Aim

Peat water table monitoring is used to determine if peat extraction activities impact adjacent bog and mitigation measures need to be implemented and are likely to succeed.

Approach

Peat water table monitoring should be recommended by RPP if there is a risk proposed peat extraction might impact upon the hydrological integrity of adjacent mire or high conservation value bog. The easiest, cheapest and most informative way to determine peat water table is to measure its distance below the surface of the peat using dip wells. Water table depths must be monitored and evaluated periodically, and results and conclusions reported to RPP.

A time binding plan for water table monitoring must be prepared and presented together with the RPP application for certification in advance of commencement of peat extraction and implemented by the site manager. Data will be examined and assessed during subsequent RPP inspections and, if these indicate that peat extraction is having an adverse impact on the adjacent bog, appropriate mitigation measures must be put in place and monitoring continued. If these are not possible or ineffective certification will be declined.

Water table - definitions

In general, two different water tables need to be differentiated:

- bog water table fed by rainwater (perched)
- (regional) water table of the mineral underground (aquifer)

Under natural conditions these water tables are independent of each other and, in some cases, may be separated by an impervious layer of strongly decomposed *Sphagnum* peat. Part of the monitoring plan is to specify the water tables to be monitored.

A) Bog water table monitoring gauge design and layout

The design and layout of bog water table measurement gauges should enable water table changes in buffer zones and adjacent mire areas to be measured. Dip wells are constructed from PE or PVC pipes, the bottom closed with a plug and a cap placed on the top to prevent unwanted material (e.g. bird faeces, small mammals) from entering. The pipe inside diameter should be 25-50 mm, depending on the water table measurement level accuracy required.

The most common approach is to place dip wells in transects running perpendicularly from the peat extraction area into the buffer zone and mire area for a distance determined by local conditions, knowledge, legislation and scientific advice. The number of transects and dip wells established along them will vary depending on site characteristics including nature/type of peatland, conservation status, and national and/or regional legislation.

Transects should include natural ponds where these exist, and their water table included in the monitoring plan. The dip well farthest from the proposed extraction site should be considered to provide the normal water table situation in the surrounding mire and used as a reference against which to compare all other dip well data. Transect and dip well numbers must be written clearly and permanently on the pipes. In the field, it is recommended strongly to mark the route to each monitoring transect (tapes or coloured markers around trees every 30 - 50 m), so they can be relocated easily in each resampling period.

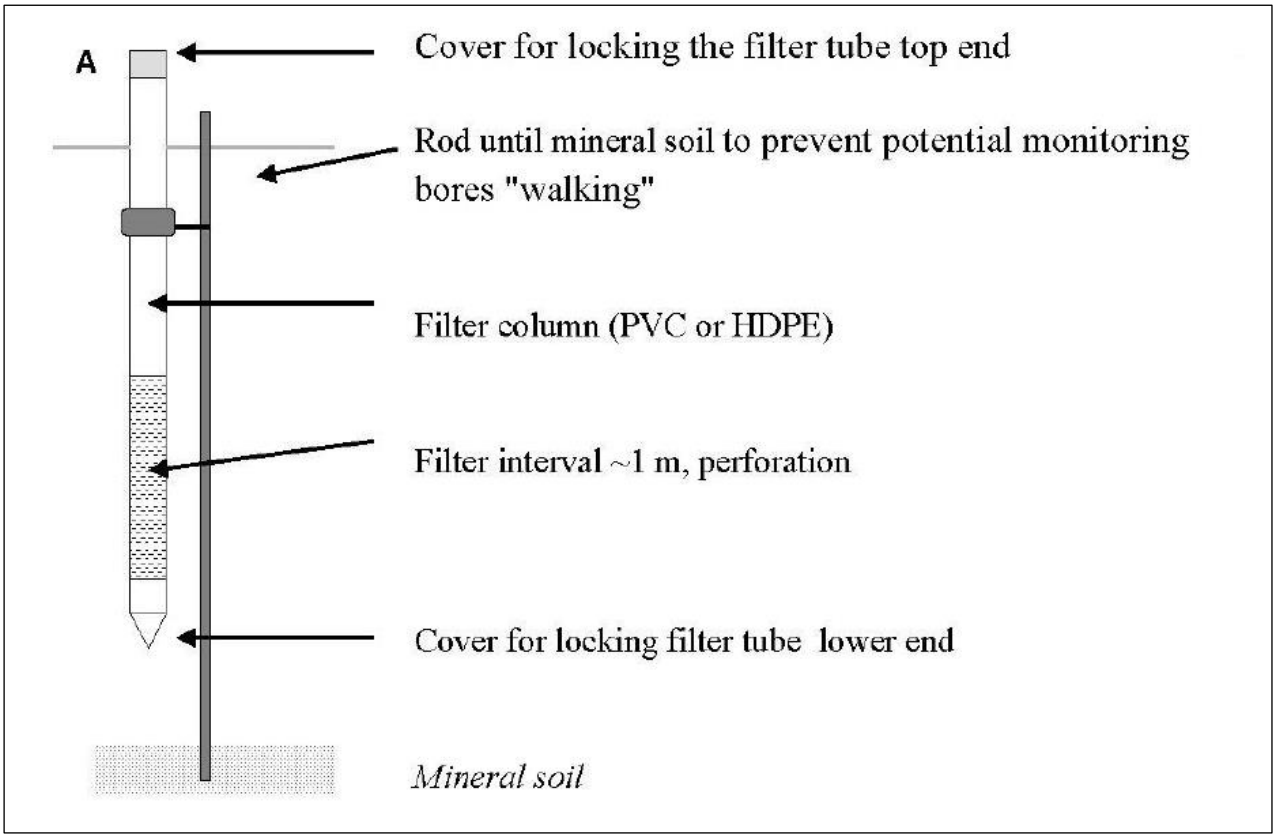

Figure 1. Example of bog water gauge (performed by LLC Kūdras Energija)

If dip wells are not fixed to the underlying mineral ground, they will move up and down with fluctuation of the peat surface. To overcome this dip wells should be attached to metal rods (diam. 8-10 mm) that are driven into the mineral ground below the peat.

