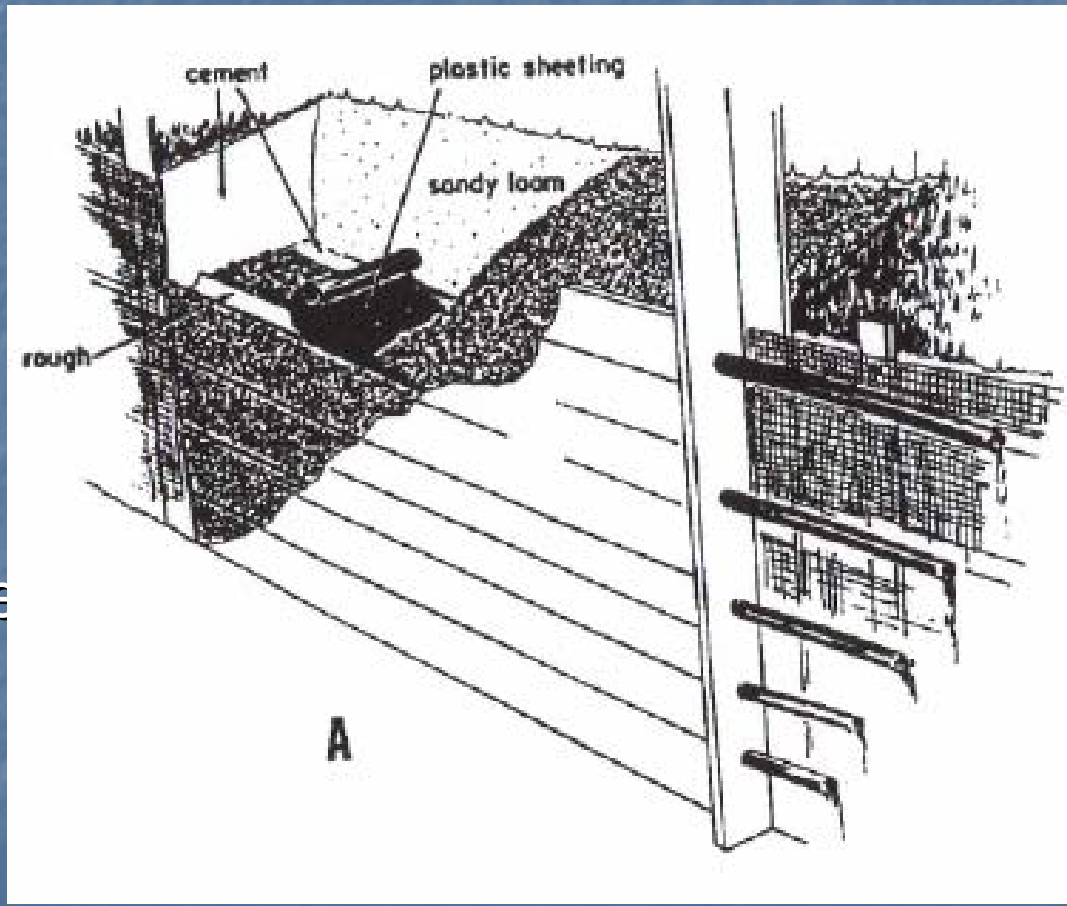
Evolution of Hillslope Studies

- Whipkey (1965) demonstrated that interflow could be collected at different layers
- Relatively small hillslope 3 X 4 meters



Dunne and Black (1970)

