



**MONITORED FOREST VEGETATION  
CHANGES AND EFFECTS ON RUNOFF IN  
WATER SUPPLY CATCHMENTS:**

**Research Forum November 2009**



## MONITORED FOREST VEGETATION CHANGES AND EFFECTS ON RUNOFF IN WATER SUPPLY CATCHMENTS :

### THE PWF PROJECT DATA INTEGRATION ACTIVITY

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#### **Objective and summary:**

To apply alternative data-analytical approach using historic data from **all available catchments** to estimate effects of forest thinning on catchment runoff under different rainfall scenarios. The aim is to examine all available historical data to (a) identify combinations of thinning regime, catchment and rainfall distribution where increased runoff has occurred and (b) to estimate effects on runoff of feasible thinning regimes under projected rainfall scenarios.

#### **Study Area and Data:**

All gauged forested catchments in SW region with at least 5 years of record in the period 1989-2007.

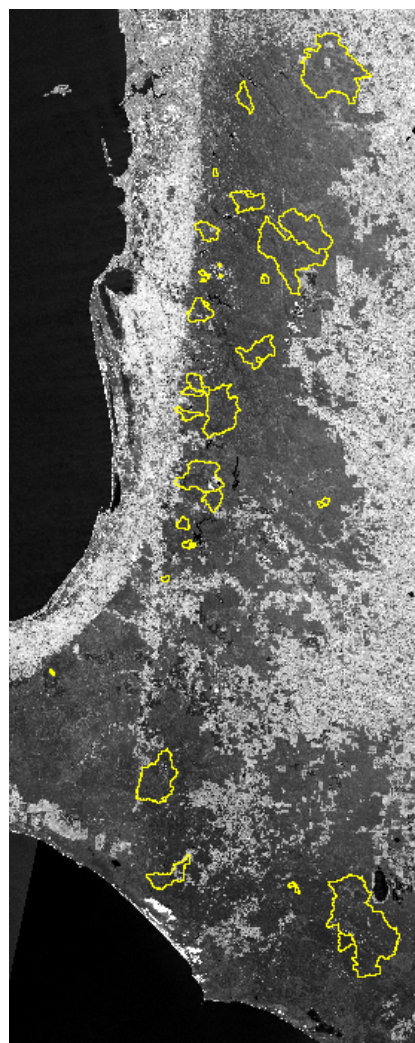
Each catchment-year provides one data point for analysis. Annual runoff ratio (RoR) was chosen as variable summarizing yield

#### **Data:**

- Daily rainfall records and summaries to represent rainfall patterns
- Run-off records
- DEM & derivatives for catchment characterization
- Catchment forest density data from Landsat TM (annual)
- Data for a total of ~450 catchment years from 42 catchments was assembled

#### **Analysis**

'Random Forests' decision tree analysis was applied to examine relationships of variables with RoR and to quantify 'predictive' accuracy of the data model, as well as identify effects of forest density/thinning in combination with other variables.



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### **Summary of Results**

Two major results have emerged from the study to date:

1. The satellite record suggests widespread decline of forest in the lower rainfall (eastern) parts of the Perth Hills
2. Analysis shows new information for hydrology
  - the data model has quite a high predictive accuracy for RoR across all catchments and years (r-squared ~ 0.77)
  - forest density index is an important predictor variable
  - the decision tree approach provides a means to identify where (and what degree) of thinning has a high positive effect on historical RoR

These results, further analytical steps and the potential applications and validation of this approach to will be presented in the talk.