Biology: A Local Ecosystem
Evaporation of Water from terrestrial plants - Transpiration

This experiment can be performed with many brands of data loggers.

Aim:

To examine transpiration through a plant stem.

Theory:

The process by which water leaves a plant is called transpiration. More than 90% of the water taken in by plant roots is ultimately lost to the atmosphere. This water is largely lost from the leaves through the stomata as water vapour.

In this experiment we examine transpiration produced by a plant stem inserted into a flask filled with water. Evaporation of water from the leaves, leads to reduction in the water level.

Equipment:
1 beaker, or other suitable fask, a suitable plant stem, mass-sensor balance and a data logger. (see figure below.)

Method:

I. Connect your data logger to your computer.
II. Connect the mass balance to your data logger into input 1.
III. Fill the flask with water to a suitable level indicated, above the bottom of the stem .
IV. Assemble the equipment by placing the flask onto the mass balance preferably in a well ventilated and light room and preferably near a window. Choose a stem of a tree or a bush, with large surface area of leaves and place the stem into the water and support the plant with a retort stand and clamp
V. Set your data logger to a sampling rate of 1 /s and 500 to 1000 samples and start collecting data.

Results:

Determine the slope of the line of best fit and use it to find the rate of water loss.

Discussion:

What are the sources of error, which may affect your results?

Conclusion:

Write your own conclusion ensuring that it relates to the aim as stated above.

Optional:

Repeat this experiment using a light sensor, or temperature, or humidity sensor with the balance to examine the effect of light intensity, humidity and temperature on the transpiration rate. You may have to perform the experiment over 24 hours or more.