health, water or protected species and natural habitats; and

[42] Section 6(16) at p 8. See also A Layard, "The Europeanisation of Contaminated Land" (2004) 6 Envtl L Rev 97 at 105.

(b) the cost of the remedial measures that should be taken to reach baseline condition or similar level would be disproportionate to the environmental benefits to be obtained."

This risk-based land management approach is well summarised in the UK Environment Agency Model Procedures for the Management of Land Contamination:

> "In deciding whether contamination is of significance, whilst the amount, or concentration, of any contaminants present is always going to be a significant factor, it does not provide the whole answer: it is also necessary to consider to what extent the substances present may harm human health or the wider environment, or damage property such as buildings. In short, what risk, if any, is caused by contaminants, and is that risk unacceptable? This need to make judgements about the degree of risk also applies to deciding what to do about the contamination. Technical obstacles as well as potentially massive costs mean that it is often neither feasible nor realistic to think in terms of total clean up of past damage. Instead the goal is to find solutions which identify and deal with risks from contamination in a sustainable way … The question of whether risk is unacceptable in any particular case involves not only scientific and technical evaluation of the particular circumstances (what is the level of risk represented by the circumstances of the site?), but also appropriate criteria to judge the risk (exactly what risk would be unacceptable?) … The overall approach in dealing with past land contamination is therefore one of risk management – implying "all the processes involved in identifying, assessing and judging risks, taking actions to mitigate or anticipate them, and monitoring and reviewing progress"…
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> The nature and level of risk are defined in large part by variability in the condition and circumstances of any individual piece of land. The details of the use of the land itself, as well as surrounding land, determine whether particular receptors and pathways are present and, if they are, the extent to which they might potentially be affected by contamination. The environmental setting of the land - eg the surrounding and underlying water environment, on-site and nearby ecosystems - are critical in the same way. Other characteristics of the site also affect the nature and level of risk in any case. For example, the nature of the soil, the local climate, and the underlying geology and hydrogeology all affect the risk presented by contamination. Taking these factors together, the same concentration of a contaminant can have widely differing implications in different circumstances. Risk assessment allows this to be considered in a structured way so that appropriate and cost effective decisions are taken."[43]

Prudence suggests that a margin for error should be retained until all the consequences of the selected option are known. This allows for potential errors in risk assessment and cost benefit analysis. Potential errors are weighted in favour of prevention and remedying environmental damage and risk of human health. One means of retaining a margin for error is to implement a stepwise or adaptive management approach.

An adaptive management approach can involve the monitoring of impacts of the carrying out of a particular activity, evaluating the monitoring data, and adjusting the

[43] pp 6-8 quoted in K Mfodwo, "Risk-Based Management of Historically Contaminated Land in NSW: An Analysis of the Regime under the Contaminated Land Management Act 1997 (NSW)" (2006) 11 *The Australasian Journal of Natural Resources Law and Policy* 43 at 58.

management approach in response to the monitoring data.[44] Monitoring the effectiveness of remediation or the risk of harm presented by the contamination of the land is one of the measures that can be required by a remediation order under Part 3 of the *Contaminated Land Management Act* 1997 (NSW).[45] An adaptive management approach can also involve requiring pollution studies and reduction programs, thereby implementing a stepped reduction in pollution.[46]

Principle of intergenerational equity

Intergenerational equity is a relevant goal both in preventing and in remediation of contamination of land.

Development and use of land by the present generation should aim to prevent the contamination of land, thereby maintaining the health, diversity and productivity of the land. This accords not only with the principle of sustainable use, but also with concepts of equity. All members of the present generation should enjoy the benefit of equivalent protection from air, water and land pollution wherever they live.[47] This involves intra-generational equity or environmental justice.[48] Prevention of contamination also involves inter-generational equity. It is inequitable for the present generation to take the benefits of development and use of the land whilst passing on to future generations the burden or costs in the form of contamination, thereby denying future generations the same benefits that the present generation is able to enjoy from development and use of the land.