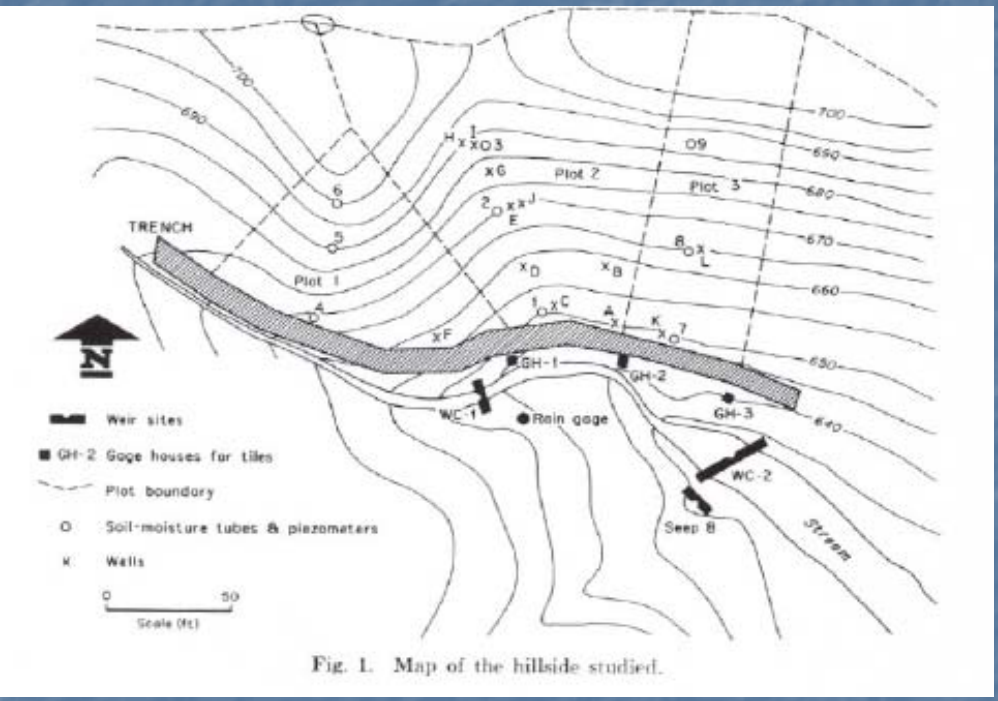


Fig. 1. Map of the hillside studied.

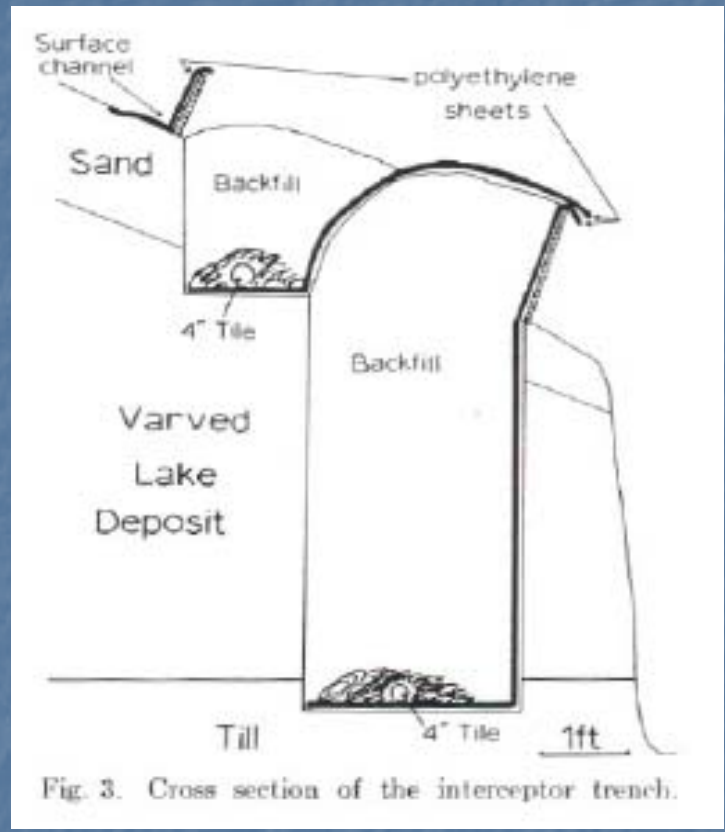


Fig. 3. Cross section of the interceptor trench.

