Floodplain Meadows Partnership

Advisory Protocol Number 2

Hydrological Monitoring

HYDROLOGICAL MONITORING.

Monitoring soil-water levels on your site need not be an expensive and mysterious process. It can be done relatively cheaply using basic equipment and time. To monitor the water-table elevation along with your botanical monitoring, the installation of dipwells is necessary. The wells should be arranged in transects, which should generally run perpendicularly from water courses in order to follow the local water-table gradient. A possible pattern for locating transects is given on the sketch below (Fig. 1).

Well installation

The wells should be made of 5 cm diameter PVC (available from DIY stores as plumbing waste pipe). They should be 1.0m to 1.5 m in length depending on the local soil profile (they should not penetrate a confined aquifer.) The tube should be perforated with holes of at least 5 mm diameter, or slits of similar dimension, along its entire length (except the top 100 mm, which should remain unperforated.) The pipe should be covered with a sleeve of woven material to exclude silt entry. Specialist geotextile “socking” can be purchased for the purpose or “socks” can be stitched from tough woven nylon material (sheer ladies stockings are less suitable, as they tend to ladder during installation!)

The wells should be placed in hand-augered holes. In permeable soils, it is satisfactory to use a 5 cm diameter auger and to place the pipe directly into the hole. In poorly structured soils, it is often better to auger a 10 cm diameter hole, place the 5 cm pipe within it and then backfill with a permeable material such as sharp sand. In this case, it would be necessary to seal the top of the hole with an impermeable clay such as “Bentonite” to avoid creating a preferential flow path for surface water. The pipe should be installed such that its top is approximately 3 cm below the surrounding ground level. A metal plate (15 cm x 15 cm with downward pointing spikes to anchor it in the soil) should be placed over the pipe to prevent surface water entry, to protect the pipe from damage by hooves and wheels and to assist in its relocation with a metal detector. A sketch map of the well’s location and a standard GPS record should be made. At some point, the top of the pipe will need to be surveyed against a known benchmark so that absolute water levels may be calculated. Figures 2 and 3 show dipwell contruction in different soil types.

Measurements

Once installed the wells should be left for one month to equilibrate with the soil water table. Thereafter, readings of the distance from the top of the pipe to the water surface in the well should be taken at fortnightly intervals using a “plopper” or electronic “buzzer” on the end of a measuring tape. These items can either be bought or constructed (contact us for further details). Readings should be taken to the nearest centimetre and the date of the reading recorded.

GENERAL COMMENTS

Where only a few botanical quadrats are being recorded, i.e. one or two transect lines, then the dipwells should be on the same transect line as the quadrats.

Where more botanical quadrats are being recorded, then the dipwell transect(s) should encompass the block of quadrats if feasible.

If you only have a small area to monitor and/or you want to monitor experimental treatment plots, you might need to consider a plot-based system of quadrats. We suggest you contact us to discuss possible methodologies to suit your individual situation.

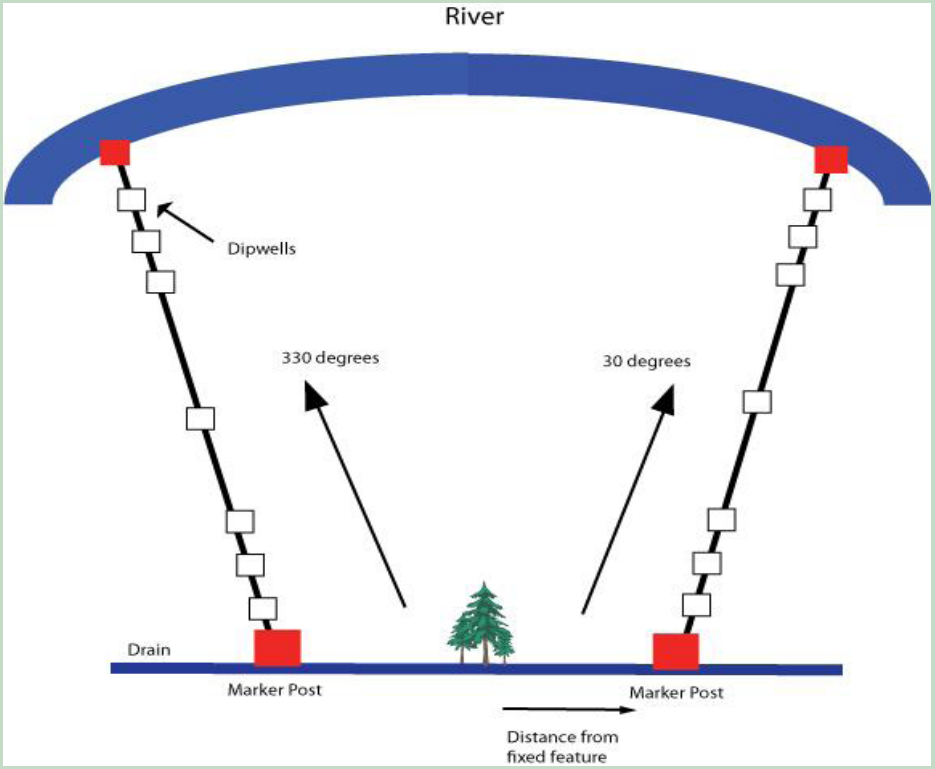


Fig. 1. Generic location of dipwells across a hydrological gradient.

