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The Australian Rangeland Society

MANAGEMENT OF SURFACE WATER FLOW

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Rainfall in central Australia is often the result of storms. They can be intense and fall over a short period of time, resulting in a high percentage of surface water run off. This water moves rapidly across the landscape causing erosion and washing away valuable nutrients which are vital for good soil structure.

The loss of nutrients and soil has a dramatic impact on land use, as poor quality soils produce poor quality pastures. Badly located and constructed roads contribute to the erosion problem. Eighty percent of gully erosion in central Australia has been caused by roads that were incorrectly positioned and constructed. The need to control surface water flow is vital to maintain good soil structure and control erosion and so increase productivity. Ponding banks are an efficient means of slowing water flow across the landscape. By slowing the water it is able to infiltrate deeper into the soil and deposit nutrients which improve soil condition and reduce soil erosion.

Under natural conditions a large percentage of storms end up as run off. From a 50 mm storm lasting an hour and a half, approximately 12 mm of rain infiltrates and 38 mm ends up as run off. Storms are normally intense and infrequent.

Ponding banks are strategically placed to slow the flow of water across the land surface, giving the opportunity for the water to penetrate deep into the soil.

They are earth banks, usually a u-shape, surveyed to hold 10-20 cm of water. A series of ponding banks starting from the top of a slope will not stop the water flow, but it slows down the movement over the land. As the ponds fill to their surveyed level excess water overflows around the end of the banks and moves on down the slope into the next pond and so on. When the water has stopped flowing a shallow pond of water is left inside each ponding bank to soak into the soil. Nutrients are trapped in the ponds, improving soil structure. This creates favourable conditions for plant growth. Vegetation response from first rains are generally pioneer species of little value, but they play a role in improving soil condition as they break down. It takes about three rain events for soil properties to improve enough for high value perennial species to replace low value annual species.

Correct bank placement and construction is important when ponding water. Banks constructed correctly the first time reduce the chance of failure. Banks that require excessive maintenance increase the cost of ponding

Water ponding must start at the top of the catchment to eliminate high volumes of water entering the banks.

Once the top of the catchment has been identified, banks are placed down the slope so water can flow from one to the next. The spacing between banks is important as there needs to be enough catchment area for each bank to pond water after short storms. A catchment ponded area ratio of 5:1 for larger banks built with a dozer or loader and a ratio of 2:1 for graded banks are appropriate catchment ratios to start with.

Ponding banks can be surveyed by hand with a dumpy level or with a vehicle-mounted laser level. One man can do in half a day with a vehicle-mounted laser level what would be achieved by two men in a week by hand. Slopes should not be greater than 3%. As the slope increases the area behind each bank becomes smaller and the cost effectiveness of the structure decreases. Each bank is surveyed to

pond water 10-20 cm deep. The laser-mounted level marks a ripped line for the position of the bank and a dozer or loader is used to construct a bank on that line. Banks should always be pushed from the down side. The finished bank should be 1-1.5 m high and 3-4 m wide at the base. Graded banks are restricted to the lower end of the scale on areas with little slope and a maximum ponding depth of 10 cm. Three passes with a grader are needed, one above and two below the surveyed line, to achieve a bank 50 cm high with a base width of 1 m.

Roads often interfere with drainage lines, the natural flow of water being obstructed by windrows or the road itself. Windrows collect water until they are eventually breached. This concentrates large amounts of water in one spot, damaging the road and causing gully erosion. Removing the windrow and placing drains, floodways and crossbanks in their correct positions allows the water to pass over the road and continue on its natural course. It is also important to consider the location of new roads, avoiding drainage lines, steep unstable slopes and keeping them away from potential erosion problems such as soft salty soils and clay pans. Aerial photos and land resource maps can help achieve the best possible road alignment by locating stable land types before the on-ground inspection and road making starts.

Central Australia's pastoral industry relies on rain-fed pastures. Maximising the infiltration from every rainfall event will lead to an extended growing season, improved plant community composition, enhanced habitat, reduced drought impact and help protect the product from market and climatic variability. Erosion, both by wind and water, is more severe the barer the surface is of vegetation. Any interference to water flow that directs it into erosion channels across the landscape must be avoided. Management of surface water flow is an essential component of sustainable management.