Greatly expanded trench 80 m long
And up to 3 m in depth

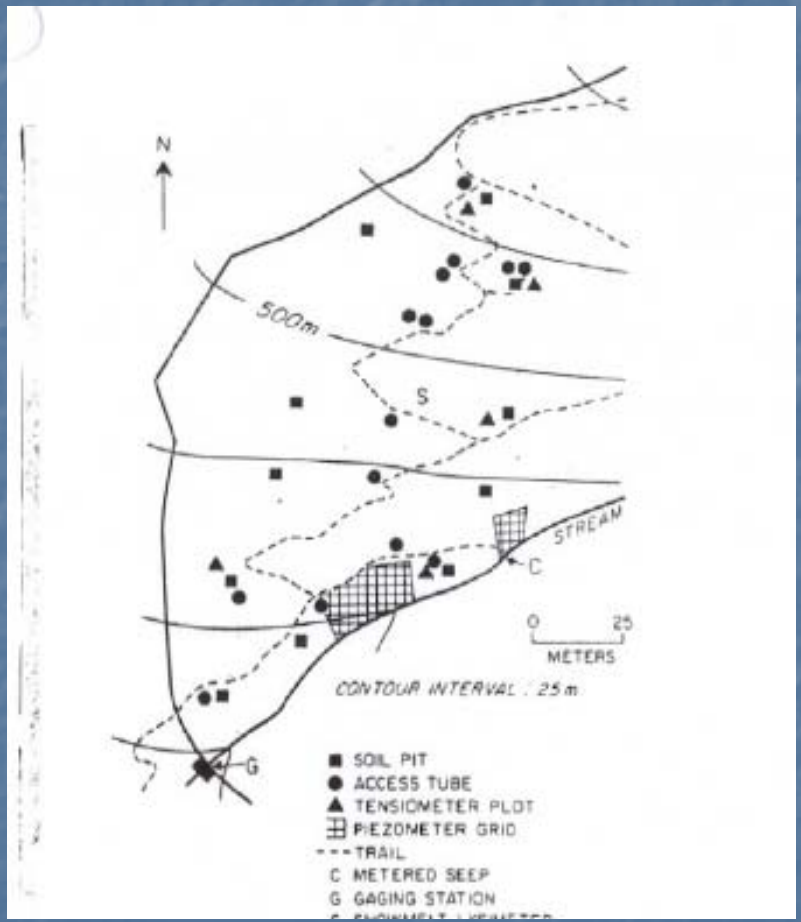
"nested within a 25 ha catchment

Weyman 1973

Employed multiple trenches on the hillslope, each capturing a specific depth

Complemented measurements with soil blocks and tensiometers

Harr 1977
Anderson and Burt 1978



Detailed tensiometer data (beginning of automation)

