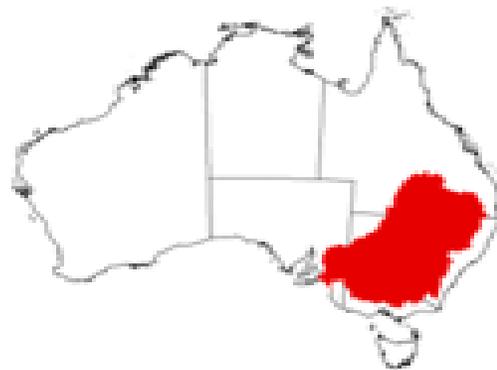


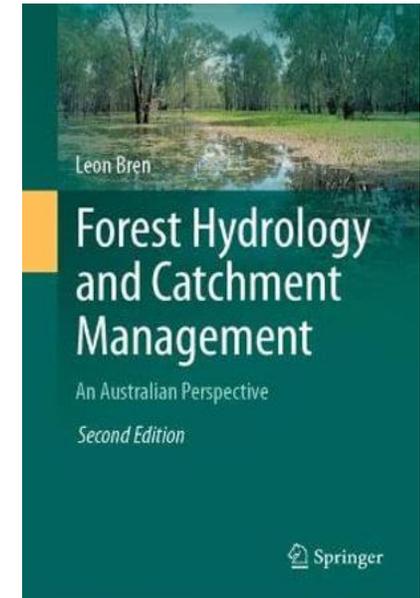
# Lessons from Fifty Years of Plantation Hydrology Research for New Plantings in the Murray- Darling-Basin

The Physics and Managing Community Perceptions



# Why Am I Up Here?

- Old! (title implies 50 years+)
- Lots of papers and some books
- Observer of both science and conflicts
  - Occasional participant in both (consultant or protagonist)
  - Felt that forestry took more punishment than we deserved
- Revision of an older books (and a new one)
  - Reflective experience
  - Second edition used stuff from sociologists looking at the hydrologic cycle
  - Second edition can be a bit more caustic about the world.....



# “New Plantings”

- Talk of them
- Need for new plantings to resolve coming “timber crisis”
  - Clearing native forest or
  - Planting up farmland or
  - Import timber or
  - Do without
- All of the above have potential for conflict in volatile “woke” Australia
- Likely areas not so far from here

# “Physics” – aka Hydrology of Plantations in MDBA – In Hindsight

## **Traditional Plantation Approach (Radiata Pine)**

- Plantation areas ideally >750mm rainfall, >2m of soil
- At a pinch, >650mm rainfall, >1m of soil
- Tend to be Upper Murray areas
- Purchase price relatively high, land often steep





# “Physics” – aka Hydrology of Plantations in MDBA – In Hindsight

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## “Low Rainfall Plantations”

- Idea comes and goes
- Suggested for carbon offsets
- Lots of old “irrigated dairy land” released due to water-trading
- Land in 500 mm rainfall zone
- Flat, often good access to groundwater
- Easy plantation land but economics untested
- Good opportunities for creative plantation development



# “Physics” implies Standards



Standard metre  
(on right)



-Used to compare  
lengths



Standard pasture  
(on right)



- Used to compare  
water yields



# How is Information Obtained?

- Anecdotal experience and casual observation (biased?)
- “Modelling” – was problematic in 1972, and still problematic without good field work
- Paired catchment experiments
  - High establishment cost, low running cost
  - Reliable
  - Very little replication (occupies middle-ground in scientific hierarchy of experimentation)
- Plot experiments
  - Useful
  - Blend in with Paired Catchment approach
  - Hard to incorporate streamflow

# Paired Catchment Plantation Work in the Murray-Darling

- Croppers Creek, Myrtleford, Vic
- Tumut (Red Hill) NSW
- Stewarts Creek, Daylesford, Vic
- Lidsdale, Bathurst, NSW
- Cotter, ACT (mainly single-catchment work)
- Canobolas, NSW