The coordinates of the dip wells should be recorded using GPS or other means, following national protocols and requirements. All dip well information (construction details, monitoring procedures, timescales, coordinates, altitudes, water table depth and other specified data must be included in the reports submitted to RPP).

Example based on information provided by company LLC Kūdras enerģija:

"Most of the dip wells were in the buffer zone between the developed area (peat extraction site) and the nature reserve boundary. 10 wells were inserted at the following distances from the extraction area boundary ditch: 2 m - 5 m - 10 m - 20 m - 30 m - 40 m - 50 m - 75 m - 100 m - 250 m**.**

Note: distances between the wells should follow a reverse logarithmic scale from short to wide distances. The number of wells must be determined in each case based upon the area of the natural bog and expected impact of the proposed peat extraction proposal **(distances from the ditch: e.g. 5 m - 10 m - 30 m - 70 m - 200 m)**. Minimum should be three wells. Six wells should cover 300 m to 400 m, which is the largest expected range of hydrological impact in the peat layer of boreal and temperate ombrotrophic bogs.

B) Monitoring mineral ground water table

The design of gauges to monitor the water table of the landscape around the peatland is different from bog water table monitoring. The main task is to separate the filter interval, in which the water enters, from the bog water above. Therefore, knowledge about the stratigraphy of peat and mineral soil is necessary.

The gauge is designed as full-section pipe in the peat layer. The filter interval in the mineral groundwater is separated with a hydrological barrier (hydraulic lock) using clay pellets, placed in the bore hole outside and around the tube.

Generally, one or, depending on the size of the study area, additional gauges are used to assess the status of the mineral groundwater (that may lose contact with the peat base during summer periods of low rainfall).

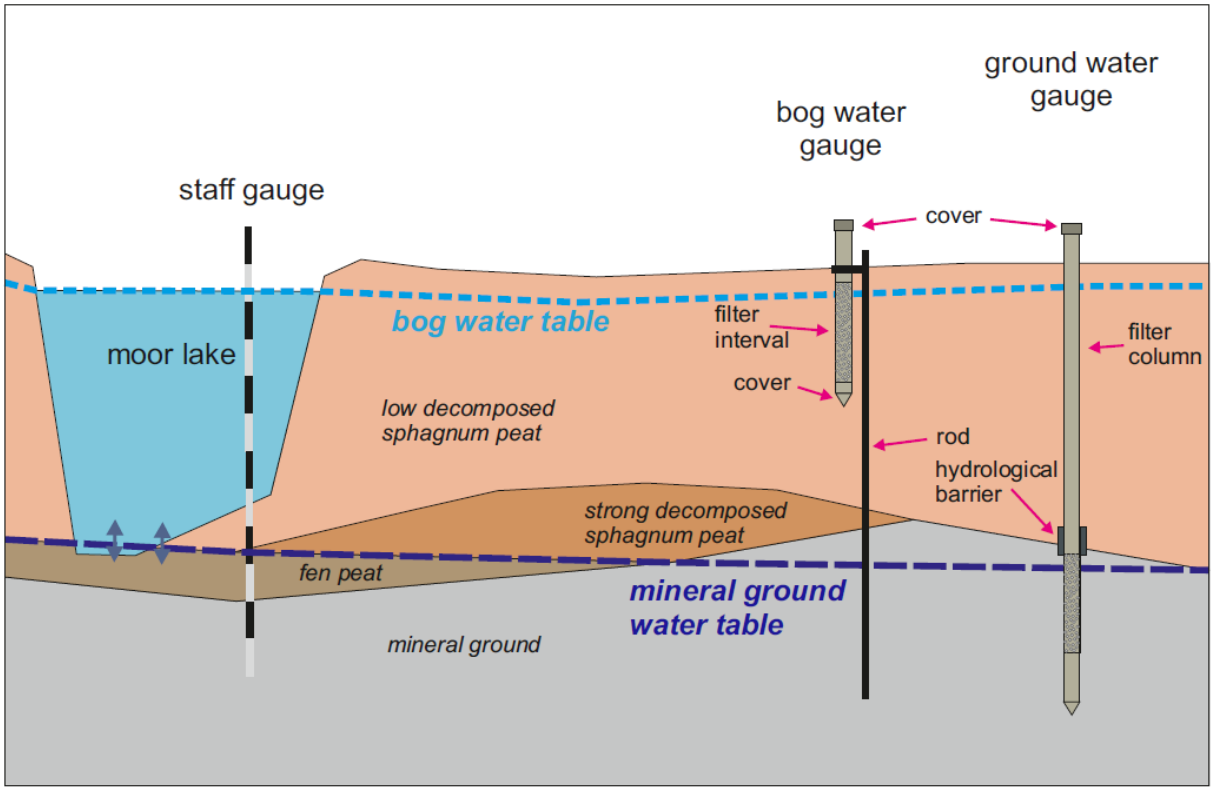

Figure 2: schematic drawing of water table measurement) (B. Höfer)

Alternative

In addition to the bog water gauge described in figure 1, it is also possible to use automatic piezometers for automated water level monitoring. These require less work and are very accurate but expensive and a minimum number may be required. Consult an expert if this option is preferred in a specific situation.