Implementing stormwater flow regime standards

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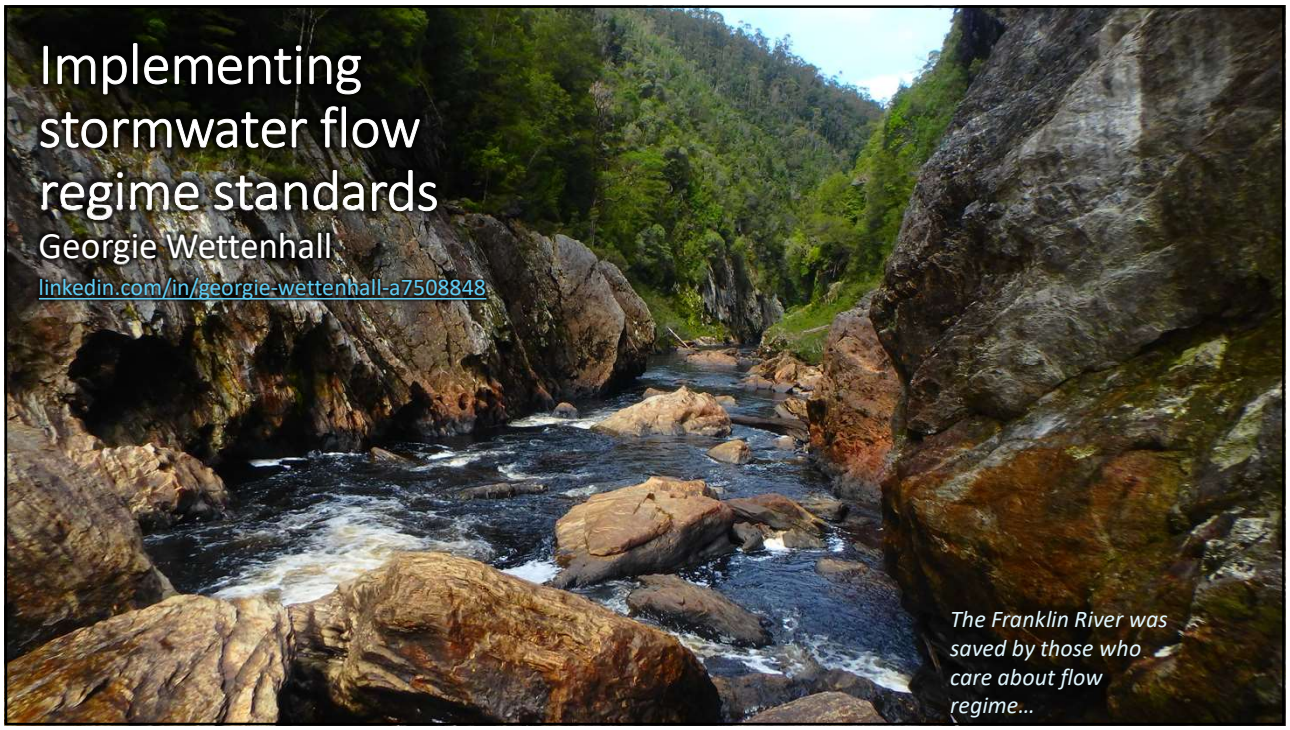
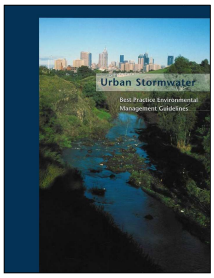
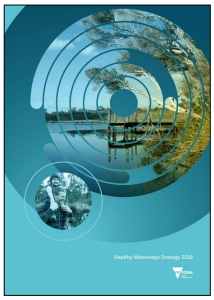


The Franklin River was saved by those who care about flow regime…

Victorian stormwater flow regime standards

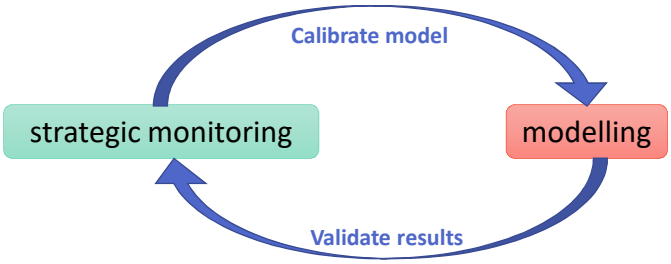
- **Old** ← Address acute problems
  - Flood attenuation
    - E.g. post development 100 yr ARI flow must not exceed pre development 100 yr ARI flow
  - Channel forming
    - Maintain discharges for the 1.5 year ARI at pre-development levels
- **New** ← Address chronic problems
  - Healthy Waterways Strategy (HWS, Melbourne Water)
    - ML/yr/ha harvested AND
    - ML/yr/ha infiltrated
  - Revised Best Practice Environmental Management Guidelines (BPEM, EPA)
    - % volume reduction (harvesting, infiltration, evapotranspiration)
    - % baseflow contribution (infiltration, slow release)