If the present generation has already contaminated land, intergenerational equity demands that the present generation ought to remediate that land so as to ensure the health, diversity and productivity of the environment is enhanced for the benefit of future generations. On a simple view, intergenerational equity would be maximised for future generations by primary remediation to the standard of multi-functionality, that is to say, remediation to the extent that the land can be used for any purpose in the future. In this way, options for future generations would be maximised. However, this may not necessarily achieve equity between generations.

For the present generation, remediation to a standard of multi-functionality comes at a high cost. Remediation of a site to the standard of what is necessary for the current or proposed land use, based on site-specific analysis, rather than to a standard of multi-functionality may be a more proportionate response to the risks involved and be more cost-effective. It may therefore be more equitable for present generations.

For future generations, achieving multi-functionality for all sites that might be contaminated can have unintended, inequitable consequences in three ways. First, the higher costs associated with achieving multi-functionality might divert funds from other activities that could yield greater benefits to future generations. Contaminated land is but one of many environmental issues needing to be addressed and that compete for funding. Heavy investment of limited funds in remediation of contaminated land may be at the expense of investing in other environmental

[44] *Environment Protection Authority v Ballina Shire Council* (2006) 148 LGERA 278 at 290-291 [75]
[45] See s 25(g).
[46] *Environment Protection Authority v Lithgow City Council* [2007] NSWLEC 695 (26 October 2007) at [26].
[47] See National Environment Protection Council, National Environment Protection (Assessment of Site Contamination) Measure 1999, s 6(15), p 7.
[48] See B J Preston, "The Role of the Judiciary in Promoting Sustainable Development: The Experience of Asia and the Pacific" (2005) 9 *Asia Pacific Journal of Environmental Law* 109 at 175-176.

problems for which solutions might provide greater long-term benefits and have lower costs. More particularly, intergenerational inequity could arise if restoration funding was diverted from contaminated sites with high potential risk to the environment and human health to sites with relatively lower risk.[49]

Secondly, establishing a goal of multi-functionality for all contaminated sites might result in more damage to the environment than if a less demanding remediation standard were to be used. As the standard of remediation becomes more demanding (towards low, non-risk clean up levels), more sites may undergo restoration, resulting in damage to or destruction of natural and cultural resources, thereby preventing or limiting their use by further generations. The loss or impairment of these resources could have an inequitable effect on future generations.[50] Such a consideration was implicit in the recommendation in the former ANZECC Guidelines for the Assessment and Management of Contaminated Sites, January 1992, that remediation should not proceed if the process is likely to create a greater adverse effect than leaving the site undisturbed.[51]

Thirdly, the choice of remedial measures can also give rise to intergenerational equity issues. For many sites, removal of contamination from the site is not feasible and on-site storing or containment is required. This necessitates on-going stewardship of the site, involving both responsibilities and restrictions. Responsibilities may include monitoring and maintenance of residual contamination. Restrictions may include limiting land use to the surface and to certain types of use. These stewardship responsibilities and restrictions on use will continue to be borne by future generations. Inappropriate or ill-conceived stewardship programs can exacerbate any inequity for future generations. Hocking notes that stewardship is too readily adopted as the convenient solution, but that such convenient stewardship plans have a propensity toward inequity for two reasons:

> "First, the plan might not adequately address the uncertainties and failure mechanisms associated with stewardship, thereby enacting the potential for great human and ecological harm and high cost. Second, the plan might not include an information management system that captures, preserves and disseminates the data present and future generations will need to make decisions related to the site and its use."[52]

Principle of conservation of biological diversity and ecological integrity

Ecologically sustainable development mandates that the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making. It is not merely a matter that decision-makers and proponents of activities *may* consider - a discretionary consideration; it is a relevant matter they are bound to consider. Moreover, it is a "fundamental" consideration. Ecologically sustainable development prioritises it over other relevant considerations.

Contamination of land is a cause of loss of biodiversity and ecological integrity. This is recognised in the Directive on Environmental Liability. Recital (1) notes:

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[49] E K Hocking, "Intergenerational equity and environmental restoration clean up levels", a paper presented to WM'01 Conference, February 25-March 1, 2001, Tucson, AZ, p 3.
[50] Hocking, n 49, pp 3-4.
[51] para 3.15.
[52] Hocking, n 49, p 4.