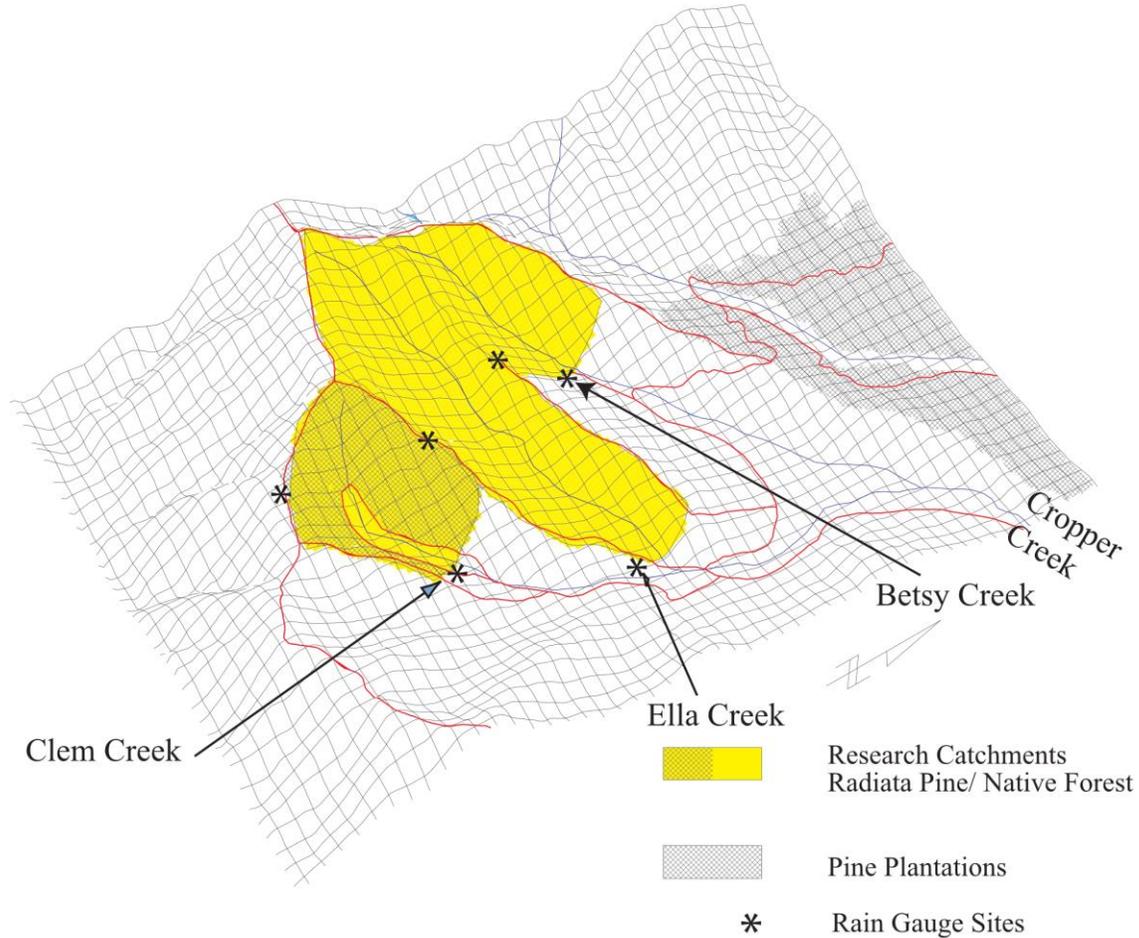


Not all created equal, and varying amounts of information produced.

Management by forest services worked well.

Creating organisations have disappeared. Workers have retired or moved-on. No data repository

# Croppers Creek Project – near Myrtleford, Vic



Very pure water naturally



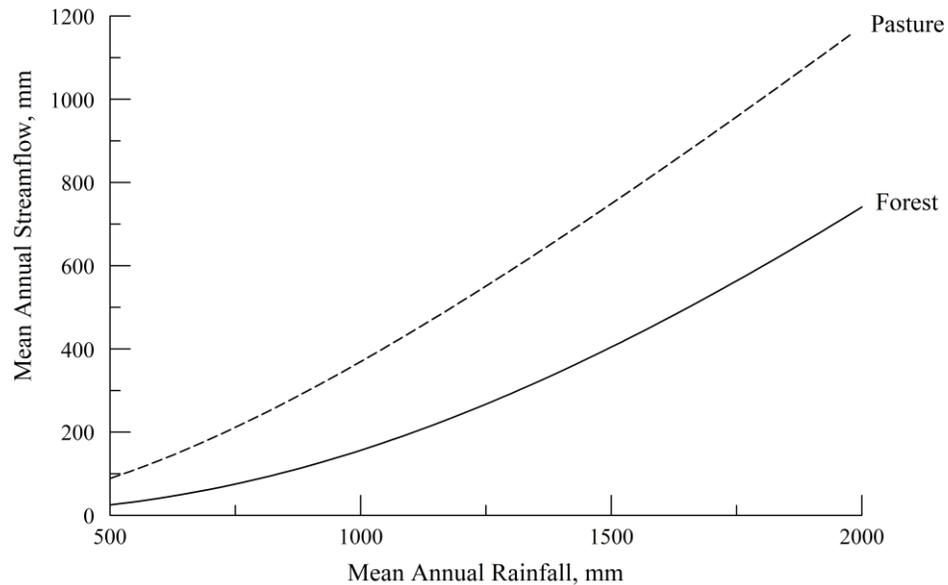
Transition from native forest to pine originally. Now on second rotation after fire



