SECTION 8

Watering systems

A reticulated watering system can be a valuable tool for integrating all parts of your property, including your riparian areas. Many of the farmers in our case studies found that installing a watering system was instrumental in improving not only the way they managed their riparian areas, but the way they managed their entire farm as well.

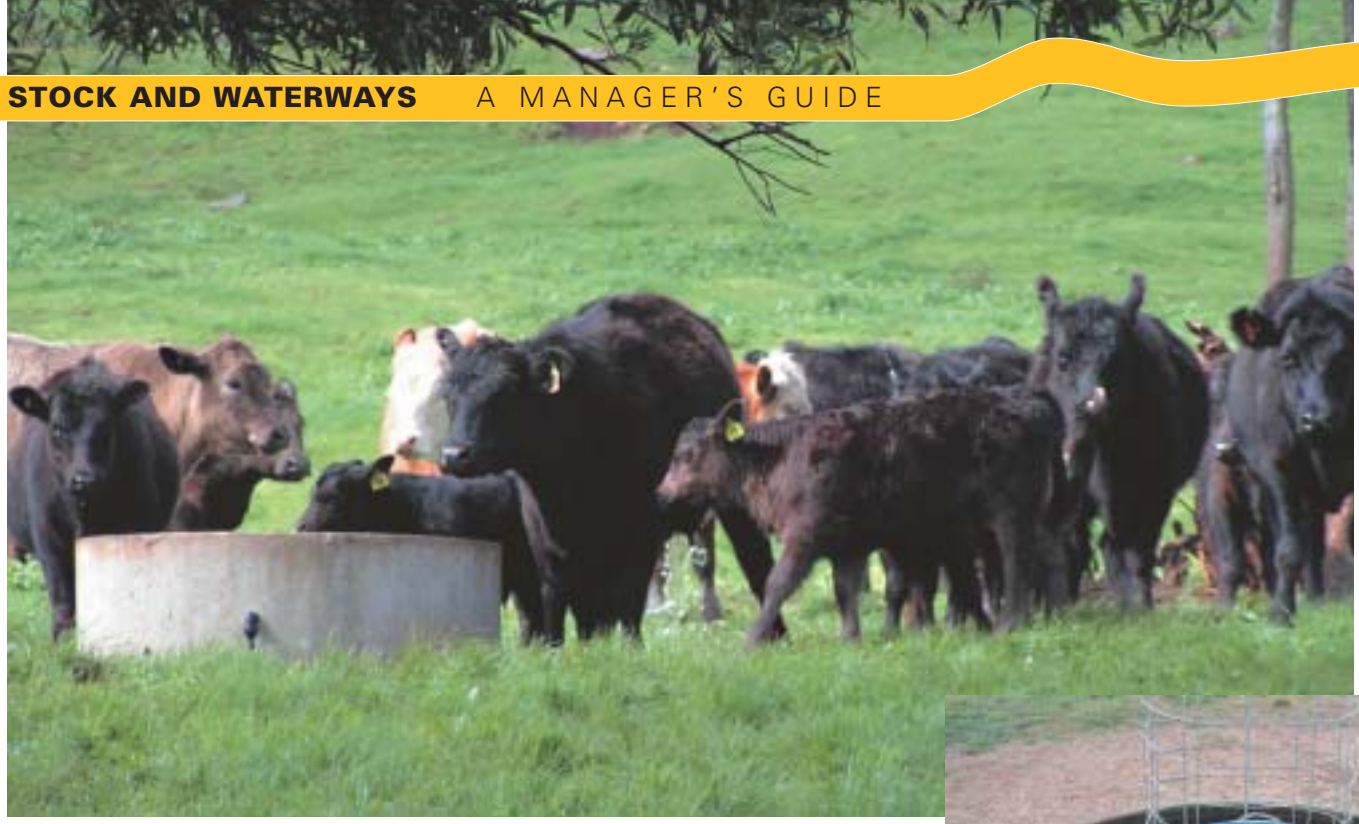
Some of the benefits of a watering system include[26]:

- cleaner water (which can lead to healthier stock, less disease, increased growth rates and better wool, milk or meat production),
- more flexibility to match the needs of stock (e.g. pregnant or lactating animals) to the available pasture,
- better control over grazing patterns and improved feed utilisation,
- better control over stock, including the potential for rotational or cell grazing,
- reduction of stock losses due to floods or being trapped in the waterway,
- reduced mustering times,
- improvements in overall riparian health, as a result of reduced stock access to the riparian area.