> "There are currently many contaminated sites in the Community, posing significant health risks, and the loss of biodiversity has dramatically accelerated over the last decades. Failure to act could result in increased site contamination and greater loss of biodiversity in the future".

The Directive applies to environmental damage caused by any of the occupational activities listed in Annex III and to damage to protected species and natural habitats caused by any occupational activities other than those listed in Annex III, and to any imminent threat of such damage occurring by reason of such activities.[53]

"Environmental damage" includes damage to protected species and natural habitats, which is any damage that has significant adverse effects of reaching or maintaining the favourable conservation status of such habitats or species, and water damage, which is any damage that significantly affects, inter alia, the ecological status and/or ecological potential of the waters.[54]

The Directive imposes responsibility to prevent such environmental damage and damage to protected species and natural habitats[55] and, if it has occurred, to take remedial action.[56]

The conservation of biological diversity and ecological integrity is also a fundamental consideration in the choice of remedial measures and the standard of remediation. Under the Directive, remedying of environmental damage, in relation to water or protected species or natural habitats, is to be achieved through the restoration of the environment to its baseline condition. This is to be done by primary, complementary or compensatory remediation. The nature of these three types of remediation has been described earlier.[57]

The purpose of each type of remediation is as follows:

> "Purpose of primary remediation
>
> 1.1.1 The purpose of primary remediation is to restore the damaged natural resources and/or services to, or towards, baseline condition.
>
> Purpose of complementary remediation
>
> 1.1.2 Where the damaged natural resources and/or services do not return to their baseline condition, then complementary remediation will be undertaken. The purpose of complementary remediation is to provide a similar level of natural resources and/or services, including, as appropriate, at an alternative site, as would have been provided if the damaged site had been returned to its baseline condition. Where possible and appropriate the alternative site should be geographically linked to the damaged site, taking into account the interests of the affected population.
>
> Purpose of compensatory remediation

[53] Article 3(1).
[54] Article 2(1).
[55] Article 5.
[56] Article 6.
[57] See above corresponding with n 38, Annex II, s 1.

1.1.3 Compensatory remediation shall be undertaken to compensate for the interim loss of natural resources and services pending recovery. This compensation consists of additional improvements to protected natural habitats and species or water at either the damaged site or at an alternative site. It does not consist of financial compensation to members of the public."

Consonant with the objective of conserving biological diversity, priority should be given to primary remediation, but when this is not reasonably practicable, complementary remediation and/or compensatory remediation may be pursued.[58]

The identification of the appropriate remedial measures, within each type, is assisted by the guidelines in the Directive:

"Identification of remedial measures

1.2.1 Options comprised of actions to directly restore the natural resources and services towards baseline condition on an accelerated time frame, or through natural recovery, shall be considered.

Identification of complementary and compensatory remedial measures

1.2.2 When determining the scale of complementary and compensatory remedial measures, the use of resource-to-resource or service-to-service equivalence approaches shall be considered first. Under these approaches, actions that provide natural resources and/or services of the same type, quality and quantity as those damaged shall be considered first. Where this is not possible, then alternative natural resources and/or services shall be provided. For example, a reduction in quality could be offset by an increase in the quantity of remedial measures.

1.2.3 If it is not possible to use the first choice resource-to-resource or service-to-service equivalence approaches, then alternative valuation techniques shall be used. The competent authority may prescribe the method, for example, monetary valuation, to determine the extent of the necessary complementary and compensatory remedial measures. If valuation of the lost resources and/or services is practicable, but valuation of the replacement natural resources and/or services cannot be performed within a reasonable time-frame or at a reasonable cost, then the competent authority may choose remedial measures whose cost is equivalent to the estimated monetary value of the lost natural resources and/or services."