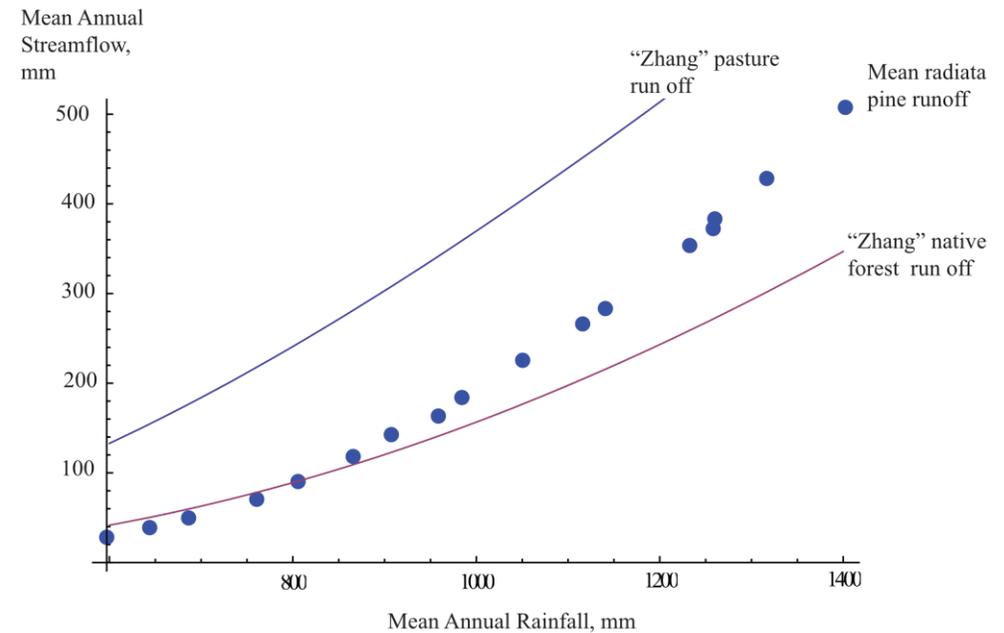
Burning impacts (pines burnt more fiercely than eucalypts, spike flows and erosion)

Showed that the area was steep but quite fertile and well-watered

# “Zhang Curves” and Our Paired Catchment Findings



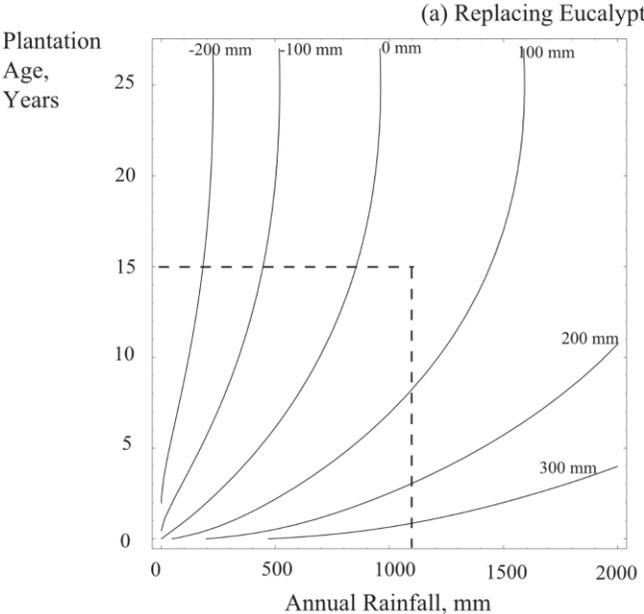
From Zhang, Dawes, and Walker (2001)



