Case study 4

Managing Soil Constraints in the Riverina

Background

Located northwest of Wagga near Coolamon is a family farm that has been managed since 1895 producing mixed crops and supporting grazing of livestock, particularly sheep. This property is also considered an important link in the "green" corridor from the Murrumbidgee River north towards Coolamon and the Malebo range that enables fauna to breed and migrate north from the river and return. Therefore, conserving soil, water and biodiversity on-farm is equally as important as managing soil fertility to maintain productivity and profitability of farming.

Several soil and climatic constraints have limited productivity on-farm and resulted in less biodiversity of both flora and fauna over time since the property was established. Following initial land clearing in the late 19th century, deep tillage and harrowing were employed to establish crops and manage pests. This resulted in formation of gullies where run-off was rapid and frequent off the hills, low-lying bogs and loss of topsoil and fertility over time due to both wind and water erosion. The climate is typical of the Riverina with characteristic cold wet winters and hot dry summers. Average annual rainfall of 500mm was distributed more evenly over the year but recent weather changes have shown long dry spells followed by long wet spells with variable rainfall ranging from 400 - 600mm, with reduced winter and increased summer rainfall.

A red loam kandosol is found on cultivated land and rocky outcrops with natural grassy woodland vegetation. No specific natural drainage occurs as creeks are absent on the property, thus dams have been constructed to control runoff, increase rainfall infiltration, and manage water supply on-farm.

Although the annual cultivated area has historically supported rainfed cereals (wheat, barley, triticale, and oats), oilseeds (canola) and pulses (lupins) with zero or minimal tillage in the last decade, the property has recently supported prime lamb production at a rate of 1300 head annually, and improved pastures of high-density legumes including lucerne and erect clovers established with zero tillage.

Figure 1: Dams constructed with silt-traps.

Figure 2: Areas prepared for tree planting by ripping, followed by harrowing. Herbicides were applied both pre- and post-emergence.

Identified problems and soil constraints:

- Soil erosion by wind and water in areas where native vegetation is depleted or pasture cover is declining, resulting in the gradual silting of dams.
- Poor drainage issues and waterlogging that affect animal health and farm machinery operation during wet season.
- Declining soil fertility and soil water holding capacity that affect pasture performance.

Figure 3: Fenced-off native vegetation and agroforestry.

Actions taken to manage soil constraints:

- Need-based classification of paddocks, and fencing-off the marginal areas allowing for re-generation of native vegetation.
- Reducing pressure on pasture regrowth and soil fertility by reducing stock rate to 65%, focusing on prime lamb production.
- Tree planting around dams and waterways.
- Installing contour banks and new dams to prevent run-off and soil erosion.
- Constructing silt traps on dams on the sides facing steep slopes to capture topsoil and manure run-off during storm drainage. This prevents topsoil loss and contamination of dam water.
- Fencing-off hilly areas, followed by revegetation with native trees and shrubs, to maintain 75% ground cover, thereby increasing rainfall infiltration, soil moisture retention and reducing run-off.
- Fencing off and revegetation of erosion gullies.

Resilient Soils
Building Resilient Soils for the Riverina

Charles Sturt University

Australian Government
Department of Agriculture, Fisheries and Forestry