The choice between identified remedial options is to be based on the evaluative criteria in the Directive quoted earlier.[59]

Principle of internalisation of external environmental costs

Sustainable and economically efficient development of land, and its resources requires internalising the costs of preventing and controlling pollution and containment, as well as any environmental damage itself.[60]

[58] See Annex II, s 1.3.2.
[59] See above corresponding with n 40, Annex II, ss 1.3.1-1.3.3.

The rationale underlying the principle of internalisation of environmental costs is that if the real values of the environment, and components of it, are reflected in the costs of using it, the environment will be sustainably used and managed and not exploited wastefully.[61]

There are various means of achieving this goal. The best known of the means is the polluter pays principle. Expressed simply, the principle holds that those who generate pollution and waste should bear the costs of containment, avoidance or abatement. It requires the polluter to take responsibility for the external costs arising from its pollution. This can be done by the polluter cleaning up the pollution and restoring the environment as far as practicable to the condition it was in before being polluted. The polluter ought also to make reparation for any irremediable harm caused by its conduct, such as death of biota and damage to ecosystem structure and function.[62]

The polluter pays principle is an economic rule of cost allocation. The source of the principle is in the economic theory of externalities. By requiring the polluter to take responsibility for the external costs arising from his pollution, the principle allocates these costs to the polluter. The polluter must internalise these costs as a cost of doing business. Internalisation will be complete when the polluter takes responsibility for all the costs arising from pollution; it will be incomplete when part of the costs is shifted to the community as a whole.[63]

The polluter pays principle is also founded on a philosophical position as to ownership of the environment. As Moffet and Bregha explain:

> "Under the polluter pays principle, the community effectively 'owns' the environment, and forces users to pay for the damage they impose. By contrast, if the community must pay the polluter, the implicit message is that the polluter owns the environment and can use and pollute it with impunity. This message is inconsistent with the principles of sustainable development…"[64]

The polluter pays principle plays a role both in the prevention of pollution and in remediation if pollution were to occur.

The principle plays a role in prevention by justifying the imposition of responsibility for prevention and control of pollution arising from the development and use of land on the person carrying out that activity. This can be done by the imposition of conditions on any approval necessary to carry out the activity.

Further, the knowledge that, if pollution were to occur, the polluter would be responsible for its containment, avoidance and abatement has a deterrent effect,

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[60] *Environment Protection Authority v Waste Recycling and Processing Corporation* (2006) 148 LGERA 299 at 341 [230].
[61] B J Preston, n 48, at 193-194.
[62] *Environment Protection Authority v Waste Recycling and Processing Corporation* (2006) 148 LGERA 299 at 341 [230].
[63] N de Sadeleer, *Environmental Principles, From Political Slogans to Legal Rules* (Oxford University Press, 2002) 21.
[64] J Moffett and F Bregha, "The Role of Law in the Promotion of Sustainable Development" (1996) 6 *Journal of Environmental Law and Practice* 3 at 8.

thereby preventing future pollution.[65] The costs of containment, avoidance and abatement of pollution are usually likely to exceed the costs of prevention of pollution. Acting rationally, a person would undertake the cost of preventative measures, rather than the cost of remedial measures.[66]

The polluter pays principle operates in the remediation of contaminated sites by requiring the polluter to bear the primary liability for the remediation of sites they have contaminated. This allocation of primary responsibility to the polluter is evident in the *Contaminated Land Management Act* 1997 (NSW). Under that Act, the Environment Protection Authority may make an investigation or remediation order in relation to contaminated land against the appropriate person. Section 12(2) specifies that the appropriate person is to be chosen from three classes of interested persons in the following order:

> "(a) a person who had principal responsibility for such contamination of the land with the substance (whether or not there were other persons who had responsibility for such contamination of the land with the substance), or, if that is not practicable,
>
> (b) an owner of the land (whether or not the person had any responsibility for such contamination of the land with the substance), or, if that is not practicable,
>
> (c) a notional owner of the land (whether or not the person had any responsibility for such contamination of the land with the substance)".