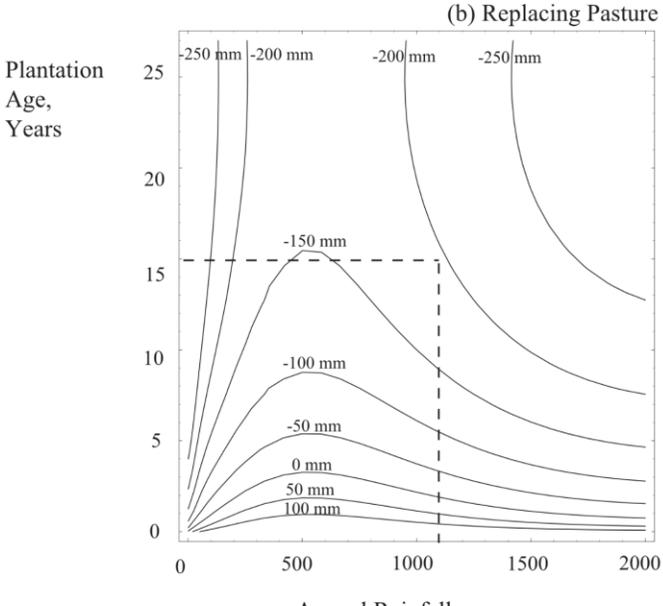
From Bren, Lane, and McGuire (2006)

