MANAGED AQUIFER RECHARGE OF THE SUPERFICIAL AQUIFER WITH UNTREATED STORMWATER

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Over the past ten years, groundwater levels under about 40% of metropolitan Perth have fallen and may also be falling under the 45% for which a trend cannot be determined because of a lack of monitoring data. The fall is a result of a drier climate and extraction of groundwater for both public and private use. The fall has taken place despite increased urban intensity (smaller blocks, large houses, urban infill) which has increased the proportion of rainfall that runs off roof and road surfaces in those areas where it is being directed into the aquifer.

There has been a long tradition of directing stormwater into the Superficial Aquifer under Perth as this is both convenient and provides significant recharge for subsequent use through local government and private bores. Increasingly, a larger proportion of public water being extracted from the Superficial Aquifer is coming from urban areas as bores under pines and native vegetation have proved less reliable.

This paper examines the potential to increase further the amount of stormwater that is recharged into the aquifer, especially in areas where there is a risk of salt water intrusion and the loss of valuable wetlands. Previous studies on the quality of urban stormwater and its impact on aquifer water quality when recharged via absorption and compensation basins is reviewed as a means of assessing the risks and benefits. Almost 100 GL of stormwater is discharged to the estuary and ocean from main drains alone, and there is a similar amount of highly treated wastewater that is discharged to the ocean.

It is concluded that there is probably enough stormwater and treated wastewater available to offset the fall in groundwater levels but there are local issues of matching supply and demand. In some areas the quality of stormwater entering the Swan Canning Estuary may also be improved, although the risk of mobilizing legacy stores of nutrients is still an unknown factor when previous market gardens are urbanized.

Outline of talk:

1. Trends in groundwater levels under Perth
    - PUR results summarized
2. How many GL per annum is being lost from storage on average in the past ten years?
    - Need to do a ROUGH calculation based on 1995 and 2005 isopotentials
3. How many GL of stormwater is discharged into the river and ocean each year:
    - Need permission from Mark Tonti to use the estimates provided by Geoff Hughes in 2005 ie 66 GL entering the river and 30 GL/yr entering the sea
    - Do we have any measured discharges – eg Simon Toze Floreat Main Drain
4. What quality is the stormwater being discharged and what impact does it have on the aquifer?
    - Review of 1970s measurements in McFarlane (1980)
    - Steve Appleyard's paper on absorption basin
    - Sasha Marten's work for WESROC and Jim Davies papers on street sweeping etc (NB: JDA are also giving a paper)
    - City of South Perth study. (also by JDA?)
    - Swan River Trust study of water quality entering the estuary – data has recently been reviewed by Emma van Looij and sho2wn that loads have fallen because of lower baseflows. Individual studies by Rob Donohue etc. Can get access to these papers via Anthony Sutton and/or Malcolm Robb.
    - Given the widespread nature of recharging stormwater, what is know about groundwater quality in urban areas?
        - Jim Bawdin's PhD Thesis and Perth Urban Water Balance Study
        - Elise Bekele's review of groundwater quality in northern suburbs.
        - Mike Trefry's review of groundwater quality in the Cockburn Sound area
5. Conclusions
6. Further work (helping shape the Premiers Water Foundation studies)