Research Methods
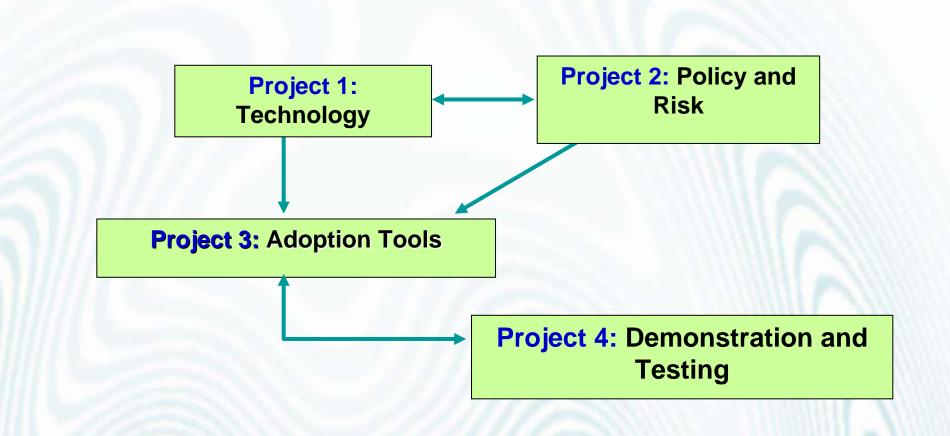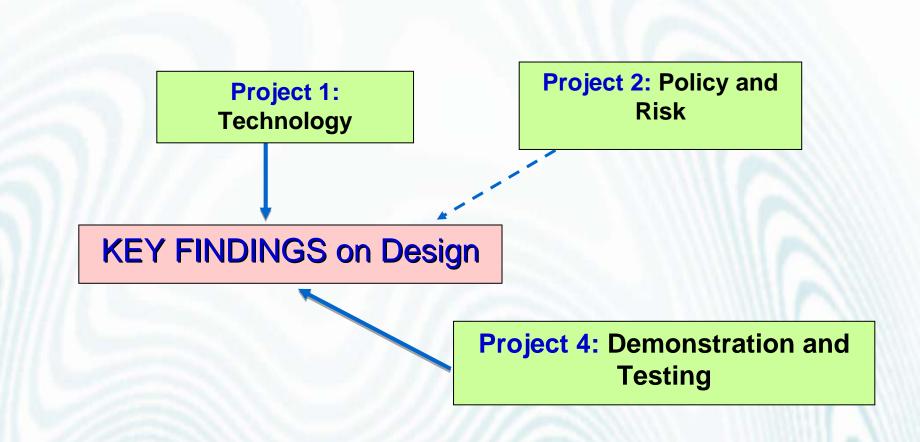
FAWB Research

FAWB Research

Project 1 – TECHNOLOGY

Lab based experiments aimed at refinement of the technology

- **Activity 1.01** - Vegetation Trials

- **Activity 1.02** – Optimisation of biofilter design: Laboratory biofilter column experiments

- **Activity 1.03** – Biofilter optimisation for stormwater harvesting

Activity 1.01: Vegetation Trials

Activity 1.02 (a) – *Laboratory study of non-vegetated filters*
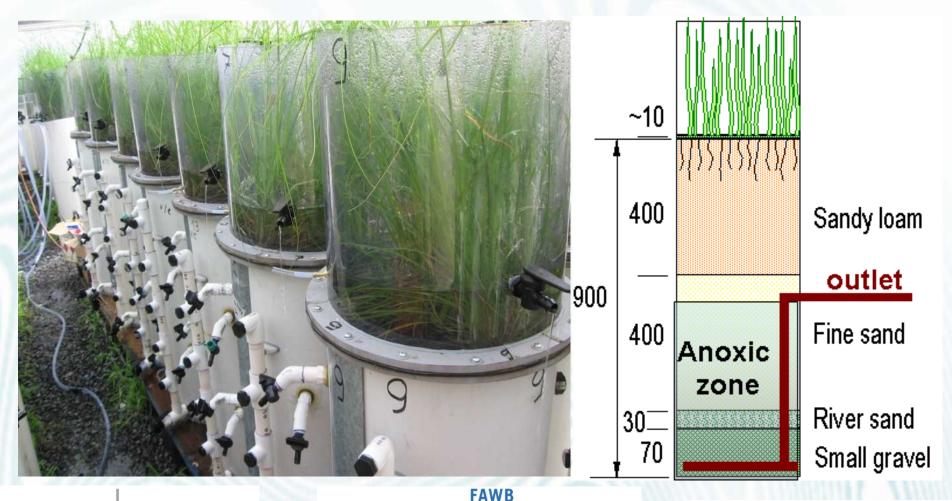
Activity 1.02 (b) – Optimisation of standard biofilter design