Very detailed soil hydraulic Information

Nested in larger watershed

Did NOT use trench. Can use seeps at base of hillslope

Sklash 1979
McDonnell 1990

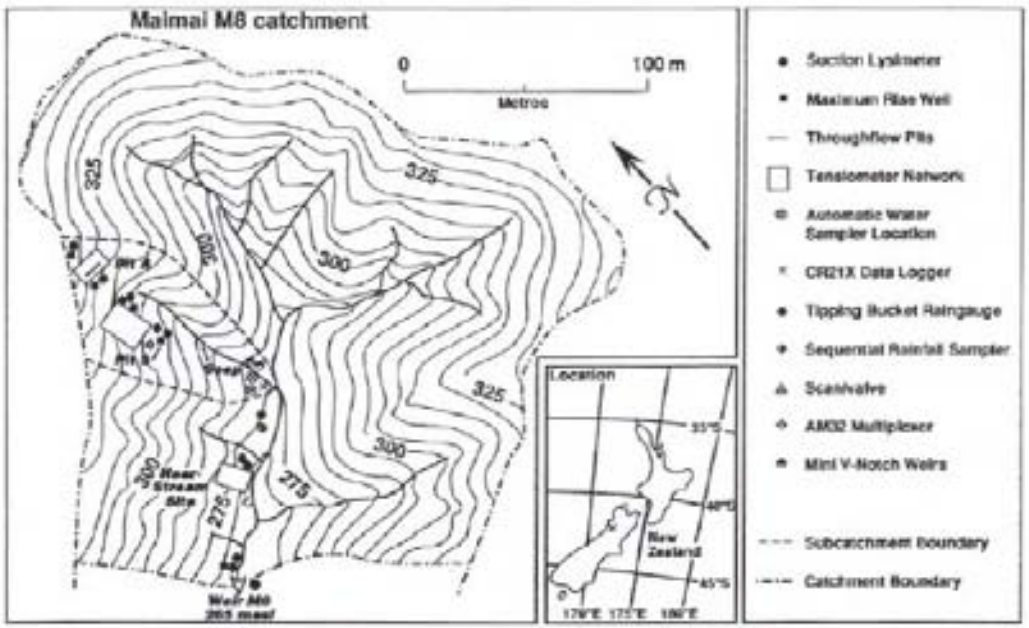


Fig. 1. M8 catchment showing locations of hydrometric instrumentation and sampling sites.

Combining detailed hydro metric work with isotopes

New understanding of tlow timing and processes

Nested, tensiometers, Piezometers, flow trenches

Torres et al. 1999

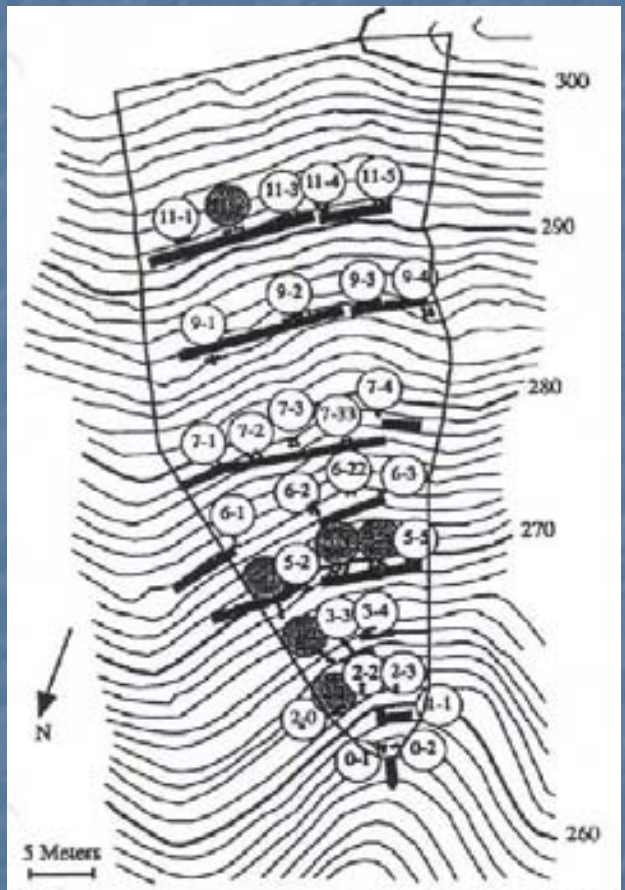


Figure 1. A 1-m contour map of the Coos Bay study site shows the relative position of tensiometers (dots), but the distances between them are not to scale. Tensiometer nests are identified by the encircled numbers; the shaded numbers represent the tensiometer nest locations where we determined in situ soil-water retention properties. The shaded rectangles across the site are access platforms, and a weir is shown at the base of the study site.