Owner and notional owner are defined terms. [67]

Critical to the allocation of liability is the concept of "responsibility" for "contamination" of land. "Contamination" of land means "the presence in, on or under the land of a substance at a concentration above the concentration at which the substance is normally present in, on or under (respectively) land in the same locality, being a presence that presents a risk of harm to human health or any other aspect of the environment" and "contaminated" means "to cause such contamination".

A person can be "responsible" for the contamination of land if they have caused the contamination. However, s 13 extends responsibility to persons for indirect and delayed contamination and for a change in the risk of harm even if contamination itself has not changed:

> "(1) For the purposes of this Act, a person is responsible (whether or not principally responsible) for the contamination of land in such a way as to present a significant risk of harm even if the land only became contaminated in such a way:
>
> (a) because an act or activity of the person (whether or not in, on or under that land) resulted in the conversion of a substance in, on or under the land that did not cause contamination of the

[65] ANZECC, "Financial Liability for Contaminated Site Remediation: A Position Paper" (1994) at 5-6 and A Kingsbury, "Funding the Remediation of Contaminated Law: The Problem of Orphan Sites" [1998] *Waikato Law Review* 2 at 3.
[66] See *Axer Pty Ltd v Environment Protection Authority* (1993) 113 LGERA 357 at 359-360; *Bentley v Gordon* [2005] NSWLEC 695 (22 November 2005) at [99] and *Bentley v BGP Properties Pty Ltd* (2006) 145 LGERA 234 at 257-258.
[67] In s 4 and s 14 respectively.

land in such a way into a substance that did cause contamination of the land in such a way, or

(b) because an act or activity of the person (whether or not in, on or under that land) resulted in a change in some pre-existing contamination of the land so that the contamination of the land became contamination in such a way, or

(c) because an act or activity of the person (whether or not in, on or under the land) resulted in a change in the approved use of the land (within the meaning of section 9) and a consequent change in the risk or the harm (even if the contamination itself did not change).

(2) An example of an act referred to in subsection (1) (c) is the making of an application under Part 4 of the *Environmental Planning and Assessment Act* 1979 for development consent.

…

(4) In determining whether a person is responsible (whether or not principally responsible) for the contamination of land with a substance in such a way as to present a significant risk of harm, it is irrelevant that the contamination or significant risk of harm did not arise contemporaneously with the act or activity of the person that ultimately was responsible for the contamination of the land with the substance in such a way."

The order of choosing the appropriate person requires identification of the person who had "principal" responsibility for the contamination.[68]

"Principal" does not mean "sole", neither in its ordinary meaning nor in its context within the statutory provision that expressly acknowledges that there might be other persons who had responsibility for the contamination. It does, however, refer to a ranking where the person, amongst the persons who had responsibility, is identified as being the person whose conduct is the chief or foremost cause of the contamination.

Other persons who had responsibility for the contamination would not be appropriate persons unless they fell within one of the other categories (owner or notional owner) and it was not practicable to choose as the appropriate person the person who had principal responsibility for the contamination. The choice of a person is not practicable if:

"(a) there is no such person, or

(b) the EPA cannot, after reasonable inquiry, find out the identity or location of the person, or

(c) the person, in the opinion of the EPA, is unable to pay the person's debts or would, if the person took steps to comply with the order, become unable to pay the person's debts".[69]

[68] See s 12(2)(a).
[69] s 12(6).

Hence, the scheme under the Act is, consonant with the polluter pays principle, to allocate liability first to the polluter, being the person with primary responsibility for the contamination, and only when this is not practicable, to another person. If the latter situation arises, it is no longer practicable to apply the polluter pays principle, and a different approach for allocation of liability needs to be invoked. The Act adopts a "beneficiary pays" approach. Under this approach, anyone receiving a benefit from contaminating activities or who may benefit from the land being remediated is potentially liable for remediation. The class of beneficiaries is limited by statute to "owners" and "notional owners".[70]

"Owner" includes persons who have a freehold interest in the land and persons who have perpetual leases of Crown land but excludes certain classes of persons, including a person who has an interest in the land under a lease, licence or permit and a mortgagee of land that is not Crown land and is not subject to the provisions of the *Real Property Act* 1900.[71]