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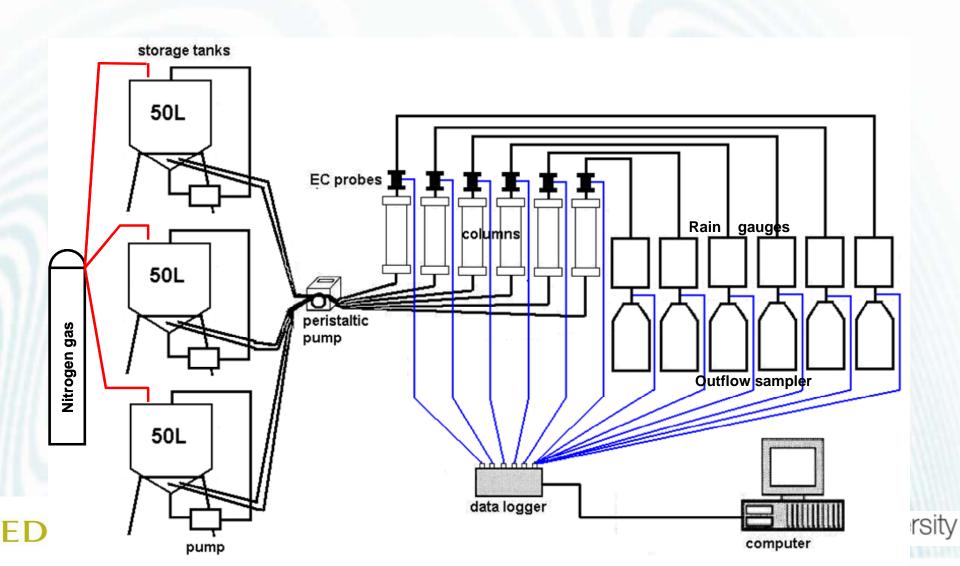# *Activity 1.02 (c)* – *The impact of a permanently submerged zone*

Activity 1.02 (d) – *The* **long term sustainability of soil media**

Activity 1.02 (e) – *The **impact of temperature***

- Joint work with Lulea University in Sweden

<u>Project 4</u> – DEMONSTRATION &TESTING

The aim is to test and demonstrate the technology by supporting its implementation and monitoring

- **Activity 4.01** - Second Ponds Creek, ***Sydney***

- **Activity 4.02** – Monash Univ. Carpark Biofilter, ***Melbourne***

- **Activity 4.03** – Wakerley Bioretention System, ***Brisbane***

- **Activity 4.04** – Testing existing systems ***Melbourne, Brisbane & Sydney***

- **Activity 4.05** - Saturn Crescent stormwater garden, ***Brisbane***

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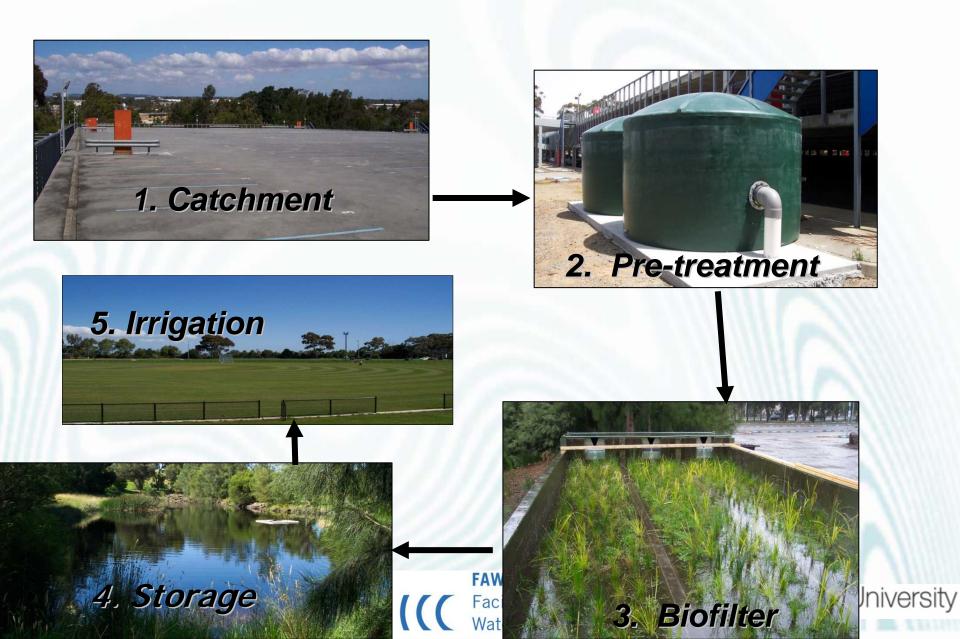Water Biofiltration

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Activity 4.01: Second Ponds Creek, Sydney

- Systems built in sodic soils: would salt leach?

