

*Living Smart  
Water Efficiency Workshop*

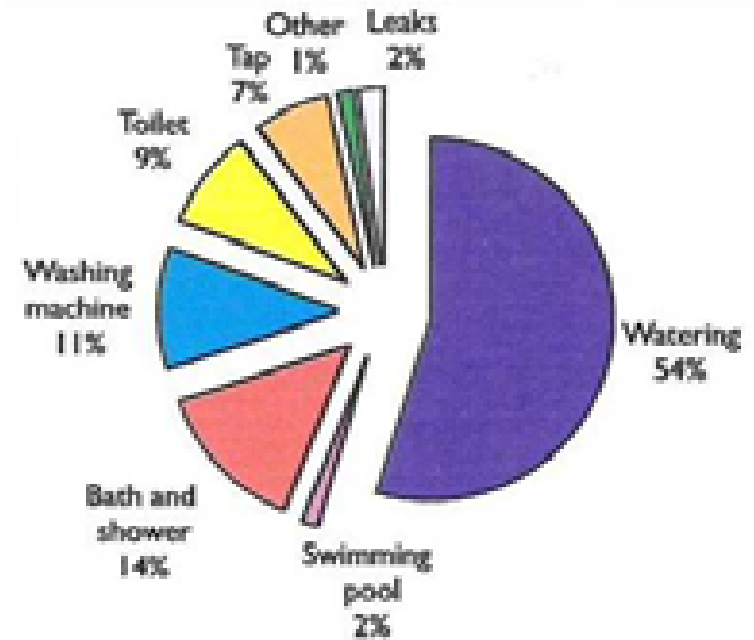
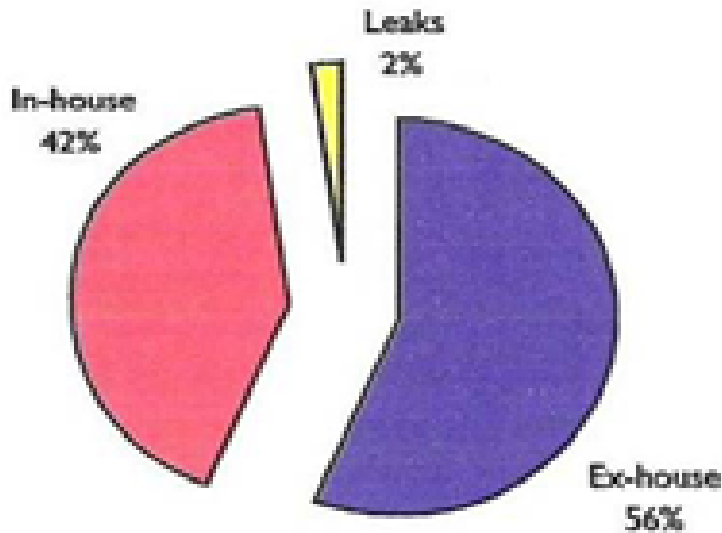


**Greywater**  
**Rainwater**  
**Irrigation**



**Dr Ross Mars**

# Household water use



	1981/21		1998/00	
	Usage (L/house/day)	%	Usage (L/house/day)	%
Ex-house	342	42	727	57
In-house	473	58	532	43
<b>Totals</b>	<b>815</b>		<b>1259</b>	

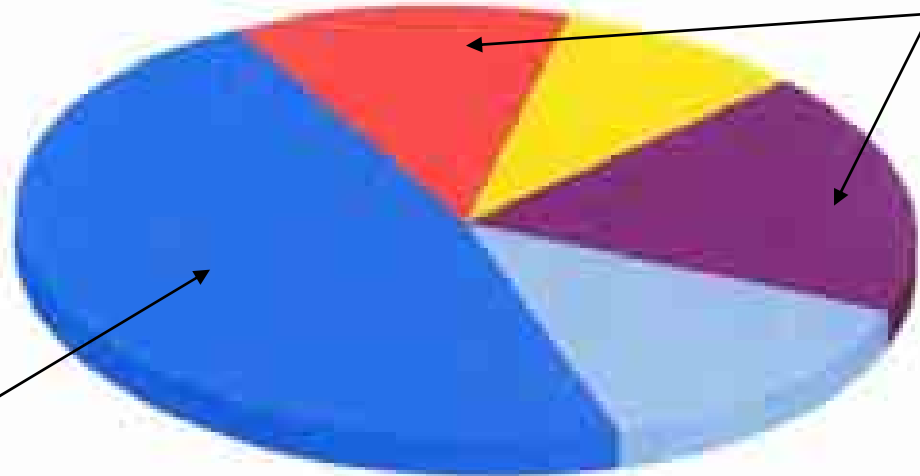
# Maximising water harvesting, and minimising use

