Sediment

MANAGING RUN-OFF

Water run-off from irrigated areas can cause increased soil erosion, loss of productivity, loss of agricultural chemicals and unacceptable off-site impacts. Run-off from intensively farmed areas usually contains soil particles which can move into streams and cause increased stream turbidity and siltation. Agricultural chemicals may also be dissolved in the water or attached to soil particles and this can further increase stream pollution. In addition, any water flowing from the property onto riparian areas that are not carefully managed can cause degradation of these areas and erosion of stream banks.

The problems associated with run-off are:

- high sediment load and chemical pollutants leaving an irrigated area (particularly in first-flush stormwater)
- high velocity of run-off flows causing erosion and degrading stream banks
- loss of productive land thus reducing economic returns.

Management practices and strategies to control run-off from irrigation properties vary with the type of irrigation system used, land slopes, geographic features and soil types.

In general, run-off can be controlled in-field by adopting appropriate tillage practices and maintaining soil cover. Off-field strategies usually include use of buffer zones and collection sumps. To minimise the discharge of contaminants into waterways, it is essential that irrigators have a stormwater management plan to deal with rainfall events that will cause run-off from the irrigated area.

Strategies to control run-off in-field include:

- retaining stubble and trash to protect the soil surface—this will slow sealing of the surface, keeping it open and able to absorb water
- avoiding cultivating soil to a very fine tilth—this will maintain surface roughness and reduce erosion caused by surface run-off
- applying irrigation at rates and amounts appropriate to the plant available water capacity of the soil
- where practical, refraining from irrigating when storms are likely, so that fields will be able to absorb a high proportion of stormwater
- using contour banks to intercept run-off on sloping land
- directing intercepted water to grassed waterways to decrease flow to less erosive velocities
- maintaining grass strips between rows of tree crops to prevent collection of silt from inter-row surfaces
- establishing grass buffer strips to decrease water flow, and filter silt and agricultural chemicals from cultivated areas.

Management strategies to control the impacts of off-site run-off include:

- installing a sump that can collect the first flush of storm run-off from the irrigated area
- designing and maintaining tail drains with sufficient capacity to hold first-flush stormwater
- managing the water level in collection sumps so that their retention capacity is maximised
- locating silt traps near storages such as sumps and on farm dams to keep silt on the property where possible, reusing run-off collected in sumps
- avoiding the use of chemicals if rainfall is predicted or imminent
- establishing vegetated buffer zones in areas to which storm run-off may be directed before it leaves the property
- directing sump overflow and stormwater away from susceptible water bodies—use grassed buffer zones or other vegetation to intercept this run-off.

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Below is a table of agronomic and structural soil conservation management measures, with comments on their applicability for certain situations.

Table 1: Agronomic and structural soil conservation measures

MEASURE	DESCRIPTION	COMMENT
Agronomic		
Zero tillage	Growing of crops with no soil disturbance for seedbed preparation or harvesting	Usually includes retention of crop residue and use of herbicides to control weeds
Minimum tillage	Growing of crops with minimum soil for seedbed preparation or harvesting	Usually includes retention of crop residue disturbance and use of herbicides to control weeds
Crop residue retention	Maintaining crop residue on or near the soil surface	Reduces the impact of raindrops on the soil surface, which initiates the soil erosion process
Cover cropping	A temporary crop grown to provide protection for the soil	Often used to provide protection for cropping land during the summer period of high intensity storms
Strip cropping	A systematic arrangement of strips of vegetation at right angles to the direction of water flow	Vegetation may be crops in rotation or grass strips
Row direction	Crop rows planted across the slope	Slows the flow of run-off
Structural		
Contour bank	A constructed earth bank with a channel on the upslope side	Constructed with a low gradient, across the slope—usually at regular intervals to break up the length of slope
Diversion bank	Similar to a contour bank but usually larger	Constructed with a low gradient, across the slope—usually strategically placed to intercept and divert run-off water
Grassed waterway	Natural or constructed channel, usually with retaining banks	Used to convey concentrated run-off down slope without causing erosion—collects run-off from cross-slope structures such as rows and banks
Cross drain	Temporary drains with the excavated soil thrown downhill to leave a channel on the uphill side	Usually only for land used for vegetable crops
V-shaped drain	Wide profile drain—soil graded from the inter-row space	Horticultural land only—usually only in tree-crop land
Mound	Low profile mound—soil graded from the inter-row space	Usually horticultural land—may be built up and down or across the slope
In-fall access track	Parallel tracks across the slope with run-off collected in a drain along the inside edge; vehicle access on the outside	Horticultural land only—usually on banana and papaw plantations
Bench terrace	Level to near-level terraces built on steeply sloping land	Used only in special circumstances—a deep, non-dispersible soil is essential
Polyacrylamide (PAM) and polyvinyl alcohol (PVA)	Synthetic soil conditioners stabilising soil structure	Reduced sediment movement prevents crusting, improves infiltration and reduces erosion—applied at very low rates

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Land and Water Management Plans Reference Manual June 2002 (Reprinted July 2007). State of Queensland, Department of Natural Resources and Water