# Pine Conversion – Change as a function of Annual Rainfall and Plantation Age

Replacing Eucalypts

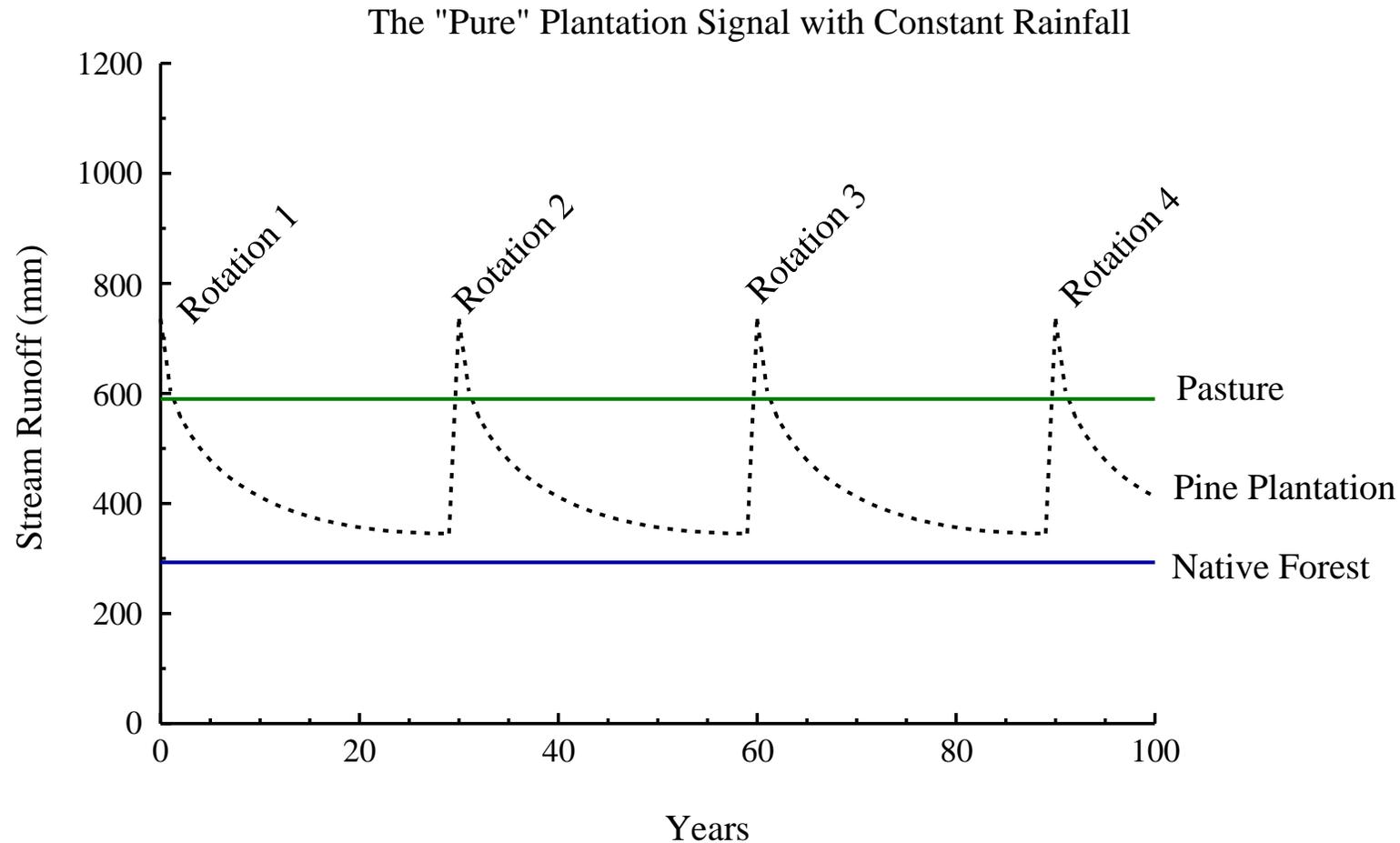


Replacing Pasture



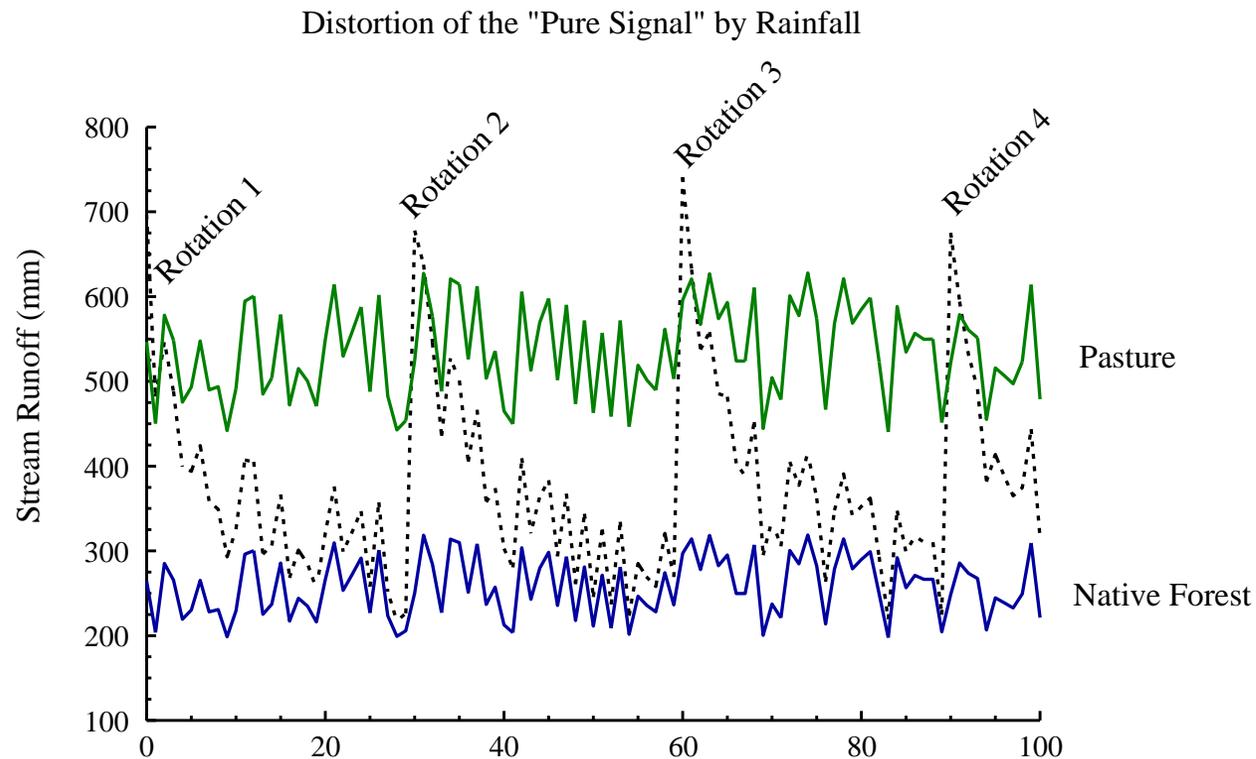
From Bren (2014) and Bren, Lane, and McGuire (2006)