- Rainwater tanks
- Stormwater capture into soil
- Greywater reuse
- Types of irrigation
- Human behaviours
- Appropriate landscaping
- Water efficient fittings and appliances



# Typical residential water use.

WHERE IS ALL OUR WATER USED?



Capture this

Re-use it here



Typical scheme water use of a household in  
Western Australia

# Greywater reuse

- Greywater is wastewater from the kitchen, laundry and bathroom.
- Blackwater is toilet water.
- While kitchen wastewater is technically greywater, many authorities group it with other blackwater sources.



# Why reuse greywater

- Reusing wastewater from laundry and bathroom/s can save about 100,000 L each year.
- This is derived from laundry 42 L/person/day and bathroom 51 L/person/day.
- Typical family of four produces about 360 L/day of greywater = 135,000 L/year.
- Average Australian family uses 800 L of fresh water each day, and about one-third to one-half of this is used on the garden.

# Health concerns

- Disposal to be below the ground surface.
- Exclude all human and animal contact.
- Isolate from mains water and stormwater.
- No contact with vegetables/food plants, except above-ground fruit trees and leafy vegetables.
- No opportunity for mosquito breeding.
- All pipework to be purple coloured.

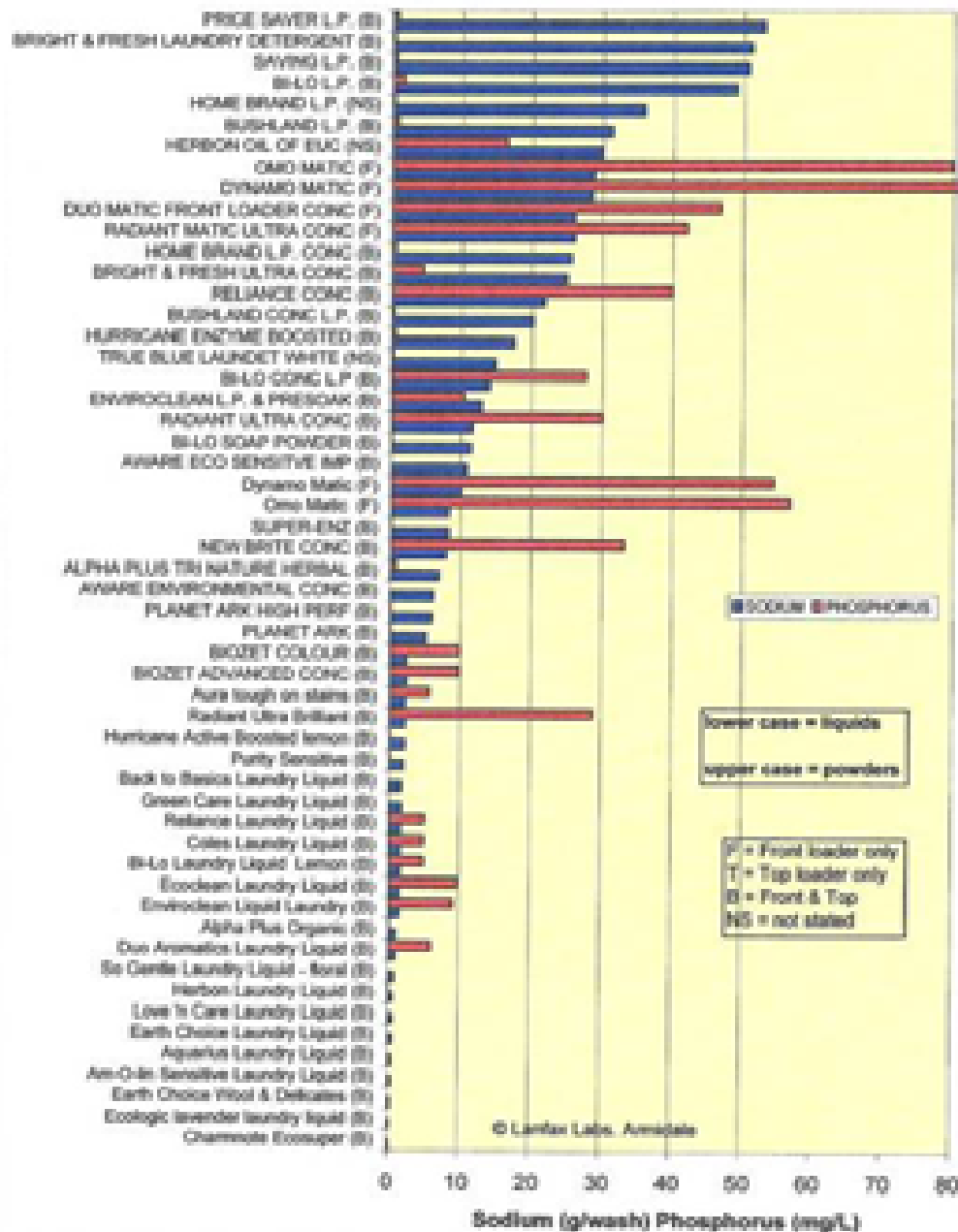
# Environmental concerns

- Greywater kept within confines of property.
- Use only low phosphate products.
- Greywater may make soil alkaline.
- Use liquid detergents rather than powders.
- Avoid excessive use of bleaches, softeners, boron/borax cleansers.
- No greywater reuse within 100m of water-sensitive ecosystems.
- Add mulch to facilitate nutrient/waste breakdown.



