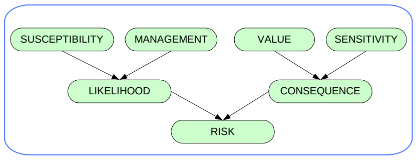
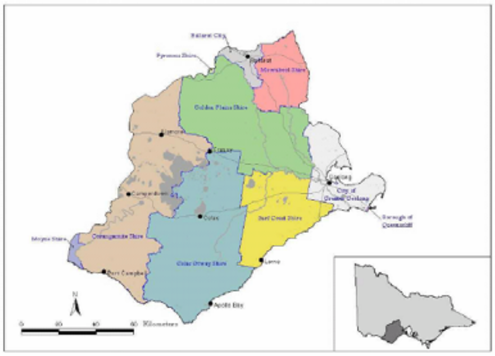
Corangamite Soil Health Strategy

Mapping risks to soil health for priority setting





Corangamite Catchment Management Authority commenced the development of a Soil Health Strategy in 2003. Because there was insufficient information on soil and land condition, we proposed that LUIM could be used to assess risks to soil condition. Good scale soil and landform mapping and land use mapping had been recently completed for the region. We implemented the revised LUIM, using our agreed risk assessment framework and BBN approach developed in 2003 for the Drivers of Land Use Change project.

Figure 23 Corangamite region project area

Key achievements

- Assessment of risk for a range of soil issues using high resolution soils and land use information.
- Development of rules for assessing sensitivity of soils to threatening processes.
- Rating of agricultural land assets for value.
- The first time that the LUIM had been used to work with a CMA to assist in development of a strategy.

Elements

The agricultural land uses included in the risk assessment were cropping, grazing, dairy farming, plantation forestry, and production forestry. The degradation issues assessed were:

1. Sheet and rill erosion.
2. Gully and tunnel erosion.
3. Wind erosion.
4. Soil structure decline.
5. Soil acidification.

No changes were made to the LUIM risk framework for this project.

Process

The method comprised the following steps:

1. Collation of existing spatial data on soil and land qualities, land use and land management.
2. Mapping of susceptibility, sensitivity and asset value.
3. Rating relationships between threats and practices.
4. Spatial modelling using the LUIM to generate maps of risk to mapped land units in the study area.

Soil landform mapping at 1:100 000 (Robinson *et al.* 2003) provided the base layer for assessing susceptibility. Susceptibility was initially mapped using standard rule sets but these were too generalised and were deemed insufficient to cope with the complexity of geomorphology and soils in the region. Susceptibility of the soil landform units to each of the threatening processes was determined by experts who were well acquainted with the region.

The project team had to develop criteria for assessing sensitivity as this type of assessment had not been undertaken for soil issues before. An example of criteria developed for assessing sensitivity to waterlogging is contained in Table 4.

Table 4 Sensitivity criteria to water logging for soils in the CCMA Soil health Strategy.

Soil Property	Class	Sensitivity
Texture A	Fine sands, silts, loams	Very High
	Sand, clay	Very Low
ASC	SO	Very High
	Bleached CH & KU	High
	TE, non bleached CH & KU	Low
	RU, KA, DE, VE, CA	Very Low
EAT A Horizon	1, 2	Very High
	3, >3	Moderate
	7, 8	Very Low
EAT B Horizon	1, 2	Very High
	3, >3	Moderate
	7, 8	Very Low

Notes: ASC - Australian Soil Classification (Isbell 1996); SO- Sodosol; CH - Chromosol; KU -Kurosol; TE - Tenosol; RU - Rudosol; KA – Kandosol; DE – Dermosol; VE – Vertosol; CA – Calcarosol. EAT – Emerson Aggregate Stability.

Asset value was assessed using a method developed by Heislers and Clifton (2004) 'Development of an asset risk and prioritisation methodology: a case study in the NCCMA'. Each asset, defined using land use classes, is scored against three classes for each of the criteria in Table 5. The scores are totalled and the assets grouped into three equal interval classes (low, moderate, high) according to the final scores. Initially, the scores for each asset class in the region were assigned using the scores documented in Heislers and Clifton (2004) as a first draft. These scores needed to be revised for a more robust asset value result. Revision of asset value was scheduled for a follow up project.

Table 5 Asset value assessment criteria sourced from Heislers and Clifton (2004).

Value class	Assessment criteria
Economic	Asset/service element directly generates substantial economic activity
	Asset/service element has a high capital value (cost of purchase, construction or establishment)
	Asset/service element facilitates significant economic activity
	Asset/service element helps to mitigate loss of financial/economic service values
Environmental	The asset/service is of international, national or regional significance
	The asset is in excellent (environmental) condition
	The asset is rare
Social	The asset has strong cultural significance
	The asset or its use provides significant direct or indirect employment
	The asset/service provides substantial amenity to users (shelter, landscape value/personal wellbeing)

There was no existing spatial information on land management practices and so regional experts were consulted in a series of workshops to provide this. Management practice information required included a list of land management practices for each land use category that might influence the occurrence of degradation for each threatening process, and an estimate of the distribution of those practices for the region (% area for each land use category). An example of information collected for grazed land is contained in Table 6.