Installing a watering system can initially be expensive and time consuming, and requires ongoing maintenance and operating costs. It is important, therefore, that you think carefully about the best system for your purposes and property, and how it will fit with your existing paddock plan.

Installing a watering system is often the trigger for a more efficient paddock subdivision.

For this reason, we encourage you to read this Section in conjunction with Section 3 (Farm planning), and Section 9 (Controlled grazing). We also suggest you read the case studies which describe the watering systems installed by farmers in different parts of the country. The case studies include information about alternative water sources, trough layout, pumps, piping and tanks.



Stock spend time loitering around water points. Photo Jenny O'Sullivan.

Choosing a watering system

The choice of watering system for your property will depend on several factors, including:

1. your water source,
2. paddock layout,
3. the amount of water required,
4. the distance between the water supply and the watering point, and the distance between watering points,
5. the height difference between the water supply and the watering point(s).

1. Water source

Some producers may be able to take water from their waterway and gravity feed or pump it to other parts of their property. Others may need to establish alternative water sources, such as groundwater bores or dams, and pump or pipe water from those sources.

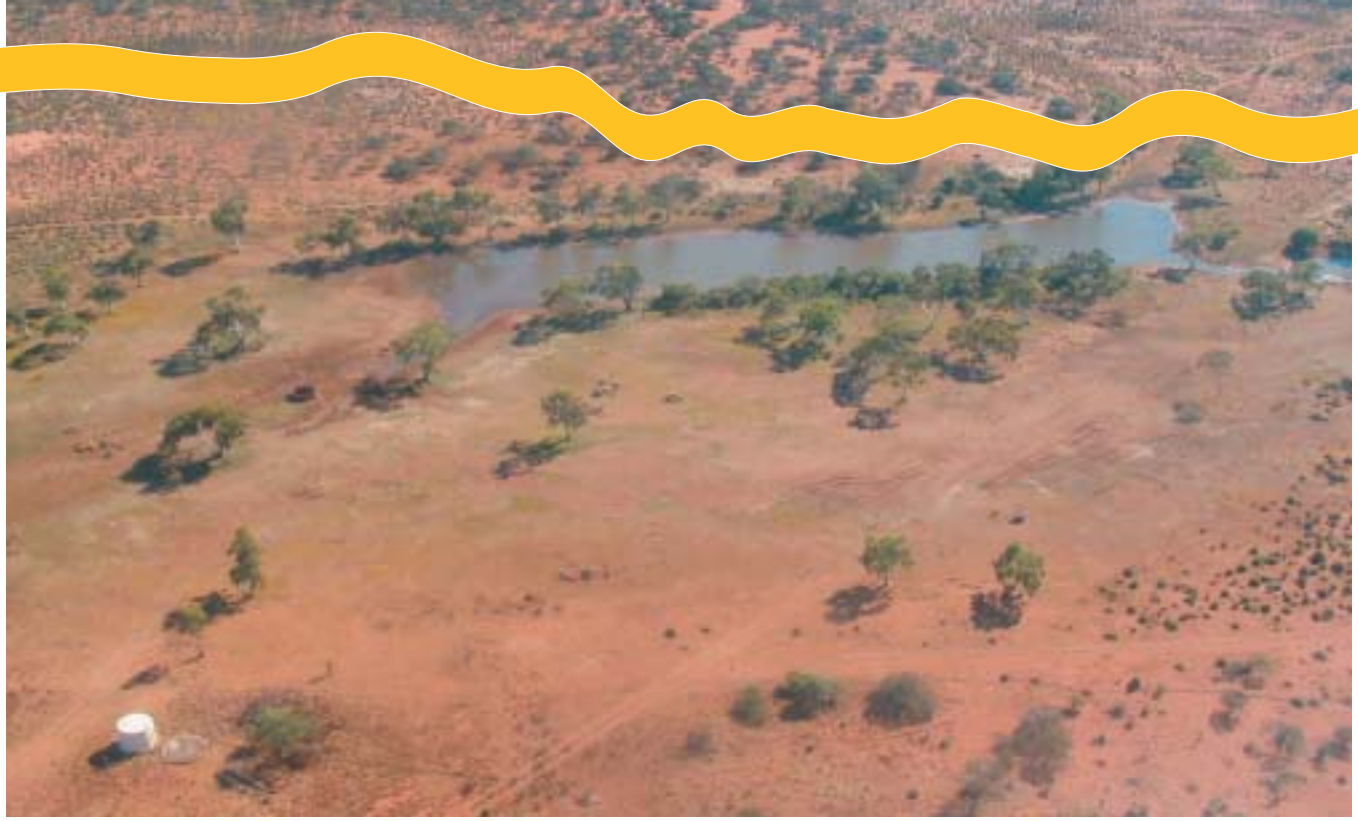
A permit or licence may be required to:

- take water from a waterway, surfacewater or groundwater source,
- build a dam or weir,
- collect water in a dam,
- drill an artesian bore.