Figure F1 - FRONT LOADING MACHINE CYCLE

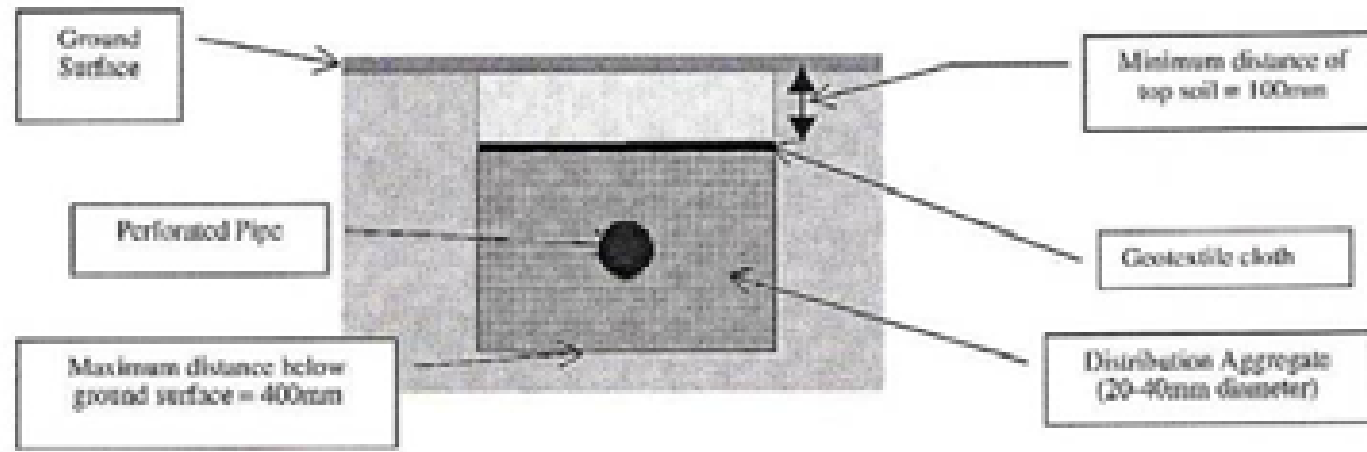
Full wash cycle: Front loader = 75 L



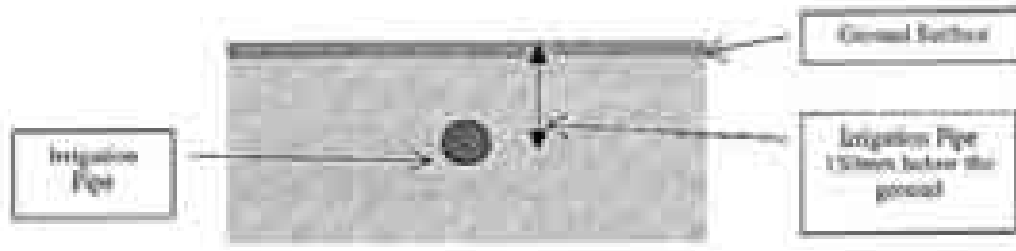
# Greywater Irrigation Options

Treatment	Greywater Reuse Application
Untreated greywater	Bucketing
Primary treated greywater <i>(i.e. treatment by either a sedimentation tank and/or a diversion device)</i>	Sub-soil trench or Sub-surface drip irrigation* <i>(*dependent on type of filter system!)</i>
Secondary treated to a 20 mg/L BOD <sub>5</sub> , 30 mg/L SS and possible disinfection to achieve <10 cfu thermotolerant coliforms/100ml	Surface spray irrigation, Sub-strata drip irrigation, Sub-surface drip irrigation, or Sub-soil trench

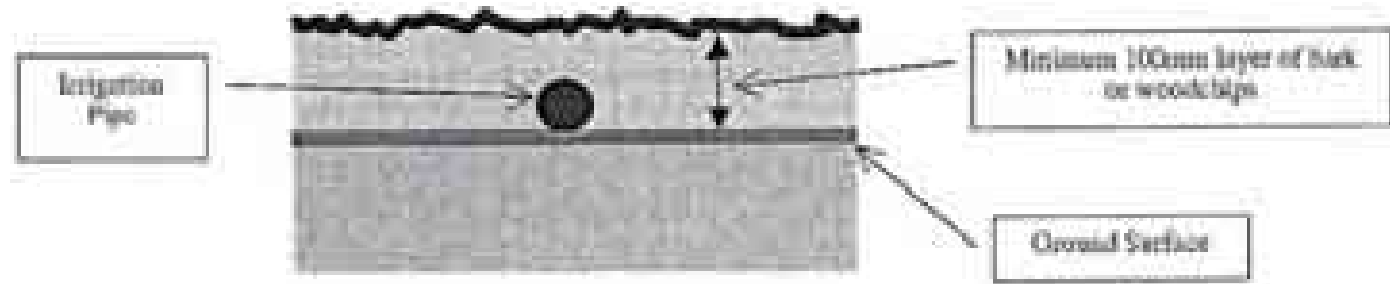
# Sub-soil trench



# Subsurface drip line



# Substrata irrigation



# What is involved to install a system?

- Application to local Council – scaled drawing, plumbing layout, location of sewer/septics, irrigation plan.
- Council fee typically \$208.
- Approval to install. Install with plumber.
- Inspection and approval to use.
- Rebate - \$500 from Water Corporation

# An overview of systems approved for use in WA

Some of the different greywater systems which are approved include:

1. Filter system for laundry wastewater, with piped trench dispersal.
2. Filter system for laundry wastewater, with dripper irrigation.
3. Single sedimentation tank system for laundry and bathroom water, with piped trenches.
4. Septic tank system with alternating conventional beds and separate tank system for laundry reuse.
5. Sand filter system, with dripper irrigation.
6. Reedbed system.
7. Filter and pump tank
8. Watersave - double tank system, with dripper irrigation, and Watersave Plus.
9. SupaFlow
10. WaterClear, and WaterClear Plus.
11. Greywater Diverta – formerly Greywater Saver
12. G-Flow: for laundry greywater
13. GreyFlow
14. Ecocare
15. Aquarius
16. Greymate
17. Greymax (Ecomax)
18. Filtrex
19. Oasis (Nubian)
20. Matala Gator Pro Plus



# GRS Filter



Trench placed alongside  
dripline of trees.