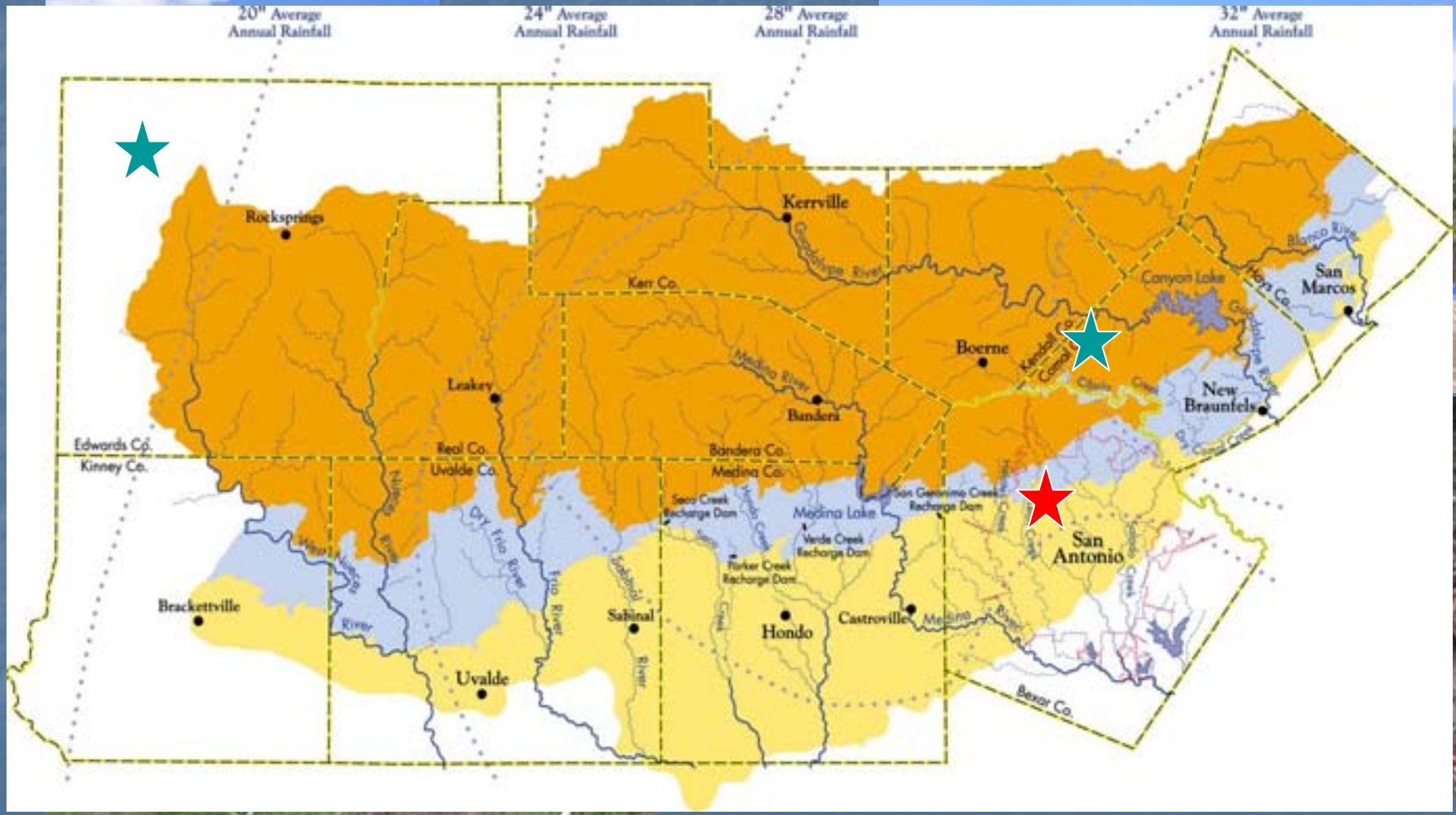
All of the above PLUS hillslope scale rainfall simulation

Second Question

Ecohydrology linkages-how is water affected by vegetation?