# Pure Pine Signals (Absolute) for Just One Age Class



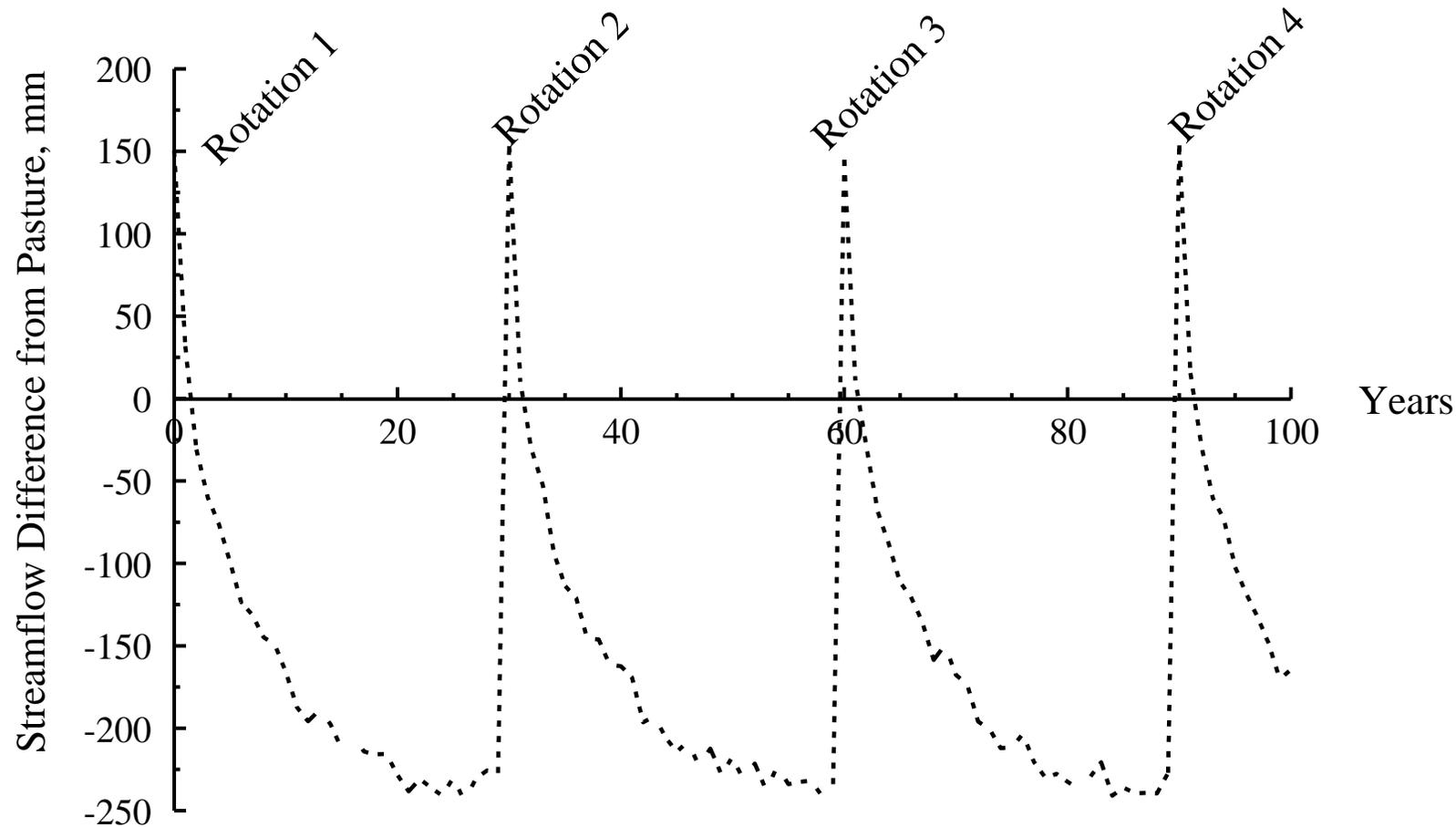
# “Noise” Added by Nature

- Varying rainfall from year to year
- Errors in measurement
- Perturbations such as roading, windthrow, thinnings
- Big storms and small storms
- Temporal and spatial variation



We've just added annual variation in rainfall to this plot. The “pure” signal is still there but a lot harder to see!

# How a Downstream Farmer Might Perceive It



“Differencing”  
reduces noise and it  
more or less the  
same as using a  
“control” catchment

Less water for diversions  
(legal or illegal). Less water  
for irrigation dams. Higher  
streamflows when  
plantations young

# Consider a Larger Plantation Block

- Pines coming and going
- Yield probably intermediate between that of poor pasture and mature eucalypt forest
- Water quality ditto (see below)
- If we wanted we could do a spreadsheet exercise modelling all of the above.....
- Difficulty is that if you present it to the water managers you will likely get a blank stare
  - No one else has done it
  - They don't know what to do with it.