Low pressure  
dripline under  
gravity



Filter and  
pump tank

# Sedimentation tank and piped trenches

A sedimentation tank allows hair, lint and other solids to settle out. Size of tank permits one day's retention.





# Watersave

## Double tank and dripper system

First tank is sedimentation, second tank is pump. Two float switches are set to operate pump and safety warning device.



# Pump tank showing scheme water (holiday) top-up.



Substrata dripline  
irrigation under fruit trees

# GRS SupaFlow



This system has a Dual Filter and a pump tank.

Has safety overflow to sewer in case pump fails or filters blocked.

Can redirect greywater to sewer in winter or at other times.

Optional: safety warning for pump failure.

SupaFlow with  
reflux valve for  
overflow to sewer



Overflow can also be  
directed into a  
disconnecter gully (DG).



# WaterClear

Has ozone injection to minimise health risk.

Two pumps and controller to regulate half-an-hour cycle.

Ideal for combined greywater – from different sources, such as small communities, caravan parks and mining sites.



# Other greywater systems - Matala Gator Pro Plus

A sequence of different filter sizes then a pump out.



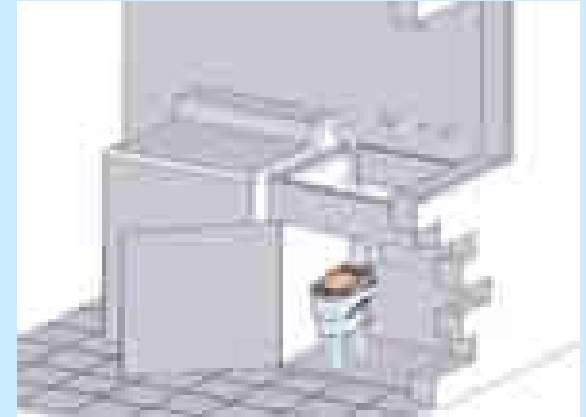
# Other Greywater Systems



G-Flow



Nylex Diverter



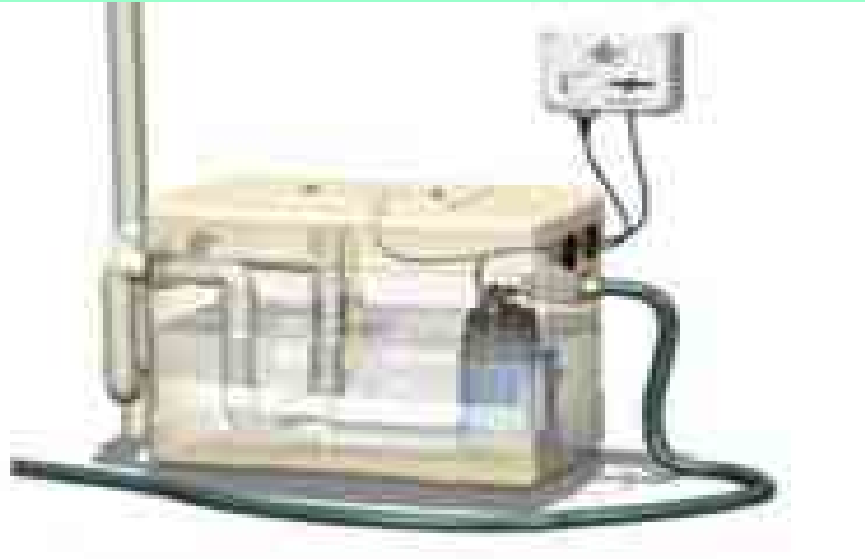
Grey-Flow

# Other Greywater systems

Aquarius



Greymate

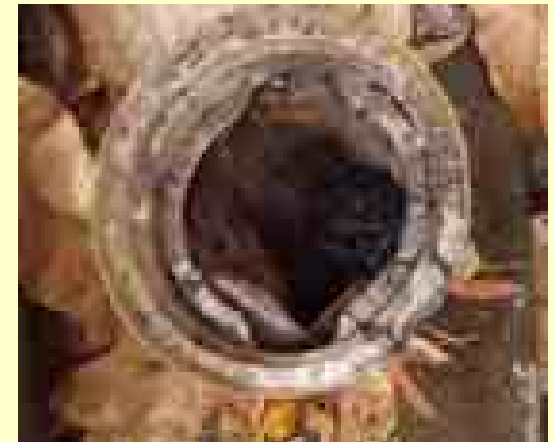


Nubian  
Oasis  
GT600



# Greywater System Maintenance

- Systems with filters require regular cleaning and/or filter replacement.
- Post pump filters (eg biomatt) require once a month clean.
- Irrigation – check for blockages.
- Dripline buried may only last 3 years unless tech filter installed.
- Pumps may last 5-10 years.
- Sedimentation tanks should be cleaned out every 5 years.