Approach

Trench Study Sites



Sonora

Honey Creek

Shallow Cave Site

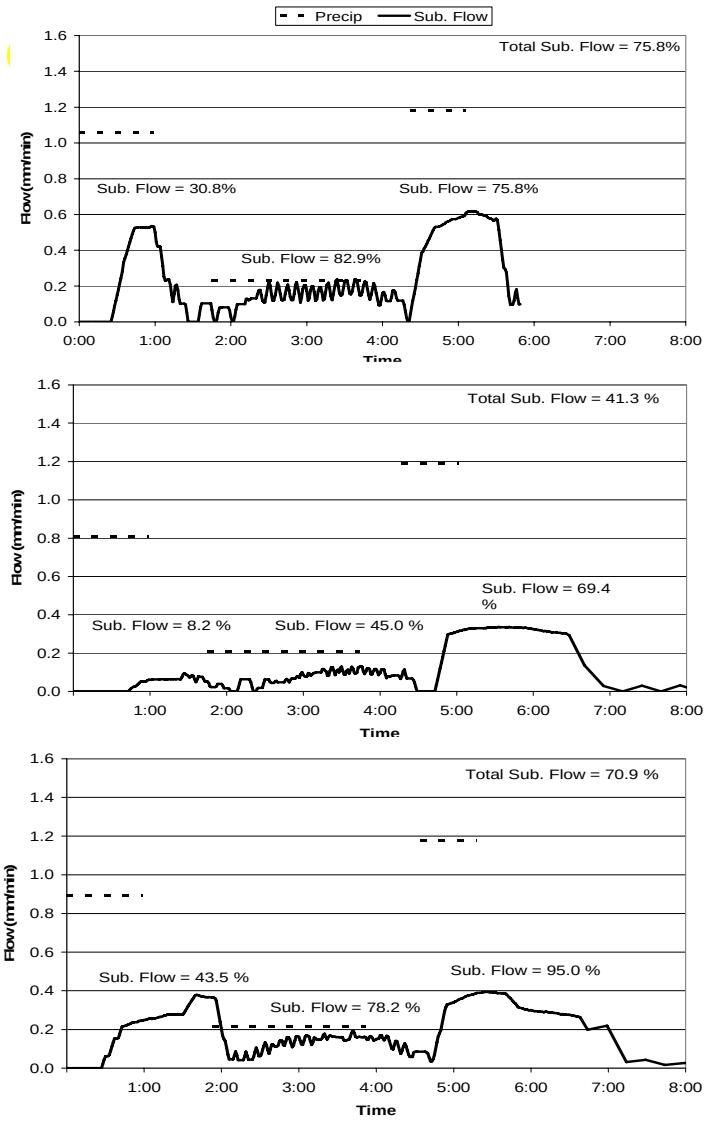
Surface runoff

Throughfall

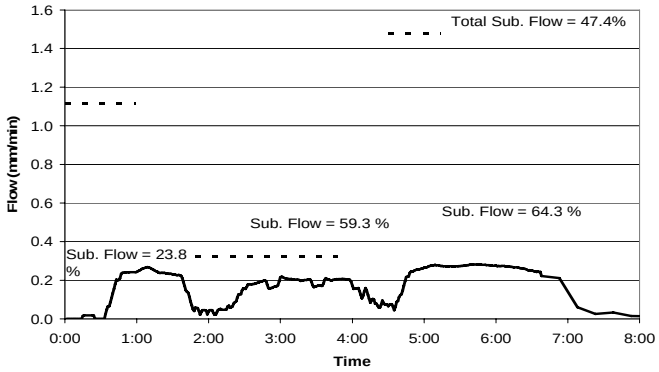
Interception

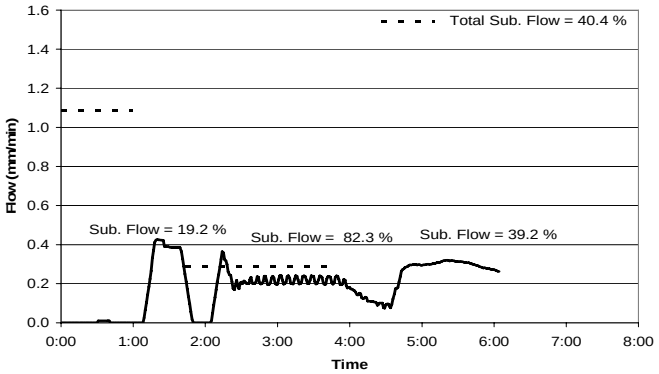
Stemflow

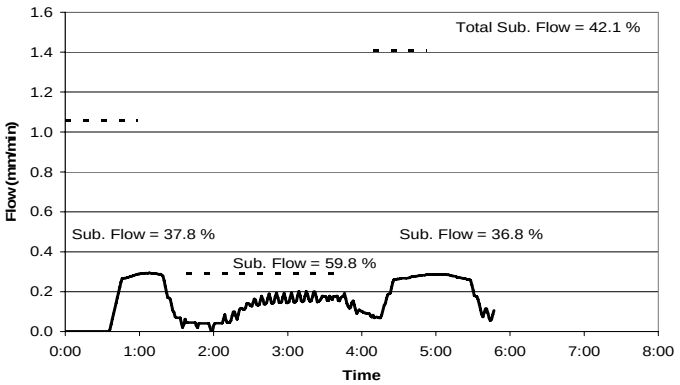
Results: Juniper Slopes



Influence of cutting juniper







