

HOUSEHOLD SCALE URBAN FARMS: THE NEXT BIG THING IN TRANSFORMING CITIES INTO FOOD PRODUCING POWERHOUSES

Biofilta have reimagined the traditional backyard veggie patch into a super productive 40m2 urban farm that uses captured rooftop rainwater and diverts that water into an advanced wicking garden system for food production. This approach demonstrates how households can close loops and re-purpose abundant roof water and food “waste” streams into valuable resources to help cities feed themselves in the process.

The Foodcube™ system is ergonomic, reduces weeding, and due to the water efficient design requires watering once a week in summer and less in winter. It also takes composted food waste from households and uses that input to grow food, which will reduce the amount of organic waste going to landfill in cities. The household farm is designed to reduce the time taken to grow food in a closed loop system and to allow the busy modern urbanite to reconnect with food and become an urban farmer.

Underlying this initiative are some deeper insights into the role an urban garden can have on our broader ecosystem.

WATER SENSITIVE

A 200 m2 roof area in Melbourne was modelled using a typical year’s worth of real rainfall in Melbourne and is expected to produce 109,000 litres of runoff per year taking into account some evaporation and losses. Hence, due to development, there is now 100,000 litres of storm water rushing into our waterways per annum where typically most of that rainfall would be soaked into the ground. Multiplied across thousands of houses our waterways are being inundated with runoff carrying pollutants such as nutrients and dust particles.

Where do these solids and nutrients come from? Rainfall carries airborne pollutants from dust to our roof and that runs off to the waterway. Annually, a typical roof runoff comprises 3.02kg of suspended solids (the gunk you find in your gutters), 16.7g of phosphorus and 242g of total nitrogen. So, for urban areas, reducing the volume of outflow is a really good thing from an environmental perspective and removing these nutrient loads is also good so they don’t accumulate in our marine environments.

Our 40m2 garden will, based on our own urban water consumption figures, consume an average of 4 litres per square metre per day (more in hot periods). This equates to a base consumption of 192 litres per day or 70,000 litres per year for a mix of lettuce, onions, silverbeet, mint and other seasonal vegetables and herbs. If we connect a 10,000 litre water tank to capture the rainfall and add the water demand pattern from the garden, the water balance for our house is:

	Flow (ML)	TSS (kg)	TP (kg)	TN (kg)
Flow In	0.109	3.016	0.017	0.242
ET Loss	0.000	0.000	0.000	0.000
Infiltration Loss	0.000	0.000	0.000	0.000
Low Flow Bypass Out	0.000	0.000	0.000	0.000
High Flow Bypass Out	0.000	0.000	0.000	0.000
Pipe Out	0.032	0.446	0.004	0.055
Weir Out	0.000	0.000	0.000	0.000
Transfer Function Out	0.000	0.000	0.000	0.000
Reuse Supplied	0.068	0.840	0.009	0.111
Reuse Requested	0.070	0.000	0.000	0.000
% Reuse Demand Met	96.808	0.000	0.000	0.000
% Load Reduction	70.470	85.199	74.158	77.156

Growing food during the year, we can meet the annual demand of the garden with a 97% reliability from rainfall and only use potable water for 3% of the water demand. Further, from a volumetric perspective, our tank and garden reduces the flow to the Council drains by 70% which could mean that if everyone did it, issues like nuisance flooding in streets would be significantly reduced and current pipe assets would provide a greater level of service.

Best Practice Environmental targets in Victoria are met if you can provide treatment for stormwater that results in:

- 80% reduction in Total Suspended Solids
- 45% reduction in Total Phosphorus
- 45% reduction in Total Nitrogen.

By capturing and reusing the rainfall from the roof, our urban farm exceeds Best Practice environmental targets:

Parameter	Best Practice Target Reduction	Biofilta Urban Farm Outcome
TSS	80	85.2
TN	45	74.1
TP	45	77.1

POWER

Our bottom watered, advanced wicking garden beds can be irrigated using gravity from the tank, which is very energy efficient.

FOOD PRODUCTION

Based on our trial gardens over the past year, only 40m2 of growing area is required to produce 640kg of food per annum, or enough for the yearly dietary consumption of 5 adults. Value of produce per annum could be over \$5,000 per annum through the production of a diverse range of herbs and vegetables. Given that only 5% of Australians eat the recommended 130kg of vegetables per annum, our 40m2 garden would likely feed more than the average household and provide opportunity for food sharing within the neighbourhood or extended family. Invite the relatives for a BBQ and everyone leaves with a bunch of silver beet and some onions. The power of this food sharing is something that really excites us. Growing local also helps to develop more resilient communities that are connected with their food and less reliance on imported goods.

CLOSED LOOP

Soil based gardening can be used to close the nutrient loop by turning green waste into compost and this is returned into the garden to recycle the nutrients into more food. How many kg’s of lettuce or vegetable scraps do you typically throw into the bin per week? By composting this green waste, you can create a closed loop system and become an essential part of our society achieving greater food security and environmental sustainability.

COST

Excluding seedlings, soil and water tanks we expect this particular household farm system to cost under \$10,000. Depending on the varieties and volumes of produce grown, the system can achieve payback times of between 2- 3 years, with an ROI of 30%.

SUMMARY

Growing food at home using captured rainwater from the roof can have substantial beneficial environmental impacts on the downstream environment by reducing the volume of storm water runoff and nutrient loads. Our model 40m2 garden could produce more than the recommended amount of vegetables for 5 adults each year. The benefits of urban farming can be significant if the accumulated effect of lot scale water sensitive urban design is taken into account. Growing food at home with the right technology is very cost effective and can represent an excellent return on investment from reduced supermarket spend. Biofilta is currently building household, community and school urban farms and is currently taking orders for the large format systems shown in the model garden. We can also offer a full design and delivery service for full landscape setup.

If you are interested in a Biofilta urban farm at your school, community, apartment or home, contact info@biofilta.com.au or www.biofilta.com.au