- Large pump tanks cleaned out every 1 to 2 years. SupaFlow tank every 6 months.



# Rainwater tank installation



Bladder - Ecosac



Polyethylene



Steel-liner

Slimline steel



Underground tanks

# Large household tanks



Piped trench used for overflow

# Underground tanks - buried rainwater tanks with soakwell overflow



# Bladder - Ecosac



Require at least 600mm space, can be a variety of widths and lengths.

# Slimline (Under-eave) tanks

Generally, slimline tanks have a size of 500-5000 L.

This is often seen as emergency water and is not usually pumped and hooked up to house fixtures.



# Leaf eater, first flush and overflow



Automatic scheme water top-up



Manual top-up

# Onga WaterSwitch



# Aquasource



Bremco  
mains device



# External Pump systems



Press control



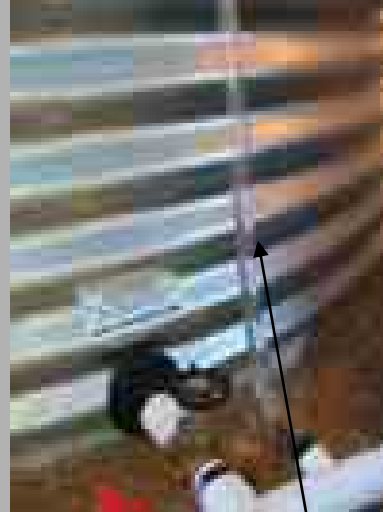
Pressure tank

**\$600  
rebate  
available!**

# Essential extras



In-line filter



Water level device

# Rainwater Tank System Maintenance



First flush



Leaf eater



Insect screens



# Waterwise Irrigation

A shift towards drip line – for both subsurface and substrata applications.



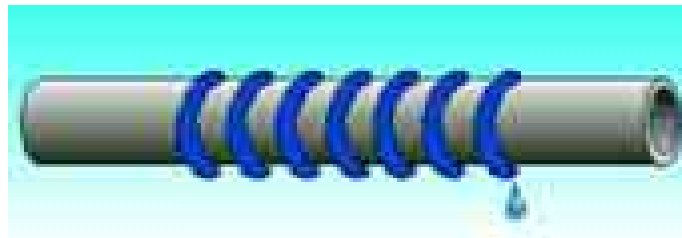
# Contemporary Spray and Sprinkler irrigation systems

- extremely wasteful (water, energy, labour, chemicals)
- not very environmentally-friendly, and increase risk of plant fungal diseases
- inflexible and not very suited to complex gardens layouts

# Why use Drip Irrigation?

## Why do we need to change?

- Increasing cost of water and power
- Depletion of our water resources
- Pollution of our water bodies
- Pressing demand for more efficient systems
- Need safer ways of re-using our greywater
- Vandalism, Public Liability



Drip irrigation can be pressure-compensated, self-flushing, anti-siphoning and have a shut-off mechanism.