The costs of dams and bores will vary according to soil type, the level of the water table, and, in the case of dams, the size required.

This "ecotrough", developed by David and Ruth Read, shows reeds planted in a restricting container. When grown the reeds will keep the water temperature down.
Photo David and Ruth Read.

The location of your water source may determine the type of watering system you can install. Piping water (using gravity feed) is a cheaper option than pumping, but is only feasible if your water source is located higher than your endpoint(s). Many producers pump from the waterway (or other source) to a higher storage point, such as a dam or tank, and then pipe to lower parts of the property using gravity.



The manager of this property has moved all watering points (see bottom left) away from the riparian zone. Photo PJ Waddell.

2. Paddock layout

Obviously you will need to make sure that stock in each paddock have access to adequate water. You may find that in the long term, it is more practical to establish a new water source to supply the surrounding paddocks, than pumping over long distances or uphill. You may consider altering fencelines to take advantage of an existing water source or favourable landform, such as a slope (for gravity feed), or a spring, soak or depression (which can be used to create a dam).

The location of your watering points will also be relevant. Permanent watering points should be located as far upslope from the riparian zone as practical, and away from boggy, fragile or degraded areas.

Allowing for additional watering points at the time of installation will save you money in the long run. Additional watering points give you a back up if the main endpoint fails or needs repair, and also the means to 'force' stock to another endpoint. This can be helpful during mustering, to even up grazing patterns, and to move stock from degraded areas. Allowing for additional watering points can be as simple as including extra taps along your pipeline for use with plastic troughs.

3. Water requirements

You will need to determine your water requirements, according to the maximum number of stock you plan to run in each paddock.

As a general guide, the daily amount of water required per head of stock during summer is as follows:

Sheep	7 litres
Beef cattle	30 litres
Dairy cattle	50 litres[27]

Structuring your system so that you can shut off or close off watering points can be a useful stock management tool.

These requirements will vary depending on a number of factors, including temperature, the amount of available feed, and the type of available feed.

4. Distance

You will need to consider the maximum distance stock will be prepared to travel to water, when considering your watering system. As a guide, healthy cattle will travel 10 kilometres to water, but for effective grazing and animal production no more than 3 kilometres is recommended between water points.

The distance and height differential between your water source or supply point and your water point(s) will be relevant to deciding whether gravity feeding is an option, the size of pipe required, and the type of pump (if any) required (see point 5).

> Larger pipe is necessary to deliver the same volume of water over a longer distance.

5. Height differential

Gravity feed, a cheaper option than pumping, is only feasible when the supply point is higher than the endpoint(s). Building a dam or tank on higher ground, or placing a tank on stands, can resolve this problem. However, the smaller the height differential, the slower the flow will be. Therefore a gravity fed system needs to be designed to ensure sufficient flow particularly at times of peak water demand. This planning is critical especially if there are numerous troughs being supplied by the system. If watering points are higher than your supply point, you will need to pump the water (see below).

Pumps

There are many different types of pumps available, classed according to the means of power. A table summarising the advantages and disadvantages of the main types of pumps available is on page 43.

Electrical mains power

If mains power is available, an electric pump is often the best option for continuous pumping, and for pumping large volumes of water uphill or over long distances. Electric or solar pumps can be set so that they start or stop with changes in water pressure.

Trough with height indicator on David and Ruth Read's property.
Photo Jenny O'Sullivan.

Petrol/diesel pumps

The main disadvantage of petrol and diesel powered pumps is the need for constant refuelling, and that they are not as easily automated as electric pumps. While diesel pumps are suitable for continuous pumping of high volumes of water, petrol pumps are more suitable for occasional use. Many operators use petrol pumps in particular as back up pumps, in case of power failure or if the main pump needs repair.

Photo Jenny O'Sullivan.

Photo Roger Charlton.

Above: Water is pumped from this dam to a tank using a petrol pump. Right: A wind-powered bore with storage tank.