# Water Quality

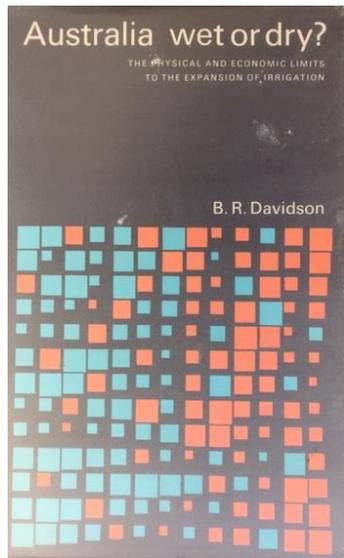
- Plantations less impact than farming but can have an impact
- Usually an impact on turbidity, less so on other parameters
- Adherence to good practice minimises this – and should always do that
- Plantation runoff OK in biological terms (farm runoff not)
- “Importance” is probably case-specific
- Fire catastrophic but not restricted to plantations



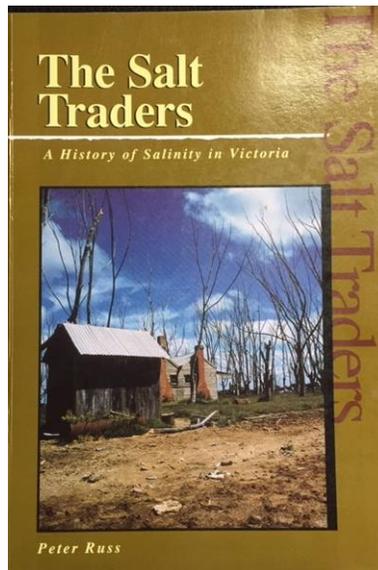
# Managing Community Perceptions for New Plantings

- Be informed on water issues
- Be informed on the hydrology and do your arithmetic
- Talk to the water management authority early in the piece
- Neither emphasise nor avoid the issue
- Allow adequate time for negotiations
- Know something about downstream
  - Users
  - Diverters
  - Wetlands
  - Possible issues
- Have a view on what your response might be to various claims
- Have an articulate and charming spoke-person
- Some “softeners” up your sleeves – e.g. tours of towns where plantations have integrated with farming

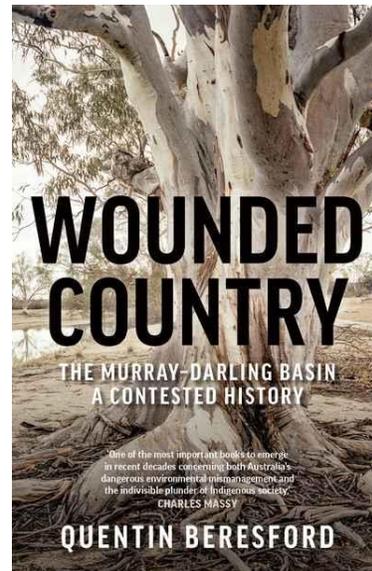
# Not the First Potential Conflict in the Murray-Darling Basin



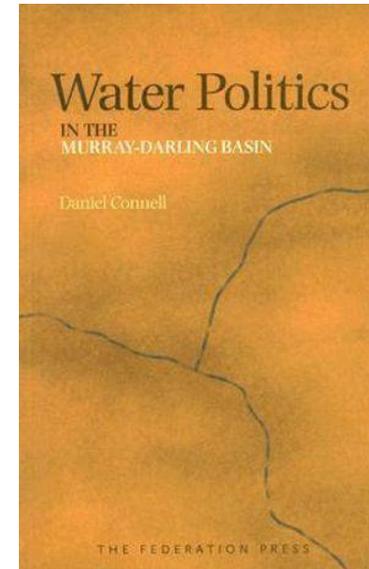
Great book, argues that irrigation is not an economic way to go



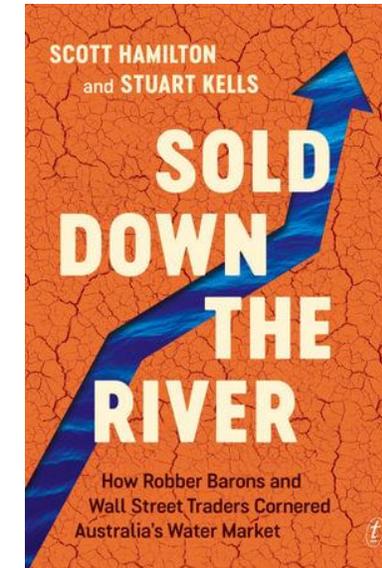
Great history of some almost forgotten conflicts



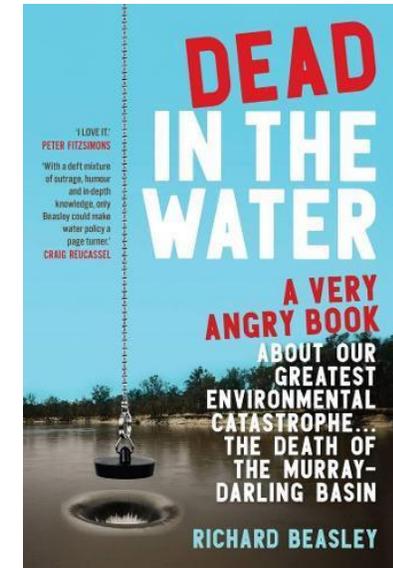
Contested by whom?



