Water and carbon in forested catchments: are we willing to manage our most crucial resources in the face of fire and changing climates?

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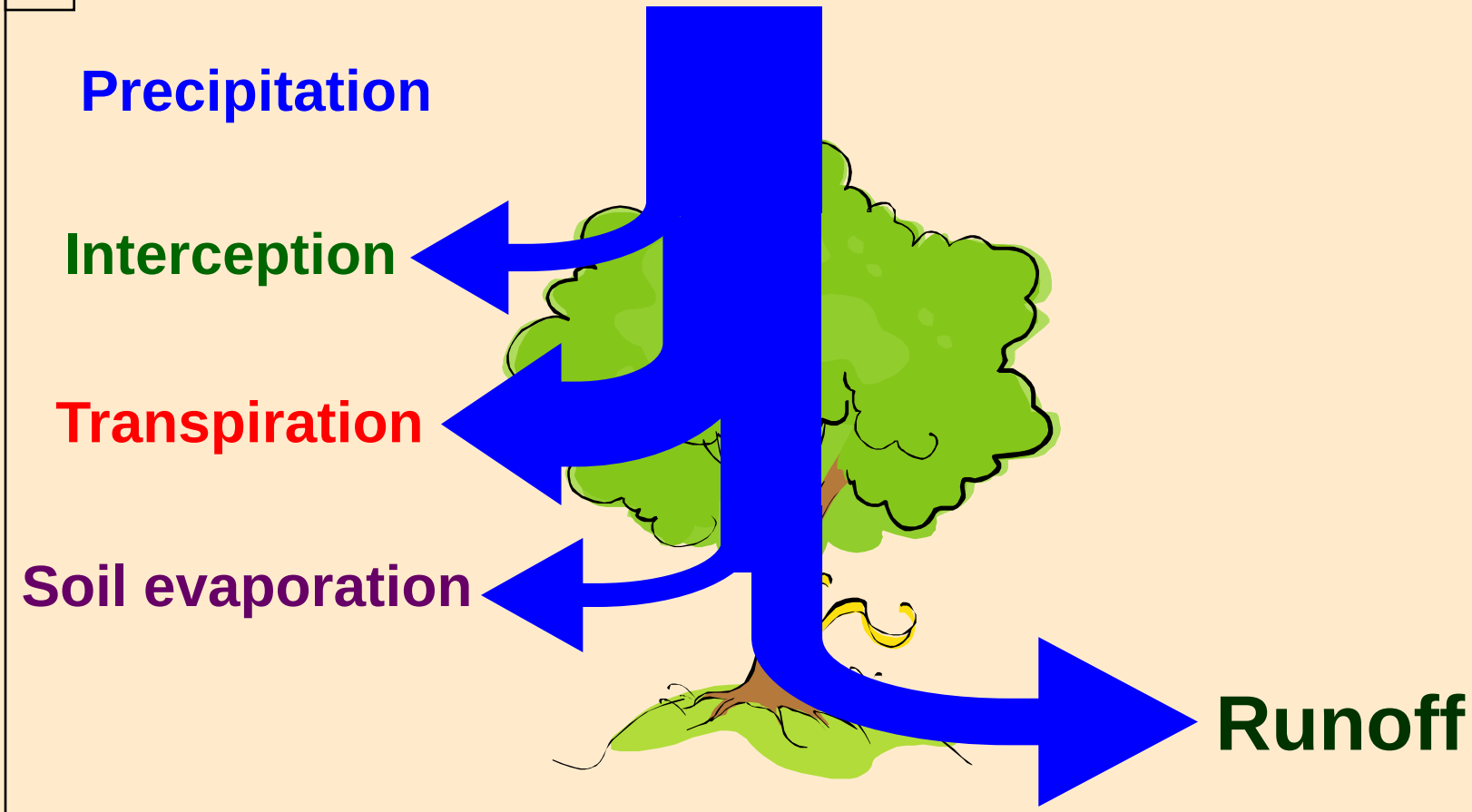
Against a backdrop of $10B of taxpayer funds for how water is used in the Murray Darling Basin and billions more spent on desalination and carbon sequestration plants…..