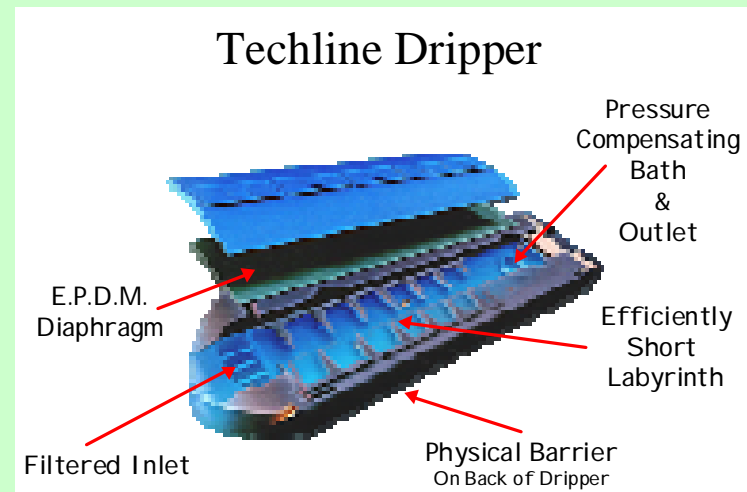
# Benefits and Limitations of Dripper Irrigation

## 💧 BENEFITS

- 💧 Efficient water use (uniform, good recovery)
- 💧 Low application rate (reduced risk of runoff)
- 💧 Ideal for odd shapes & narrow strips
- 💧 Improved disease control
- 💧 Effluent (eg greywater) reuse
- 💧 Reduces weed growth
- 💧 Allow for 24 hour operation possible
- 💧 Reduces exposure to vandalism
- 💧 Reduced injury risk
- 💧 More energy-efficient
- 💧 Ability to better use Fertigation

## 💧 LIMITATIONS

- 💧 Requires capillary action of water to work
- 💧 More technical maintenance required
- 💧 May need replacing after 3-5 years if drippers blocked
- 💧 Does not tolerate short cuts
- 💧 Establishment of lawn may require temporary overhead watering







# Domestic lawns

## Roll on turf in sandy soils

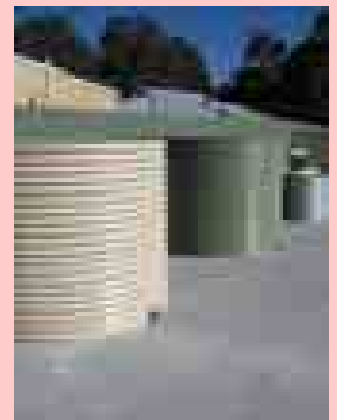


# Retail Outlet at Mundaring





Manufacturers of quality steel tanks.



# Focus on irrigation and plumbing pipe and fittings



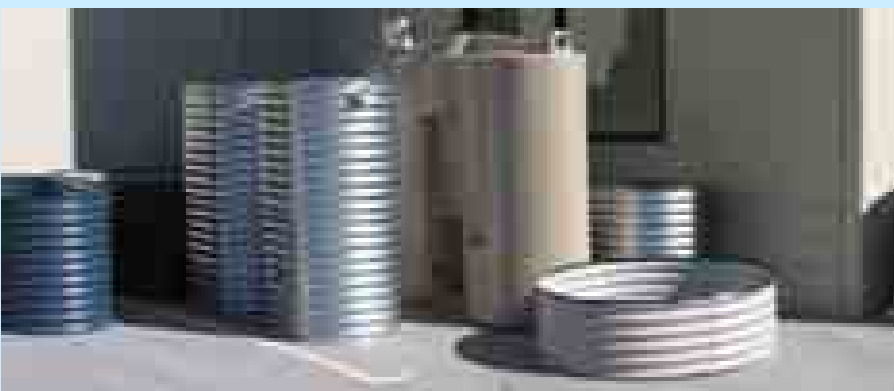
Waterwise irrigation –  
dripline and low water-  
use products.