Figure 2. Dipwell in permeable soil

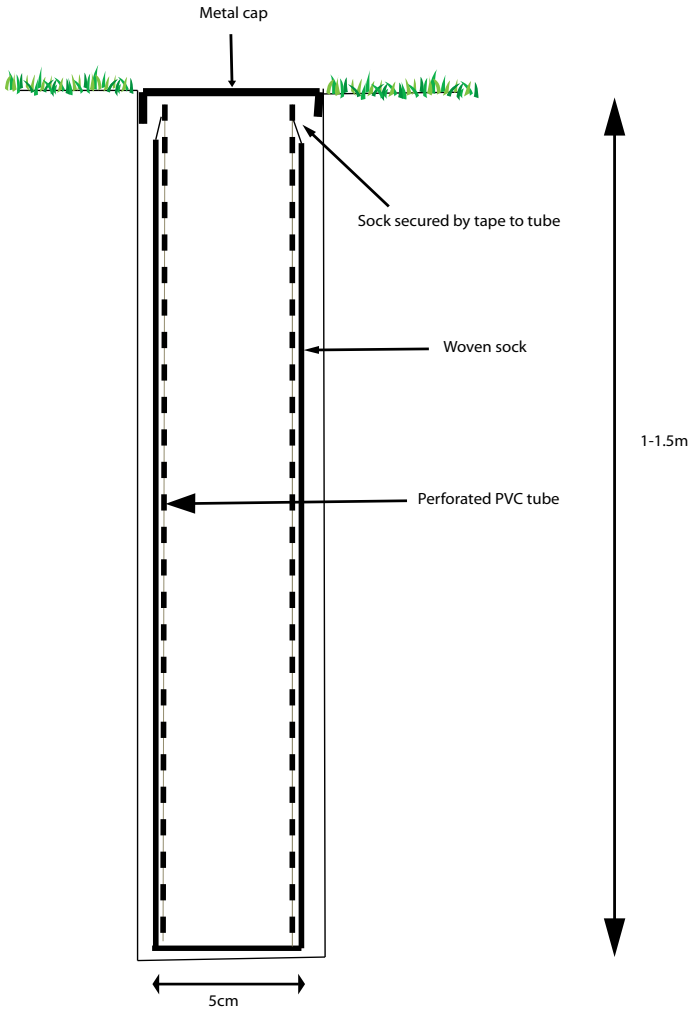
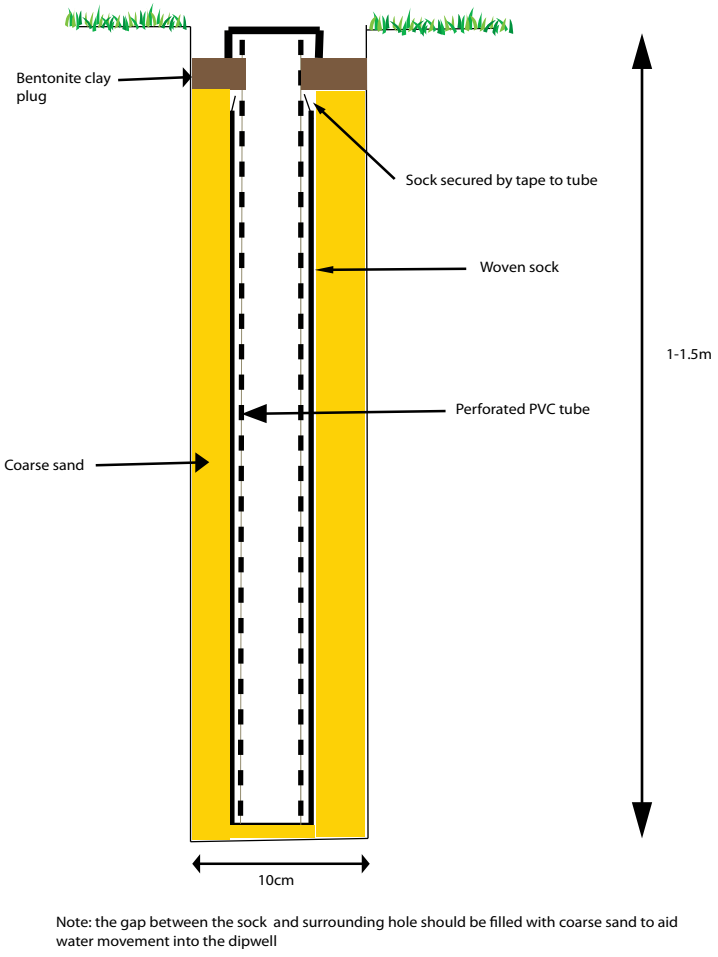


Figure 3. Dipwell in less permeable soil



Note: the gap between the sock and surrounding hole should be filled with coarse sand to aid water movement into the dipwell