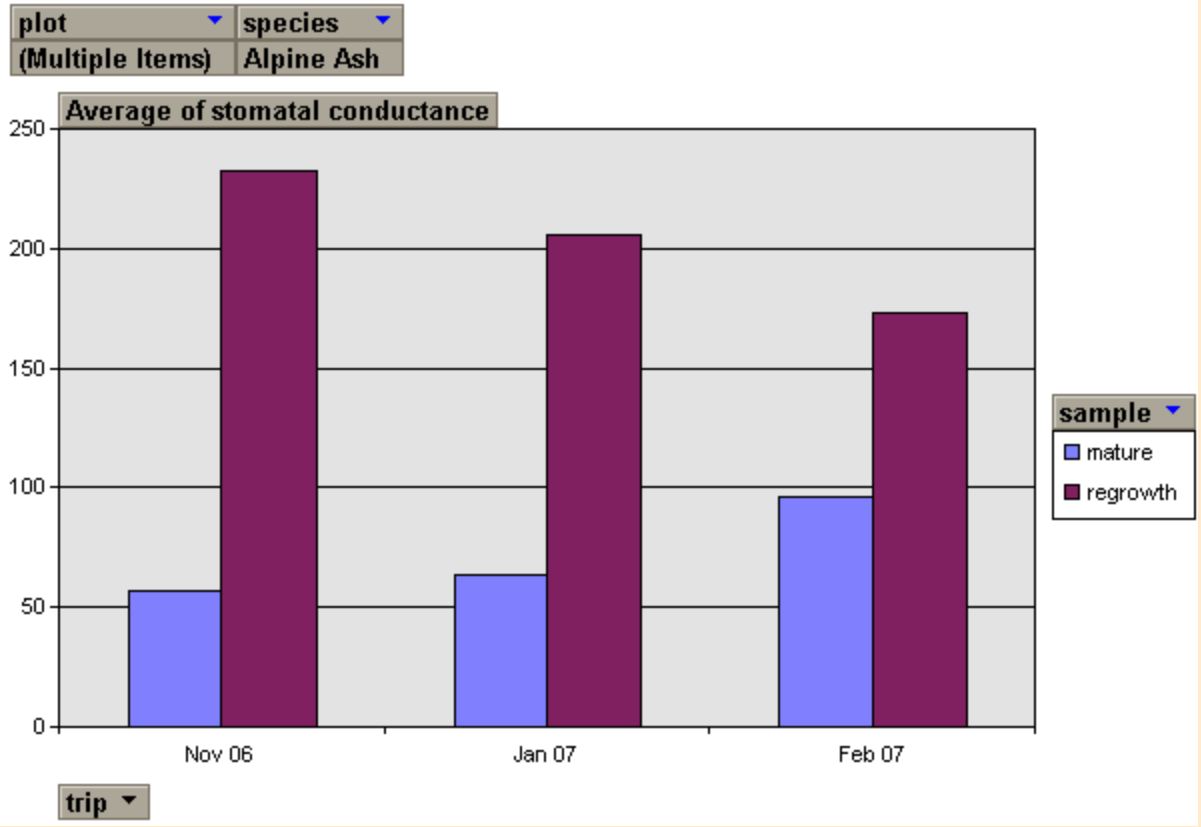
Four factors affect catchment run off



Fires change forests and the amount of water they use

Alpine ash (*Eucalyptus delegatensis*), near Howmans Gap, Victoria

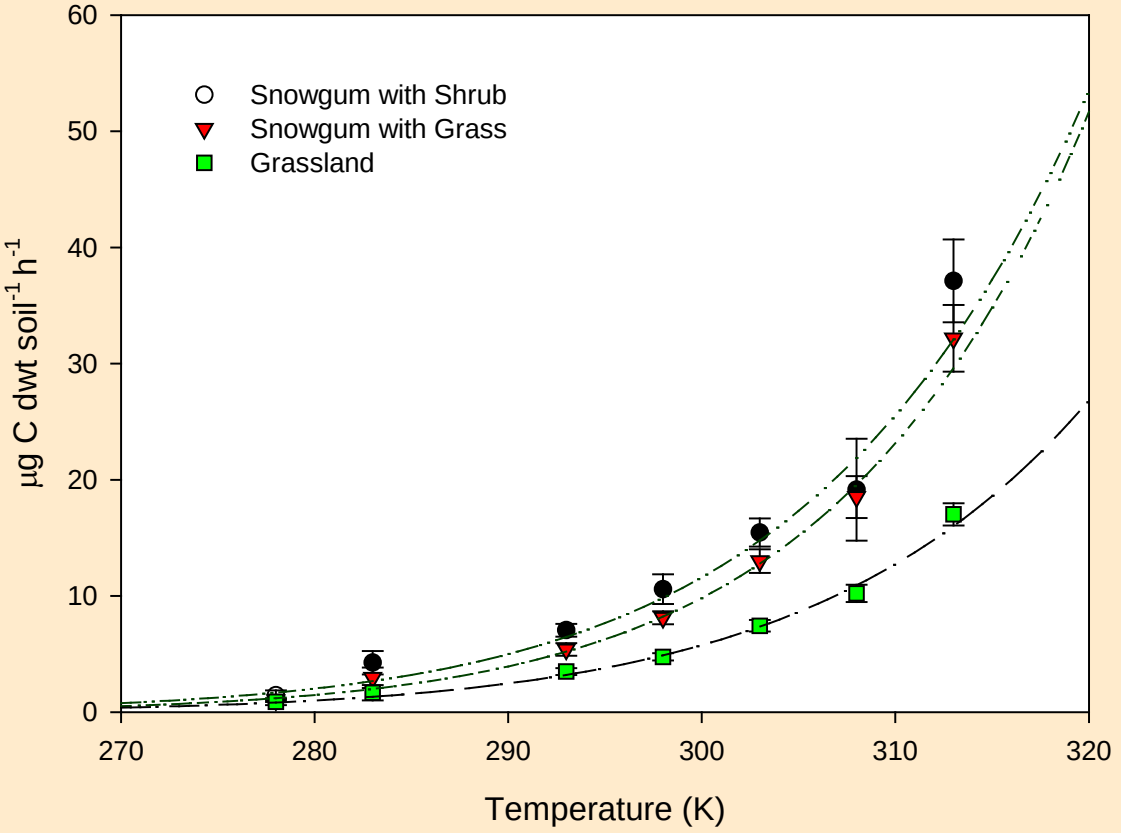
Water use (transpiration)



Bushfires release massive quantities of CO_2

- Much more than all industrial outputs from Australia in ‘bad’ fire years.
- Elsewhere in the world, wildfires can produce ‘step’ increases in global atmospheric CO_2
- Lack of knowledge about carbon in soils, especially black carbon - but we do know it is very significant
- Fires also change rates of release of carbon from soils in the long-term

Relationship between soil respiration and temperature for three subalpine vegetation types at the 0-10cm soil depth.
[Dashed lines indicate fitted Arrhenius functions.]



Summary

- Plant transpiration is the single most important component of catchment water balance.
- We now have one of the most comprehensive networks of *calibration* stands for studies of water and carbon balance of forests.
  - Incorporates the effects of fire and climate change
  - Strong, statistically rigorous design
  - Incorporates rigorous experiments of the interaction of grazing with prescribed burning
- Planned fire (or prescribed fire) can be used to control fuel loads and fire risk in many upland forests (SG, AA, MS), woodlands and grasslands

Take home messages

For Eastern Highlands as a whole in Victoria (including Gippsland) runoff will decline

How much?~ **30%** **(-75% to +5%) over coming decades**

Why? **less rainfall**
more interception
more fire

Options?

Fire management - more planned burns where we can
Understorey management (fire, mechanical, grazing)
Thinning
Pay billions more for water *(desalination)* and poor Carbon outcomes

Some water catchments have long been managed via a "strategy of hope"

- "I hope that they don't burn on my watch"
- Unfortunately, that strategy is being increasingly adopted for nearly all of our native forest estate.
- **Surely, the $ value of water and carbon is changing public and thus political perceptions of such a strategy?**