- Filter media problems: unstable soil structure

Activity 4.02 – Monash Biofilter, *Melbourne*

1. Catchment

2. Pre-treatment

5. Irrigation

4. Storage

3. Biofilter

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Activity 4.03 – Wakerley Bioretention System, *Brisbane*

Activity 4.04: Testing existing systems

Melbourne
-Monash Car park, Clayton
-Cremorne St, Richmond
-Aleyne St, Chelsea
-Point Park, Docklands
-Hamilton St, W. Brunswick
-Avoca Cr, Pascoe Vale
-Parker St, Pascoe Vale
-CERES, West Brunswick
-Bourke St tree pit, Mel
-Hallam Bypass, Floret Pl
-Hallam Bypass, Wanke Rd

Sydney
-Wolseley Pd, Vic Park
-Leyland Gr, Vic Park
-Second Ponds Creek

Brisbane
-Streisand Dr
-Saturn Cr
-Donnelly Pl
-Hoyland St

Activity 4.05: Saturn Crescent stormwater garden, *Brisbane*

- The first system built using FAWB design specifications

- Several design simulated stormwater events have been monitored so far

Publications

On Filter Media

1. FAWB Filter Media Guideline – ***the latest version can be downloaded from FAWB site,*** *http://www.monash.edu.au/fawb/*

2. Hatt, B. E., Deletic, A., Fletcher, T.D. (2007a) Stormwater reuse: designing biofiltration systems for reliable treatment. *Water Science and Technology*, 55(4) 201-209

3. Hatt, B.E., Fletcher, T.D. & Deletic, A (2007b) Hydraulic and pollutant removal performance of stormwater filters under variable wetting and drying regimes, *Water Science and Technology* Vol 56(12), 11-19

4. Hatt B.E., Fletcher TD, Deletic A, (2008a) Hydraulic and pollutant removal performance of fine media stormwater filters, *Environmental Science and Technology* 42, 2535–2541

On Vegetation

5. Bratieres K, Fletcher TD, Deletic A, Zinger Y, (in press), Optimisation of the treatment efficiency of biofilters; results of a large-scale laboratory study, Water Research

6. Fletcher T. Y. Zinger, A. Deletic (2007) Treatment efficiency of biofilters; results of a large-scale column study, Rainwater & Urban Design 2007 Conference, Sydney, August 2007

7. Read J., Wevill T, Fletcher DH, Deletic A, (2008) Variation among plant species in pollutant removal from stormwater in biofiltration systems, Water Research, 42, pp 893 – 902

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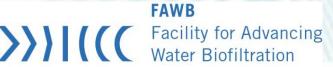
Publications

Submerged Zone and Carbon Source

8. Blecken GT, Zinger Y, Deletic A, Fletcher TD, Viklander M, (under review) Impact of a submerged anoxic zone and a cellulose based carbon source on heavy metal removal in stormwater biofiltration systems, Ecological Engineering

9. Zinger Y., T.D. Fletcher, A. Deletic, G.T Blecken and M. Viklander (2007a) Optimisation of the nitrogen retention capacity of stormwater biofiltration systems, Presented at NOVATECH 2007, Lyon, France, June 2007

10. Zinger Y, A. Deletic, T.D. Fletcher (2007b) The Effect Of Various Intermittent Dry-Wet Cycles On Nitrogen Removal Capacity In Biofilters Systems, Rainwater & Urban Design 2007 Conference, Sydney, August 2007

Hydraulic Performance

11. Coustumer S. Le, Fletcher T. D., Deletic A. and Barraud S. (2007) Hydraulic performance of biofilters for stormwater management: first lessons from both laboratory and field studies, Water Science and Technology, Vol 56(10), pp 93–100

12. Coustumer S, Fletcher TD, Deletic A (2008) Hydraulic performance of biofilter systems for stormwater management: lessons from a field study – FAWB and Melbourne Water (Healthy Bays and Waterways)

13. Coustumer S, Fletcher TD, Deletic A, Barraud S, Lewis J (under review(a)) Hydraulic performance of biofilter systems for stormwater management: lessons from a field study, J Hydrology

14. Coustumer S, Poelsma P, Fletcher TD, Deletic A, Barraud S, (under review(b)) Clogging and metal removal by stormwater biofilters; a large-scale design optimisation study, J Hydrology

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Publications

Field Studies

15. Hatt B.E., J. Lewis, A. Deletic, T.D. Fletcher (2007c) Insights From The Design, Construction And Operation Of An Experimental Stormwater Biofiltration System, Rainwater & Urban Design 2007 Conference, Sydney, August 2007

16. Hatt BE, Fletcher TD, Deletic A (in press), Hydrologic and pollutant removal performance of biofiltration systems at the field scale, J of Hydrology

17. Smith N, Allen R, McKenzie-McHarg A, Deletic A., Fletcher TD, Hatt B (2007) Retrofitting Functioning Stormwater Gardens Into Existing Urban Landscapes, Cairns International Public Works Conference, Cairns, August 2007

Other Design Issues

18. Blecken G.-T., Y. Zinger, T.M. Muthanna, A. Deletic, T.D. Fletcher and M. Viklander (2007) The influence of temperature on nutrient treatment efficiency in stormwater biofilter systems, Water Science and Technology, Vol 56(10), pp83–91

19. Deletic A, Mudd G (2006) Preliminary Results From Laboratory Study Into Performance Of Bioretention Systems Built In Western Sydney Saline Soils – FAWB report

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