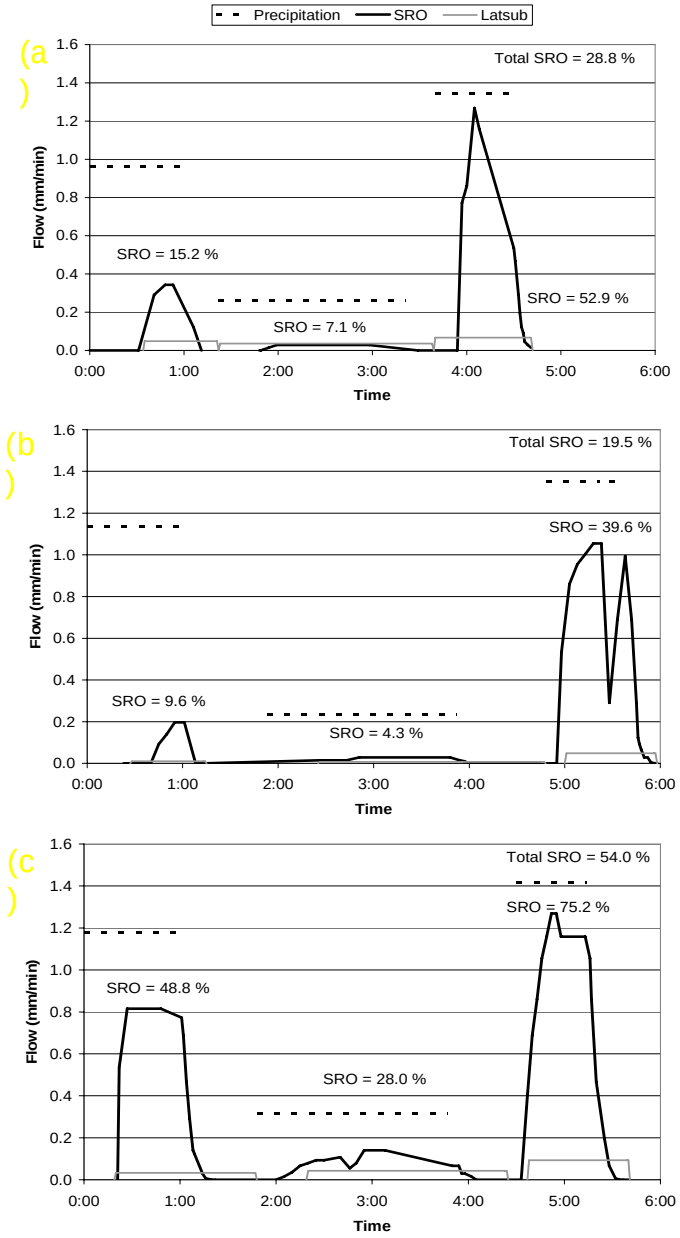
Interflow still dominates but somewhat reduced.

No surface runoff

Intercanopy Plots

High surface runoff

Small interflow



Key measurements

- Surface runoff
- Shallow subsurface flow (trenches or seeps)
- Soil water (TDR)
- Groundwater (piezometers)
- Soil Tension (tensiometers will not work)
- Natural isotopes