

More than 22 000 farmers in New South Wales now have soil conservation works on their properties. They, and many others, have also introduced land management practices to protect the soil and to improve productivity.

The address of your nearest soil conservation officer can be found under "State Government Departments" in telephone directories.

Farm Water Supplies

Water is the most basic requirement for survival. It is needed for drinking, cooking, washing, and watering plants.

Quantity of water required

It is handy to know how much water is required from a domestic supply such as a dam, a bore or a roof-water tank so that the right size and place for each can be found.

Water is measured in litres for most farm applications. A flow of water in a pipe is measured in litres per second. The quantity of water required for various purposes is measured in litres per day.

It is impossible to give exact amounts of water for various purposes because climate and habit frequently dictate the requirements for water. However, the following table gives a general guide to what is required:

Water requirements

Activity	Water required (L/person/day)	Animals	Water required (L/animal/day)
Drinking, cooking, washing up	15	Lactating cows	70
Washing clothes	25	Other adult cattle	45
Bathing	80	Calves	25
Flushing toilet	35	Working horses	55
Other activities including cleaning teeth, washing floors, general cleaning	25	Grazing horses	35
		Sheep on dry pasture	5-14
		Pigs (other than sows)	10-20
		Sows	25-60
		Laying hens	0.3
TOTAL	180		

Further information concerning estimates of the water requirements for these and other uses can be obtained by contacting the local office of the Department of Agriculture. Before irrigating seek advice. Irrigation generally requires a large amount of water to achieve a good result.

Rain water tanks

The most obvious way to obtain a domestic supply of water is to collect roof-water in a tank when it rains. Tanks can be above or below ground. They can be made of concrete, galvanised iron or, if in the ground, lined with bricks, clay or plastic. It is usual to fit roof-water tanks with a lid to discourage evaporation as this seriously depletes water supplies in many parts of the State. The lid also keeps light out and discourages algal growth in the water. Algae can render a water supply unpalatable.

Dams

Stock water supplies usually need to be larger than domestic supplies. An obvious way to supply water to stock is to have a small dam.

A dam requires a catchment (some land which drains into the dam). The dam must be large enough for the purpose and have a catchment which is large enough to supply the water required. There must be sufficient water for stock after evaporation has taken its toll. Professional advice on the size of storage which you require may be available from the Soil Conservation Service but for small storages professional advice may not be needed.

At some time all dams will overflow and provision should be made for this to occur safely. It is an offence under the law to concentrate water which subsequently damages someone else's property. An earth "by-wash" or by-pass channel may be a satisfactory way to avoid collapse of a dam caused by flood waters rushing over it.

Not all soil is suitable for building a waterproof embankment. If the soil is too sandy or the clay is not of the right kind, or if the soil is not well-compacted, the dam will leak and may eventually fail embarrassingly, or even disastrously. It is sometimes possible to prevent water leaking through or around dams by lining upstream areas with clay, or bentonite (a clay that swells when wet) or various chemicals. However, it is easier and cheaper to construct a dam properly in the first place. There are few soils that do not respond well to compaction during construction. Compaction is usually achieved by rolling the soil in thin layers as the dam is built.

Bores

The main advantage of a bore is that it does not rely directly on falls of rain to replenish the water supply. However, bores are often very expensive, and, if the water is in a deep layer, the cost of pumping will be substantial. Not all areas have bore water of suitable quality

and quantity at shallow depths. The Hydrogeological Branch of the Water Resources Commission keeps records of bores in the State and can give an assessment of your prospects of obtaining suitable water and its likely depth. The Commission will also drill bores. The costs of a bore vary according to a number of factors not usually known until after construction.

Bores are required to be licensed by the Water Resources Commission. Bore licences (except for artesian bores) are free and are intended to provide information to the Commission regarding the behaviour of groundwater levels.

Streams

Water can sometimes be obtained by pumping from the water flowing in a river or stream. The pump is required to be licensed by the Water Resources Commission unless the water is used only for stock and domestic purposes.

Pumps

Almost always the water you require will not be where it is wanted. To get it where it is required, a pump has to supply the energy needed to pump water uphill and to overcome the friction of the water on the walls of the pipe. Clearly, if a small pipe is used to carry a quantity of water, it must move through the pipe more quickly than if a larger pipe is used. The faster the water moves, the more resistance there is to the flow. The extra pump pressure required to overcome this resistance to flow costs money in energy. Over the life of a pump and pipeline, it is generally better economy to install larger pipes. Although they cost more initially, the investment is amply repaid by lower energy costs. Pump suppliers can assist in determining the correct pump and pipeline for your requirements.

The power source for a pump is usually diesel fuel or electricity. If a pump is very small and infrequently used, a petrol motor may be suitable. The running cost of fuel engines is generally about the same as that of electric motors, though this varies from area to area.

Windmills

Windmills can be used for pumping small quantities of water but are very expensive to buy and must be associated with a storage from which water will flow under gravity for more than a week when the wind is not blowing.

Solar power

Photovoltaic cells can be used to provide energy for pumping. They are expensive and either energy storage or water storage is required if water is required during a cloudy period.

Irrigation systems

Irrigation is aimed at making good the shortages of water occurring in the soil due to uneven distribution of rainfall. It is a means of ensuring that plant production is not limited by critical deficiencies in soil moisture and is not just an activity during drought conditions.

Because water for irrigation is often scarce and costly to bring to where it is needed, be careful in choosing an irrigation system. For example, some soil types which cannot hold a lot of water need small quantities of water frequently rather than large amounts less often.