# Garden (veggie) tanks



# All shapes and sizes



# Conclusions

- There is an increasing awareness to recycle and reduce waste.
- However, there is also little evidence of any real desire in the community to reduce the level of consumption.
- We all need to conserve and re-use our limited resources.
- Each of us needs to adopt reuse strategies for a sustainable future.
- Each of the systems discussed here have specific advantages and particular applications.
- Historically, rainwater capture and use in the home is well known, and is still the only water source in many hills and county areas. Its use has less risks than greywater reuse.
- As water becomes more expensive and scarcer, we need to adopt waterwise irrigation strategies.

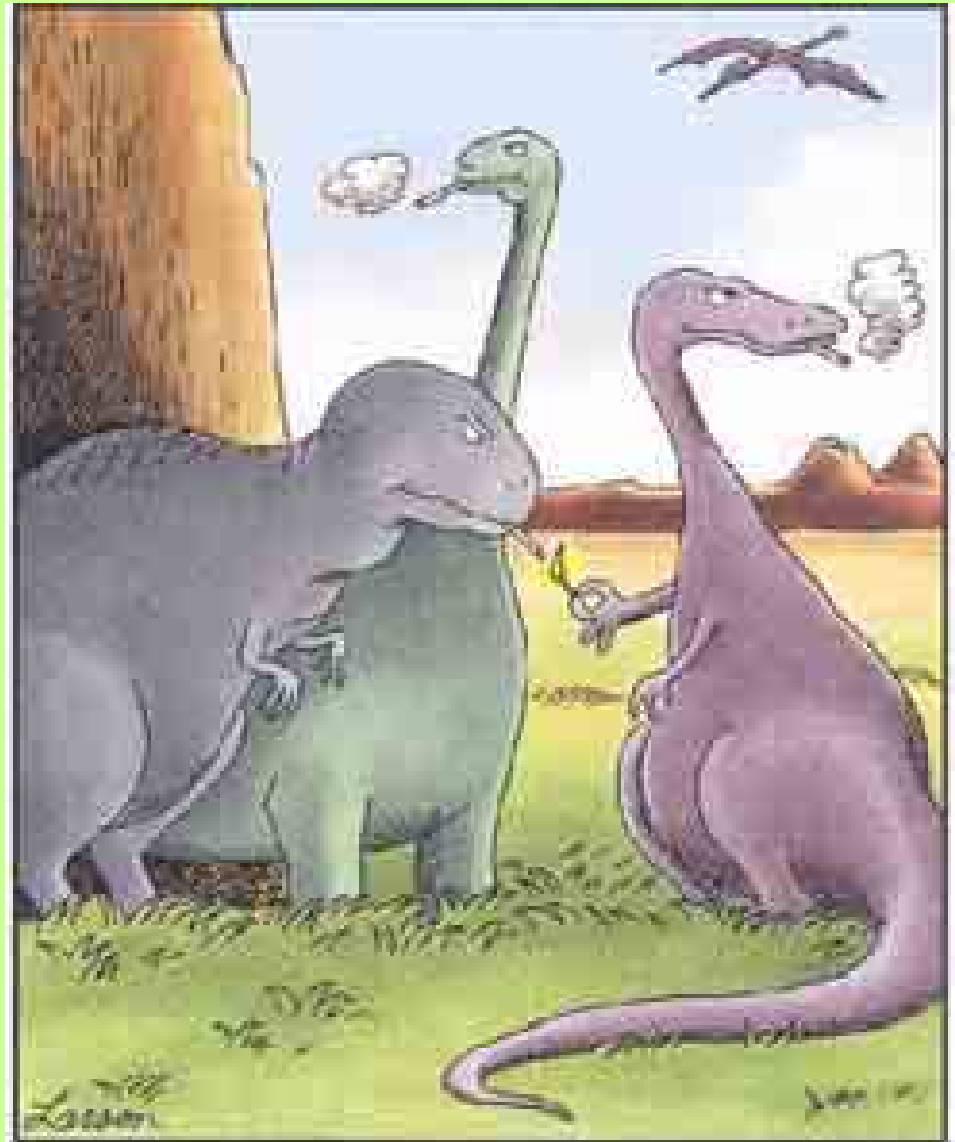


What will be our priorities?

What are our best options?

How do we secure our water future?

# The End



The real reason dinosaurs became extinct