Australia has been reasonably successful in walking a fine line between “water claimants”



Argues water trading has mucked everything up along the River Murray



“Death” is an over-rated word for a river system. Is “anger” an appropriate response?

# Taking the Community Along with You

“You can’t do anything if you don’t carry the community with you, and that community of farmers opposed Mineral Reserve because they didn’t believe in it”

Water Minister Evan Walker in 1984 talking about the long-forgotten Tresco Mineral Basins salt-dumping conflict – which shaped River Murray policy.

## *You Might Try:*

Good public relations

Providing speakers at Rotary, Apex, etc.

Tours of Project areas and similar areas elsewhere

Talking to Councils, water authorities, farmer’s meetings

Answering queries factually, politely

Where possible, use strategic purchasing to avoid head-on clashes

Highlighting good practices

Aim at providing some local employment

Aim at providing work-experience

Other River Murray conflicts: Salinity, water for South Australia, mouth of the river open or shut, water in the Menindee Lakes, fate of the Red Gum Forests, management of water above/below the Barmah Choke, reduction in capacity at the Barmah Choke, balance between irrigation and conservation

# Street-Fighting 1: “Outrage” About Water Use of Plantations planted on Farm Land

- Downstream farmers get upset that their stream flows may be lowered.
- Users should have a water diversion licence (often they don't)
- With increasing catchment area, impact diminishes
- On larger catchments, impact negligible unless the plantation is unusually large
- Plantations replace the “peakiness” of agricultural land with a more sustained outflow
- Usually more outrage than farmers affected

# Street-Fighting 2: Occasional Accusations of “Water Theft”

- Terms like “silent thieves” used
- All plants transpire, none talk, so it’s a stupid sentiment
- Assumption that the water in the streams is put their for farmers to use
- Suggestions that plantation owners should pay some sort of tax on the water use (tax to whom – the farmers?)

# Street-Fighting 3: Plantation Water Use Taxing

- If the response is “happy to participate provided the tax is equitably applied across the catchment” it usually disappears:
  - Crop-growers & “improved pasture” would pay heavily
  - Native forest owners, conservation plantings, “National Parks”, etc would pay heavily
- Any other regime is a discriminatory tax
- A non-discriminatory tax will cut a deep swathe in the community

# On the Social Side

- Be proud of your plantations and what they offer the community
- Don't accept proffered premises about "ownership" of water, the "value of irrigation", etc.
- Don't accept the proffered premise that water management is a "scientific art"
- Follow good practice (buffers, wet weather control, good road drainage, etc.)
- "Sauce for the goose is sauce for the gander"
  - Are the same criteria being applied to agriculture (improved pasture, crops)?
  - Are the same criteria being applied to native forests, conservation plantings, "national parks", etc.
  - Demand evidence that this is so

# Conclusion – What I've Learnt

- The hydrology arithmetic is there for anyone to use
- Plantation management should use “good practice”
- Probably some great opportunities at the lower end of the rainfall for plantations
- Plantation development can be controversial but that fades away
- A common reason is that it breaches an unspoken assumption that farmers “own” the water (and social issues on future of farming)
- Plantations are somewhat intermediate between native forest and pasture
- Improved pasture and crops are probably similar to plantations but a different “signature”

# Conclusion – What I've Learnt (Continued)

- Over-hyped “science of water management” that demands justification for plantations but does not apply the same criteria to other uses
- If new plantations are to be developed, then they will have to come out of farmland or clearing native forest
- Plantations on rainfall <700mm doubtful economic – hence there will be competition for the better farmland
- If new plantations are planned, forest owners should do their water-use sums early

# Conclusion – What I've Learnt (Continued)

- As a minimum, demand that any 'water justification' demanded be applied to other uses (pasture, conservation plantings, native forest)
- Ditto with suggestions that plantations should be taxed on the basis of water ("discriminatory taxing unless it is universally applied)
- Ask for justification of "assumptions". My past experience was that the foresters had to work hard to meet criteria that were not applied to others.

And thanks for listening, guys  
and  
Good luck with those new plantations!