Solar power

Recent developments in technology mean that solar power is now an efficient and economical way of supplying electricity. Solar pumps are often ideal for use in remote areas. Solar powered pumps are not as powerful as other types of pumps, and are best suited for moving low volumes of water over shorter distances (less than 2 kilometres) and lower heights. To increase their power requires additional solar cells which can be uneconomical over the short term, and unwieldy. However, solar technology is improving rapidly and has the advantage of no running costs.

Pumping performance varies according to latitude and number of sunny days, with more water being pumped in summer than winter. To compensate for any variability, solar pumps are often used in conjunction with a tank with a 5 day capacity. Batteries can also be used as a back up for cloudy days.

Wind power

Wind is fast losing popularity to solar power as the preferred method of pumping water in remote areas due to high maintenance costs and unreliability. A larger pump requires higher wind speed to start the pump, so wind is more suitable for pumping low volumes of water. To compensate for the fickle nature of the wind, wind powered pumps are generally used in conjunction with a tank of 7–10 day capacity[28].

Solar powered pump with back up petrol pump. Solar panel shown above right. Photos Roger Charlton.

Air

The main advantage of an air powered system is that the air compressor can be located remotely from the pump. This makes air powered pumps ideal for properties where mains power is available, but is too far from the water supply to be able to use an electric pump. Other forms of power (solar, for example) can also be used to power the compressor. Air powered pumps are especially suited for situations requiring continuous operation at low volumes per hour and where the water supply is intermittent (low producing bores, for example)[29].

Ram pumps

Ram pumps use water flow to pump water out of a waterway. The amount of water able to be pumped is dependent on water velocity. Ram pumps require a fall of at least 1 metre to operate. Ram pumps are most suitable for pumping low volumes of water throughout winter (when water flow is greatest) into a storage area for use during summer.

Stock operated pumps

These are simple systems which rely on the stock pushing some part of their body against a lever to drive a piston (or other mechanism) to pump the water. Stock are easily trained to operate the system. Stock operated pumps are cheap to purchase and have no operating costs. Easily mounted on skids, these pumps can be extremely portable. An advantage of the fact that stock operated pumps can only deliver very low volumes of water on demand, is that the risk of water wastage is unlikely.

Cattle operated nose pump. Photo Malcolm Brown.

26 Lovett, S., Price, P. & Lovett, J. 2005, *Wool Industry River Management Guide: High rainfall zones including tableland areas*, Land & Water Australia, p. 74.

27 *Water Note 7*, January 2000, Water and Rivers Commission (Western Australia), p. 3.

28 *Water Note 7*, January 2000, Water and Rivers Commission (Western Australia), p. 3.

29 Lovett, S., Price, P. & Lovett, J. 2005, *Wool Industry River Management Guide: High rainfall zones including tableland areas*, Land & Water Australia, p. 77.

Funding is often available to help set up watering systems to take pressure off your riparian areas. Contact your local Landcare facilitator to find out what funding is available.

Type of pump	Advantages	Disadvantages
Electric (mains power)	• most suitable for pumping large volumes uphill or long distances • reliable (provided electricity supply is reliable) • can be automated	• need access to mains power • can be expensive to purchase
Diesel	• suitable for pumping large volumes uphill or long distances • portable	• can be expensive to run • needs refuelling • difficult to automate • can be expensive to purchase
Petrol	• good back up option for other pumps (e.g. electric) • portable	• can be expensive to run • needs refuelling • difficult to automate • can be expensive to purchase
Solar	• cheap to operate • ideal for remote areas • reliable • easy to maintain	• not suitable for pumping large volumes or uphill (but becoming more effective as technology improves) • can be expensive to set up (but price is falling as technology improves)
Wind	• cheap to operate • used in remote areas	• least reliable • not suitable for pumping large volumes or uphill • needs to be used with large storage tank
Water (ram pump)	• good option for continuous, low volume pumping • no operating costs (provided stream is flowing)	• needs 1 metre fall in waterway • not suitable for pumping large volumes • capacity can decrease in summer months • can be expensive to purchase
Air	• good option where mains power is available, but located too far from pump to use an electric pump • good option where water supply is intermittent (e.g. bore) • suitable for pumping low volumes over long distances	• not suitable for pumping large volumes • air leaks can be difficult to detect • compressor requires second source of power (e.g. mains electricity or solar)
Stock operated	• cheap to buy • stock are easily trained to operate pump • no operating costs • portable • no water wastage	• suitable for low volumes only