The Hills to Levels project has constructed numerous leaky woody dams in small headwater streams, and has monitored how the dams function over time:

(1) how well they trap debris over time,

(2) whether they build up flood water and temporarily store it upstream, and

(3) whether leaky dams alter channel morphology.

Monitoring is ongoing and methods are constantly improving, but here is an overview of what we have found so far.

Trapping debris over time

The below dams were constructed in October 2017 and had all trapped varying amounts of small debris, leaf litter and larger woody material throughout the winter until mid February 2018.

Newly constructed: October 2017   *With trapped debris: February 2018*

## Building up and temporarily storing high flows upstream

We measured water level up and downstream of dams through this winter. Data showed:

♦ The water levels upstream are higher than the levels downstream of the dam.

♦ The falling limb is shallower downstream than upstream.

♦ The difference between the base level and the peak is greater upstream than downstream.

Dive loggers used to monitor water depth

Each dam only has a small effect on water levels and the effectiveness of dams varied greatly. Used together in cascade of several dams, they cumulatively make a notable difference to flow peaks and travel times.
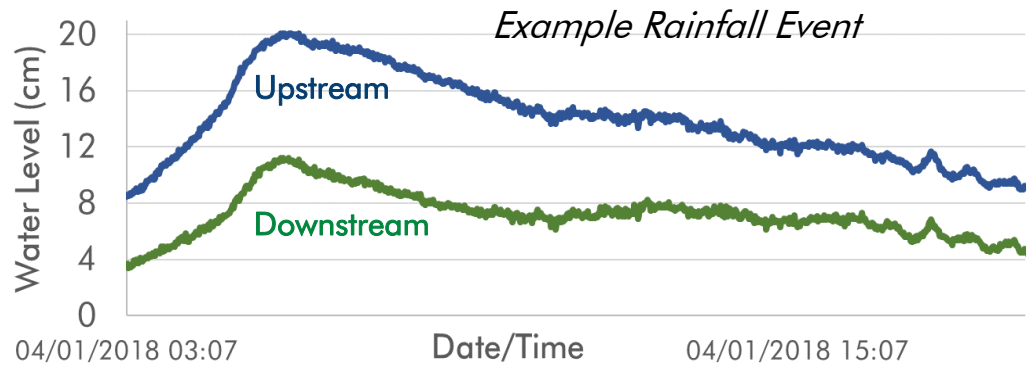
During low flows

Slowing the flow in flood flows

Geomorphological Changes

We are measuring channel profiles to determine sedimentation upstream of the dam and the formation of a scour pool downstream of the dams.

Channel profile data is also essential when interpreting the above dive logger data.

Scour pools have been formed downstream of the dams and siltation is occurring upstream of the dams. This also confirms that our dams are creating a variety in flow conditions (riffle, pools) which in return creates habitat for aquatic biota.

Left: October 2017, Right: Created scour pool and deposition of coarse sediment downstream February 2018.

(Note picture taken from opposite banks)

Questions to be answered with further monitoring

Does geomorphological change reduce water storage capacity over time (sedimentation upstream of the dam reduce channel depth)? Are leaky dams based on our designs self sustaining, collecting debris and occasionally self-clearing rather than blocking up completely, or do they need management and how much? Do leaky dams function differently in different catchments (e.g. high energy systems vs slower velocity systems with fine sediment.