

Chapter 4 — Features of salinity investigations

Salinity is the result of the complex interaction of geologic history, past climate, climate, vegetation, geomorphology (geology and landforms in combination), and land and water development activities on sensitive landscapes. Because of the diverse nature of these interacting factors, there is no **one** aspect or factor that can identify the risk of salinity or the likely extent of possible salinity problems. Effective management strategies need to be based on salinity risk assessment as well as processes affecting salinity development.

Features of salinity investigations are listed and the information they contribute to salinity investigations are discussed here in Table 6. In **Answers to common questions about salinity** (page xi) in the front of this handbook, features of salinity investigations that need to be undertaken to provide an initial assessment of salinity, and features that make up more detailed investigations are discussed.

Table 6. Features of salinity investigations.

Feature	Information contributing to salinity investigations	Level I : Initial D : Detailed M : Monitoring	Page
Landscape characteristics and salinity mapping			
Landform feature identification	<ul style="list-style-type: none"> Identifies landform features that are hydrologically sensitive and susceptible to salinity Indicates specific landscape positions where salinity is likely to occur Indicates areas and landforms most at risk of salinity under changed land use and hydrological conditions Can provide information about discharge and recharge areas 	I : Initial, D	39
Geology	<ul style="list-style-type: none"> Can indicate likely sources of salts Can reveal geological structures and rock types controlling water movement in the landscape, and provide information on aquifer characteristics 	I, D	42
Landscape salinity mapping	<ul style="list-style-type: none"> Provides information about the current extent and severity of salting Can be used to locate historic salt loads 	I (if equipment available), D, M	43
Vegetation			
Plant communities as salinity indicators	<ul style="list-style-type: none"> Indicates location and extent of any current or recurrent salt-affected areas Can be used to locate areas for more detailed investigations Useful in uncleared or partly cleared areas or areas under pasture 	I	49
Vegetation patterns on remote sensing images	<ul style="list-style-type: none"> Variations in density, species composition and vigour can indicate Changing vegetation patterns on air photos over time can provide a historical perspective of cyclic variations in salinity and the effects of land use and development 	I (field observations), D (remote sensing)	50
Plant response to salinity and specific ions	<ul style="list-style-type: none"> The appearance of individual plants—stunted growth, leaf effects—can indicate plant responses to salinity or high levels of specific ions 	I, D	51
Climate and rainfall patterns			
Average annual rainfall characteristics	<ul style="list-style-type: none"> Indicates whether land in the region is at risk of watertable salting as characteristics indicated by the correlation between watertable salting occurrences and rainfall patterns 	I	55

Feature	Information contributing to salinity investigations	Level I : Initial D : Detailed M : Monitoring	Page
Moving average rainfall pattern	<ul style="list-style-type: none"> Indicates where the current time fits into long-term rainfall patterns, pattern and potential for increased or decreased salinity with changes in water inputs (from rainfall or irrigation) over the medium- to long-term 	D	56
Soils			
Soil properties	<ul style="list-style-type: none"> Indicates areas with a history of waterlogging or salting 	I	58
Soil salinity	<ul style="list-style-type: none"> Provides guidelines for the potential of the soil for cropping, pastures, trees 	I, D, M	60
Soil salt profiles	<ul style="list-style-type: none"> Indicates current salinity levels and dominant hydrological process Provides information for choosing species to plant, based on plant salt tolerance data Can be used to approximately locate recharge and discharge areas and to estimate recharge 	I (field 1:5), D (laboratory soils analysis), M	61
Soil sodicity	<ul style="list-style-type: none"> Provides information on soil stability and potential for soil response under irrigation Provides information for erosion control measures that may be required 	D, M	63
Water			
Field tests for waters	<ul style="list-style-type: none"> Indicates salt concentrations, and initial suitability of water for various uses Mapping water salinity in surface waters and existing groundwater sampling points can indicate salt sources and salinity distribution 	I (existing water) (sampling points), D, M	65
Use of piezometers	<ul style="list-style-type: none"> A network of bores or piezometers can be used for regional mapping of groundwater and restrictions to groundwater flow Monitoring provides insight into processes Water level contours can indicate barriers to water flow Suitable for monitoring the effects of management and rainfall variability 	I, D, M	66
Catchment groundwater balance estimation	<ul style="list-style-type: none"> Provides an initial assessment of the magnitude of the water imbalance balance Provides information on the amount of water to be managed to reclaim saline areas 	I, D, M	70
Water chemistry and salt sources identification	<ul style="list-style-type: none"> Analysis can be used to indicate likely geologic sources of salts which can sources identification be linked with the actual position of these salt sources in the landscape to interpret hydrologic processes Indicates mixing of waters and salt concentration processes 		73
Water quality			
Human domestic use	<ul style="list-style-type: none"> Analyses will indicate suitability for human domestic use 	I, D, M	79
Stock watering	<ul style="list-style-type: none"> Analyses will indicate suitability for stock watering 	I, D, M	79
Irrigation	<ul style="list-style-type: none"> Analyses will indicate suitability for irrigation depending on soils, climate and crop type Analyses will indicate potential effects on soil and likelihood of contributing to soil degradation 	I, D, M	81
Human activities			
Human land use and records	<ul style="list-style-type: none"> Can be useful for identifying specific areas where salinity may have occurred records in the past, and in conjunction with five-year moving average rainfall information can indicate areas of the landscape most at risk of salinity under changed hydrologic conditions Provides a historical perspective on how human activities have contributed to the development of salting Farm records on land development, bores, water levels etc. can be used to identify past hydrological changes 	I (oral history), D (air photos, management y records etc.)	88