

Chapter 17

LANDSCAPE ECOLOGY—INTERMINGLED ECOSYSTEMS

IN THE NEWS

Dryland salinity is a major problem in Colorado, North Dakota, Montana, Alberta, and southern Australia, as well as in the Middle East. Salt originates from the breakdown of minerals in rocks and from salt deposits in areas where the ocean once covered dry land. Near coastlines, salt is blown in from the sea. Areas with old, highly weathered soils, such as much of Australia, contain large amounts of salt. Most plants will not grow in soils that are highly saline—and no agricultural crops will grow in saline soils—so, as more areas become saline, agricultural production falls, deserts advance and biodiversity is reduced. About 400,000 ha of Colorado soils are saline-affected, as are 650,000 ha of Alberta soils. In Australia about 2 million hectares are already affected by salinity, and another 12 million hectares are at risk of succumbing during this century. Why has this problem of saline soils arisen, and what can be done about it?

The salt that threatens agricultural production dissolves in rainwater as it percolates through the soil, and accumulates in the water table. In areas with saline soils, the water table is contaminated with high levels of salt, and the key to salinity management is to prevent the saline water table from rising to the surface of the soil profile. Before agriculture began, native trees and shrubs in the landscape transpired large quantities of soil water, and kept the water table deep down in the soil profile. But native vegetation has been replaced over the last 200 years by crops such as wheat that have a shallow root system and use much less water than the original native vegetation. The result is that the water table rises, bringing the salt up toward the surface, as shown below.

As the water table rises closer to the surface, salt is washed into streams and rivers, causing salinity problems in freshwater ecosystems. Similar soil contamination with salt can occur in crops that are irrigated. The excess water used in irrigation can raise the water table, bringing salt to the surface (see <http://www.nlwra.gov.au/>).

There are three solutions to saline soil problems. The technological fix is to grow crops that are salt tolerant or, in the longer term, to select crop strains that are more and more salt tolerant. This is a temporary fix that can help, but it does not solve the underlying problem. The second solution is to