Table 6 Inventory and distribution of grazing practices relevant to soil structure decline (McNeill and MacEwan 2004).

Issue	Practices	Practice distribution (% area)
Structure decline	<u>Pasture composition (dominant)</u>	
	Sown annual	5
	Annual	75
	Perennial	20
	<u>Grazing method</u>	
	Set stock	60-70
	Graze and spell/rotation	30-40
	Surface water management	<5
	<u>Renovation method</u>	
	Cultivation	85
	Direct drill	15
	Gypsum	<5
	Adding organic matter (chicken manure)	<5

Regional experts were consulted to identify current understanding of the interactions between land use practices and different threatening processes. Combinations of practices were classified (Beneficial, neutral, weakly negative, moderately negative and strongly negative) for their influence on the occurrence of each of the degradation issues.

Results

The spatial data were combined with the expert data on land management and threatening processes to produce maps of likelihood and risk for each threatening process. Figure 24 contains an example of a likelihood map for soil structure decline, and Figure 25 contains an example of a risk map for the same degradation issue.

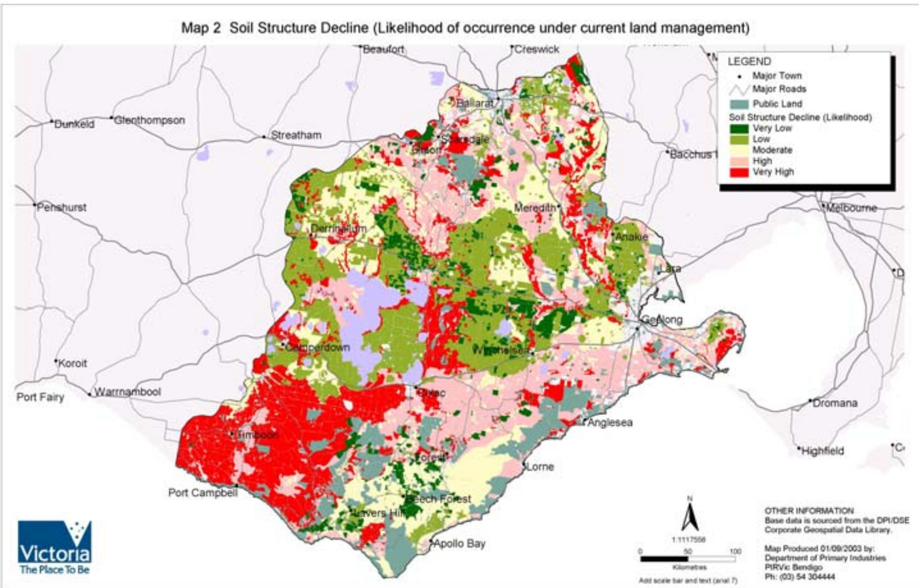


Figure 24 Example of the CCMA Soil Health Strategy likelihood output for soil structure decline (McNeill and MacEwan 2004).

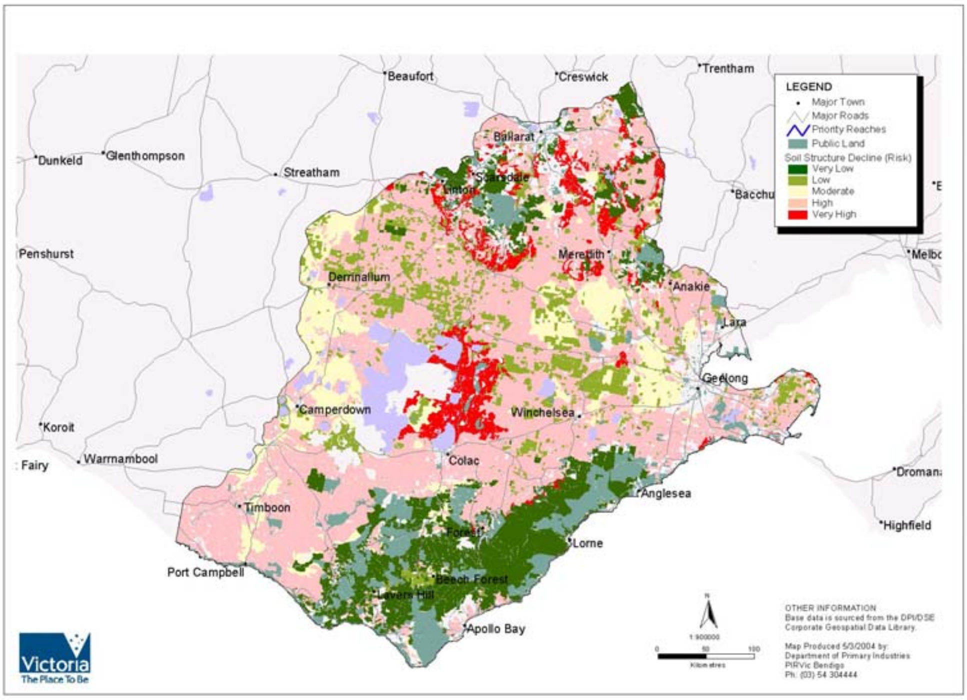


Figure 25 Example of the CCMA Soil Health Strategy risk output for soil structure decline (McNeill and MacEwan 2004).