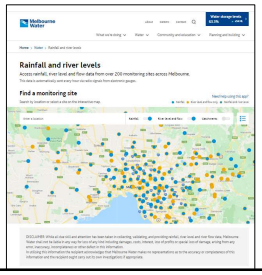
Monitoring ~~vs~~ AND modelling

	Pros	Cons
Monitoring	• Direct measure of reality	• Can only capture current conditions • Expensive
Modelling	• Can simulate future or past conditions • Cheap	• Indirect prediction of reality



Monitoring challenges – measuring runoff

- Continuous flow monitoring
  - Typically designed for accurate measurements of medium to high flows
  - Depth +/or velocity -> flow
- Monitoring water level to calibrate/validate flow regime models?
  - Used for Albert Park water balance model
  - Melbourne Water records water levels in many constructed wetlands (to monitor plant health)



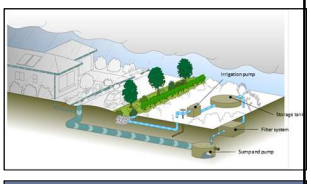
Modelling challenges – predicting runoff

- Standards based on:
  - what we do not want (stormwater excess)
  - rather than what we do want (natural flow regime)
- Runoff volume is key metric
  - Urban runoff volume dominated by runoff from impervious surfaces
  - Impervious surface runoff predictions less reliant on calibration



Modelling challenges – predicting harvesting demand

- Harvesting is key to achieving HWS and BPEM standards
  - Compliance typically requires harvesting at multiple scales e.g.
    - Private rainwater tanks
    - Public realm
- Modelling predictions sensitive to assumed harvesting demands
  - Indoor demands
    - Residential - commonly assume # bedrooms = # occupants
    - Non-residential – hard to predict – especially when tenancy unknown
  - Outdoor demands
    - Sometimes easy to predict (e.g. oval irrigation)
    - Often hard to predict (e.g. irrigation demands in planned urban development)
      - Unknowns (garden area, vegetation type, occupant behaviour)
      - STORM Calculator excludes outdoor demands for this reason (conservative approach)
    - Novel demands – irrigate roof??

Implementation challenges – competing supplies

- **Battle of the alternative water sources**
  - Harvested stormwater/rainwater
  - Recycled water (treated wastewater)
  - Groundwater

Abundance not scarcity

- Combinations
  - Example 1
    - Rainwater -> hotwater (mains backup)
    - Recycled water -> outdoor, laundry, toilets

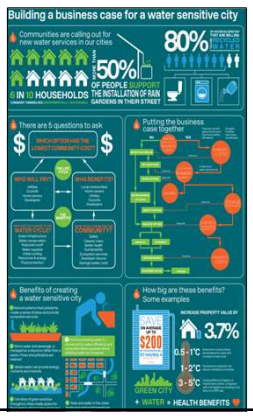
    e.g. Aquarevo
  - Example 2
    - Rainwater -> outdoor, laundry, toilets (recycled water backup)
  - Example 3
    - Treated stormwater mixed with recycled water and supplied to customers

    e.g. Harvey Bay

Quantitative standards change economic questions

- I am not an economist

- Benefit cost analysis (BCA) commonly used to inform investment decisions
  - Incorporates financial, social and environmental benefits & costs
  - Benefit & cost estimates are uncertain



- Without quantifiable standards
  - *Does the benefit of reducing stormwater volume by 60% exceed the cost?*
  - *Does the net benefit of reducing stormwater volume by 60% exceed the net benefit of reducing the volume by 50%?*

- With quantifiable standards
  - *What is the most cost effective way to reduce stormwater volume by 60%?*
  - Eliminates the need to estimate some factors that are hard to monetise

Where and when do standards apply?

- Triggered by new development?
  - Is this equitable?
  - Will this protect our waterways quickly enough?
  - Gaps if applied to private infill development e.g. roads and public carparks
  - Point in time assessment – is infrastructure maintained & behaviour sustained
- Receiving waterway
  - Priority (place based targets)
  - Type: flow regime not important if development runoff is piped to coast (but stormwater quality is)
- Standards need to be met before stormwater enters a waterway
  - Further upstream the "purer" the stormwater
  - Rainwater (roof runoff) less polluted than stormwater (mixed surface runoff)
  - Wastewater & groundwater can enter stormwater pipes & restrict harvesting opportunities

Are stormwater quality standards still needed?

- Standards determine size of stormwater management infrastructure (e.g. wetland area or storage tank volume)
- Impractical to have a standard for every pollutant and every aspect of flow regime
- Set standards for attributes that are most likely to limit infrastructure size
  - Flow regime standard can be met without meeting stormwater quality standards
    - e.g. rainwater tank sized to reduce volume by 25% will not reduce total suspended solids by 80%
  - Stormwater quality standards can be met without meeting flow regime standards
    - e.g. wetland in Melbourne sized to meet pollutant standards only reduces runoff volume by ~7% (due to evapotranspiration)

Support for industry

- Clear guidance for developers and development approval authorities
- Example compliance strategies
- How to demonstrate compliance with standards
  - Accepted tools (e.g. MUSIC and revised STORM Calculator)
  - Accepted modelling parameters (e.g. rainwater tank harvesting demand)

Innovation comes from constraint

- Our capacity to manage flow regime will improve
- (MUSIC did not exist when stormwater quality standards were introduced)