Department of Agriculture and Food
GOVERNMENT OF WESTERN AUSTRALIA

noteworthy
Small landholder series NW 47 | 2014

Calculating dam capacity for small landholders

As a small landholder it is critical to know how much water is being stored in your dam(s).

This is particularly crucial over summer and autumn when levels drop and demand from livestock, irrigation or household use remains high.

Knowledge of your dam(s) storage capacity is also required if you plan to develop or expand an existing or new enterprise on the property.

But with so many dimensions and variables how do you measure water storage capacity?

Measuring the dimensions of dams

t is critical to measure water in small dams as they will dry out faster than larger, deeper dams.

It's easy to take measurements around the water surface, but it is difficult to measure water depth and diameter of the base of your dam.

With a few tools and some preparation the following method provides a good estimate of dam capacity.

You will need the following to complete this task:

- 20-30m of surveyor tape (depending on the size of the dam)
- light weight rope — long enough to reach from one side of the
- dam to the other
- binoculars
- an assistant
- notebook and pencil.

Step 1

Take half the length of rope and make loops every metre.

The rope will serve two purposes; it will support the surveyors tape and also be used as a measuring device.

The loops should be large enough to easily thread the tape.

Step 2

Thread the tape through the loops, so the rope can support it for most of the distance across the longest side of the dam.

Be careful to avoid twisting the rope and tape, which will prevent the free movement of the tape through the loops.

Step 3

Tie a weight to the end of the tape to help it sink.

Use binoculars to read the depth of the tape at the waters surface

Step 4

Ask your assistant to take one end of the rope and walk to the opposite side of the dam.

Your end will have the loops and the threaded tape.

Step 5

When in position let out the tape until it hits the bottom of the dam.

Read the water depth on the tape at the water surface using the binoculars.

Step 6

Move the equipment and measure the depth again until you find the edge of the deepest part of the dam (the edge of the rectangle/ square base).

Count how many rope loops are suspended over the water.

Step 7

Repeat the procedure across the dam until you find the edge of the base on the other side — closer to your assistant.

Again count the number of loops that are suspended over the water.

The difference in the number of loops suspended over the water from one side of the base to the other, will give you the length of the base of the dam.

Step 8

Record the length and depth of the base.

Step 9

Now repeat steps 4-8 at right angles to your first measurement line.

Some of the equipment that will be needed to cary out the task.

You now have measurements for the base of the dam (length and breadth) and the dam depth.

Step 10

Measure the surface dimensions of the water.

Pace the length and breadth of the bank at the water surface for rectangular or square dams (see Figure 1).

Round dams can be measured by pacing the circumference of the bank at water level.

Then divide this distance by 3.142 (π) to calculate the diameter (see the calculations on page 3).

Step 11

By inserting the figures into the following equations an estimate of current water volume can be calculated.

The equations vary according to the type and shape of the dam.

Calculating full capacity

The full capacity of the dam can be calculated using the figures obtained in the method above — the hard work is done.

Step 1

Measure or pace the sides or circumference of the dam at the elevation of the spillway discharge.

This will give you the top measurements when the dam is full.

Step 2

Measure the difference in height between the current water surface and the spillway discharge.

Step 3

Add this to the current depth to calculate the water depth when the dam is full.

Step 4

Insert the new measurements into the appropriate equation on page 3 to give you the volume of the dam at full capacity.

This simple, cheap and quick technique for measuring dam volumes should be added to your armoury of farm management tools to provide you with an early warning of water shortage problems.

Knowing how much water storage capacity you have can help you make decisions regarding stocking rates.

Having water available year round is essential to any small landholding.

It is also vital to monitor quality. There is no point in having water available if it cannot be used.

Figure 1

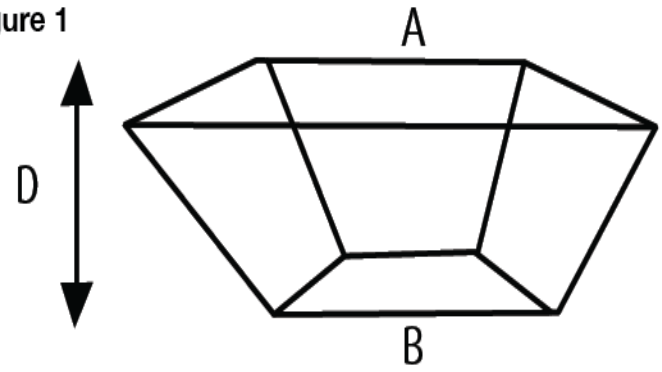

Figure 2

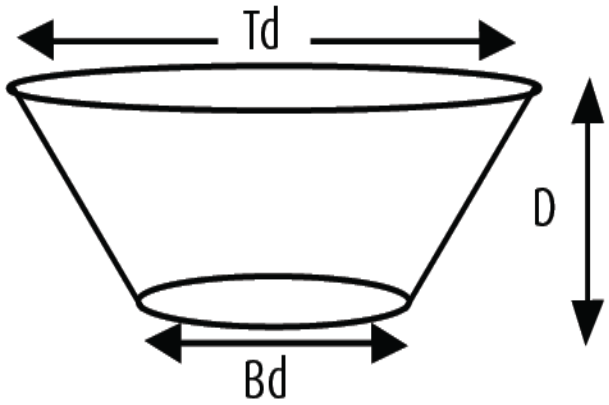

Figure 1 Square or rectangular dams

Volume (m^3) = [A + B ($\sqrt{}$ (A x B)] x $\frac{D}{3}$

Where: A = top surface area (m^2)
B = base area (m^2)
D = depath (m)

Figure 2 Round dams

Volume (m^3) =
0.2619 x D x [Td^2 + Bd^2 + (Td x Bd)]

Where: Td = top diameter (m)
Bd = base diameter (m)

Note: diameter = $\frac{\text{circumference}}{3.142}$

Below: Tape measure held above the water by a rope with loops through it.

Notes

If you enjoyed this Small Landholder Information Service Noteworthy visit our website to check out the entire range.

While you are there sign up for our e-newsletter to hear about the latest Noteworthy releases, events and seasonal calendar.

You can also join the conversation and follow us on Facebook and Twitter or visit at one of the many regional events we attend throughout the year.

For more information

Noteworthy 2 - Fencing for beginners

Noteworthy 6 - Treating blue-green algae in small farm dams

Noteworthy 7 - Maintaining livestock water quality on small landholdings

Noteworthy 8 - Livestock water supplies for small landholders

Noteworthy 41 - Waterwise irrigation - big benefits for small properties

Noteworthy 42 - Calculating livestock water requirements for small landholders

Contact details

Small Landholder Information Service (SLIS)
agric.wa.gov.au/small_landholder
+61 (0) 8 9733 7777
or +61 (0) 8 9780 6100

Important disclaimer