"Notional owner":

> "(a) is a person (not being the owner of the land or the Crown or a person or body representing the Crown) who has a vested interest with respect to the land that carries an entitlement to have a freehold interest in the land vested in the person or that enables the person to dispose of or otherwise deal with a freehold interest in the land, so that the person is able to benefit from the value of the land, or a substantial portion of it, by such vesting, disposal or dealing; and
>
> (b) includes a mortgagee in possession of the land".[72]

However, a person is not a notional owner of land in certain circumstances, including just because the person has a security (such as a mortgage, charge or lien) over the land[73] or where a person who would otherwise be a notional owner of the land (eg is a mortgagee in possession of the land) has entered into a contract to sell the land for the purpose of realising part or all of the value of the land in order to discharge the obligation secured under a security the person has over the land.[74]

This beneficiary pays approach is akin to the polluter pays approach in that it allocates the burden or costs of remediation to a person who has benefited in some direct or indirect way from the contaminating activities on the land or who may benefit from the remediation.[75] There is still an internalisation of the costs and a transfer of the costs of remediation away from the community as a whole.

In addition to the appropriate person being liable to take action specified in an investigation or remediation order, they can be liable to pay the Environment Protection Authority's administrative costs associated with such orders,[76] a public authority's substantive costs in carrying out the order if the person fails to act,[77] and

[70] Kingsbury, n 65 at 6.
[71] See definition of "owner" in s 4.
[72] s 14(1).
[73] s 14(2)(a).
[74] s 14(2)(d).
[75] Kingsbury, n 65, p 5.
[76] s 34.
[77] s 35.

the costs of any other person who might have carried out investigation or remediation and who had no responsibility for the contamination.[78]

The adoption of, first, the polluter pays principle and, if that is not practicable, then the beneficiary pays approach, increases the likelihood of remediation of contaminated land being achieved and sites not being left "orphaned". An orphan site is a contaminated site for which no person is clearly responsible. Orphan sites continue to post serious long-term risks to health and to the environment. They offend the principles of ecologically sustainable development, including inter-generational equity and intra-generational equity.

Fault based liability schemes increase the likelihood of creating orphan sites, because fault liability can be difficult to establish.[79]

The Directive on Environmental Liability adopts a hybrid approach, combining the polluter pays principle with a fault-based approach. Recital (2) pronounces that:

> "(2) The prevention and remedying of environmental damage should be implemented through the furtherance of the 'polluter pays' principle, as indicated in the Treaty and in line with the principle of sustainable development. The fundamental principle of this Directive should therefore be that an operator whose activity has caused the environmental damage or the imminent threat of such damage is to be held financially liable, in order to induce operators to adopt measures and develop practices to minimise the risks of environmental damage so that their exposure to financial liabilities is reduced."

The Directive elaborates on this responsibility by reference to particular categories of costs. Recitals (18) and (21) provide:

> "(18) According to the 'polluter-pays' principle, an operator causing environmental damage or creating an imminent threat of such damage should, in principle, bear the cost of the necessary preventive or remedial measures. In cases where a competent authority acts, itself or through a third party, in the place of an operator, that authority should ensure that the cost incurred by it is recovered from the operator. It is also appropriate that the operators should ultimately bear the cost of assessing environmental damage and, as the case may be, assessing an imminent threat of such damage occurring.
>
> (21) Operators should bear the costs relating to preventive measures when those measures should have been taken as a matter of course in order to comply with the legislative, regulatory and administrative provisions regulating their activities or the terms of any permit or authorisation."

The operative provisions imposing liability on the operator include Article 8, which provides that, prima facie, "the operator shall bear the costs for the preventative and remedial actions taken pursuant to this Directive".[80]

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[78] s 36.
[79] Kingsbury, n 65, at 6.
[80] Article 8(1).