The three common systems from which to choose are flooding, which uses large amounts of water; overhead sprinklers on spray lines, and micro-irrigation systems, which use small amounts of water.

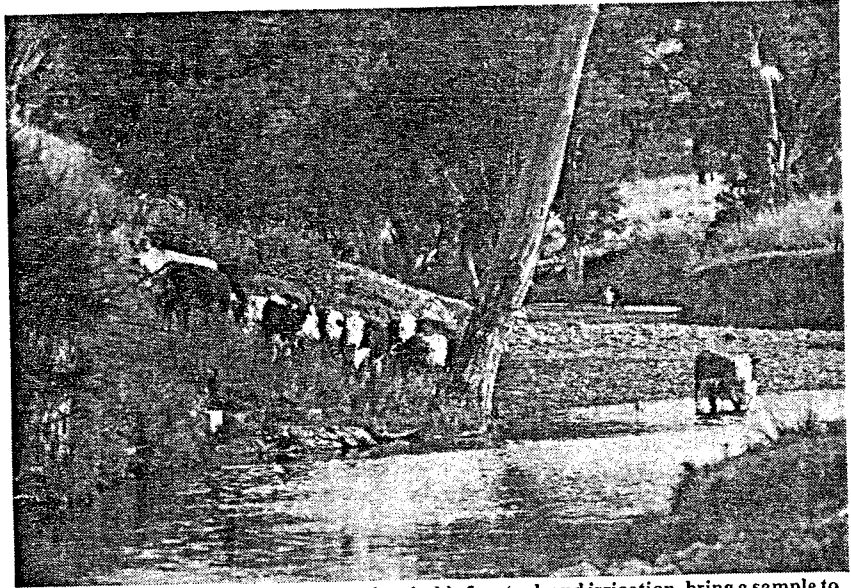
Irrigation equipment

After taking into consideration such factors as the water needs of the plants to be watered and the characteristics of the soil, the merits of the large range of equipment available should be evaluated. It is important, for example, to know the rate at which the water can be delivered to the plants, the pressure at which it is delivered, the efficiency of the pump, and the amount of energy used in relation to water delivered.

Officers of the irrigation management service, agronomists and horticulturists from the Department of Agriculture and private consultants can help with advice about systems before choices have to be made between competing suppliers of equipment.

Overhead sprinklers mounted on movable spray lines can be suitable for irrigating pastures and crops on small farms. Lengths of aluminium spray lines are easily carried by one person and feature quick, easy coupling devices. Centrally pivoting or self-propelled lateral spray lines are for larger installations.

The many variations of micro-irrigation systems are particularly suited for horticultural crops. Sprays, sprinklers, drippers, small tubing and pipelines are usually made of plastic. Components should be selected with care for particular crops. Correctly managed, micro-irrigation systems make good use of small quantities of water.



If you doubt whether your water supply is suitable for stock and irrigation, bring a sample to the nearest Department of Agriculture office. For a report on its suitability for domestic use, take a sample to your shire or municipal council.

Flood irrigation is an ancient technique involving spreading large quantities of water in specially graded channels and fields. Although simple in concept, flood irrigation demands a high degree of skill to produce good results.

Licences

All water use above tidal reach is controlled by the Water Resources Commission. However, owners of land on a watercourse can pump up to 50 L/second for stock or household use and can irrigate 2 ha of land provided the produce of that land is not for sale. All other water use from streams, wells or bores must be licensed. A dam requires a licence if it holds more than 7 ML, or is on a watercourse where downstream users will be affected by the storage, or where the watercourse has a flow of more than a few days after rain. If in doubt a licence application should be lodged with the Commission. A deposit is required on application. This initial fee may form part of the first licence fee if a licence is subsequently granted.

Domestic supplies

Domestic water supply systems often use a centrifugal pump to supply, automatically, water under pressure directly to the taps. When

the pressure in the system reaches a certain level the pump is stopped by a pressure switch. Water can be drawn off from the system as required. As it is drawn off the tank progressively empties, the air in the tank expands and the pressure in the system drops. When the pressure reaches a certain lower limit the pressure switch starts the pump and the process is repeated. The system is excellent but relies on the availability of electricity.

Further reading

Hardie's Textbook of Pipeline Design. James Hardie and Co. Pty. Ltd, Sydney.

The Pump Users' Handbook. H. Addison. Pitman and Sons, London.

Australian Pump Technical Handbook. Australian Pump Manufacturers' Association Ltd, Melbourne.

Managing Farm Water Quality

The number of good quality water supplies for agricultural use has rapidly decreased over past years because of the intensive use of our limited water resources, and the increasing competition between domestic, industrial and agricultural users. For this reason, many marginal or poor quality waters are now being used. Farmers are increasingly concerned about the damage to soils, crops and stock caused by these waters.

The Department of Agriculture offers a comprehensive Water Quality Assessment and Treatment Service to help New South Wales farmers obtain maximum crop production. If in doubt about the quality of the water on your property, bring a sample of about 500 mL in a clean plastic bottle to the local office of the Department.

The report on the test will indicate whether or not the water is suitable for stock and irrigation. If you require a more comprehensive biological report on its suitability for human consumption, contact the Health Department of your shire or municipal council. They will tell you how to take samples in a sterile manner.

Various quantities and types of dissolved salts (ions) are present in all irrigation waters. Crops, soils and irrigation equipment can be adversely affected by the presence of too much or too little of one or more of these ions.