"Operator" is defined to mean "any natural or legal, private or public person who operates or controls the occupational activity or, where this is provided for in national legislation, to whom decisive economic power over the technical functioning of such an activity has been delegated including the holder of a permit or authorisation for such an activity or the person registering or notifying such an activity".[81]

"Occupational activity" means "any activity carried out in the course of an economic activity, a business or an undertaking, irrespective of its private or public, profit or non-profit character".[82]

However, this allocation of liability to the operator of the occupational activity - the polluter - is subject to exceptions. First, the Directive applies differentially depending on the type of occupational activity. For occupational activities listed in Annex III, the Directive applies to all environmental damage caused by such occupational activity, but for occupational activities not listed in Annex III, it only applies whenever the operator has been at fault or negligent and even then only to damage to protected species and natural habitats caused by that occupational activity.[83]

Secondly, where the Directive does apply, environmental damage caused by specified events beyond the operator's control is excluded.[84] Thirdly, an operator may not be required to bear the cost of remedial actions "where he demonstrates that he was not at fault or negligent" and that the environmental damage was caused by an emission or event expressly authorised by and fully in accordance with the conditions of a relevant approval then in force or an emission or activity or any manner of using a product in the course of an activity which the operator demonstrates was not considered likely to cause environmental damage according to the then state of scientific and technical knowledge.[85]

These exceptions to the strict liability imposed by the polluter pays principle increase the likelihood of liability for environmental damage not being able to be allocated to private operators in certain circumstances, thereby creating orphan sites or sites requiring to be remediated by government.[86]

The principle of internalisation of external environmental costs can be achieved through mechanisms other than the polluter pays principle. One is to ensure that users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste. Improved valuation and pricing encourages more sustainable use of resources and less waste. A reduction in waste and in waste going to landfill can reduce land contamination to some extent in the long term.[87] Financial incentive mechanisms can include taxes, such as taxes on waste. Monies raised can be used specifically for the costs of dealing with contaminated land.[88]

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[81] Article 2(6).
[82] Article 2(7).
[83] Article 3(1).
[84] See exceptions in Article 4 and Article 8(3).
[85] Article 8(4).
[86] See V Fogleman, "Enforcing the Environmental Liability Directive: Duties, Powers and Self-Executing Provisions" [2006] 4 *Environmental Liability* 127 at 137-143.
[87] J Desmond, "Local government powers over contaminated land in New South Wales – improved outcomes through improved information management" (2006) 11 *Local Government Law Journal* 219 at 227.
[88] Christie and Teeuw, n 15, p 12.

Another mechanism is that "environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems".[89]

This mechanism incorporates the concept of subsidiarity by recognising the role that the private sector plays in developing solutions and responses to environmental problems. As Mfodwo explains, subsidiarity recognises the individual citizen's ability and responsibility to act at their level of engagement. It de-emphasises the "top-down" approach where government determines and acts upon the situation and persons. It aims to ensure that decisions are taken as closely as possible to the citizen. In the case of sustainable development, this means enabling "those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems".[90]

In the case of contaminated land, those best placed to maximise benefits or minimise costs are the potential polluter and the beneficiaries of development activities. Incentives, including, market mechanisms, can encourage these persons to pursue preventative measures to avoid contamination of land by their activities or, if contamination has already occurred, adopt remedial measures to clean up the site so as to maximise the range of beneficial uses to which the site can be put.

Conclusion

The principles of ecologically sustainable development provide a framework structuring the exercise of discretionary decision-making in relation to contamination of land. The goal is to sustain the reasonable needs of society, both present and in the future, in perpetuity whilst also sustaining the environment on which life depends. Implementation of the principles will assist in achieving this goal. But equally importantly, the principles, if adequately implemented, may ultimately realise a paradigm shift from a world in which the development of the environment takes place without regard to environmental consequences, to one where a culture of sustainability extends to institutions, private development interests, communities and individuals.[91]

[89] See statement (d)(iii) in "principles of ecologically sustainable development" in s 10(2) of *Contaminated Land Management Act* 1997 (NSW).
[90] Mfodwo, n 43, p 57 and footnote 43 therein.
[91] B Boer, "The Globalisation of Environmental Law" (1995) 20 *Melbourne University Law Review* 101 at 111.