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PS 5.4 Changing Benefits

Self-watering Vertical Planter:
Sustainable Solution for Urban Greenery in Tropical Region

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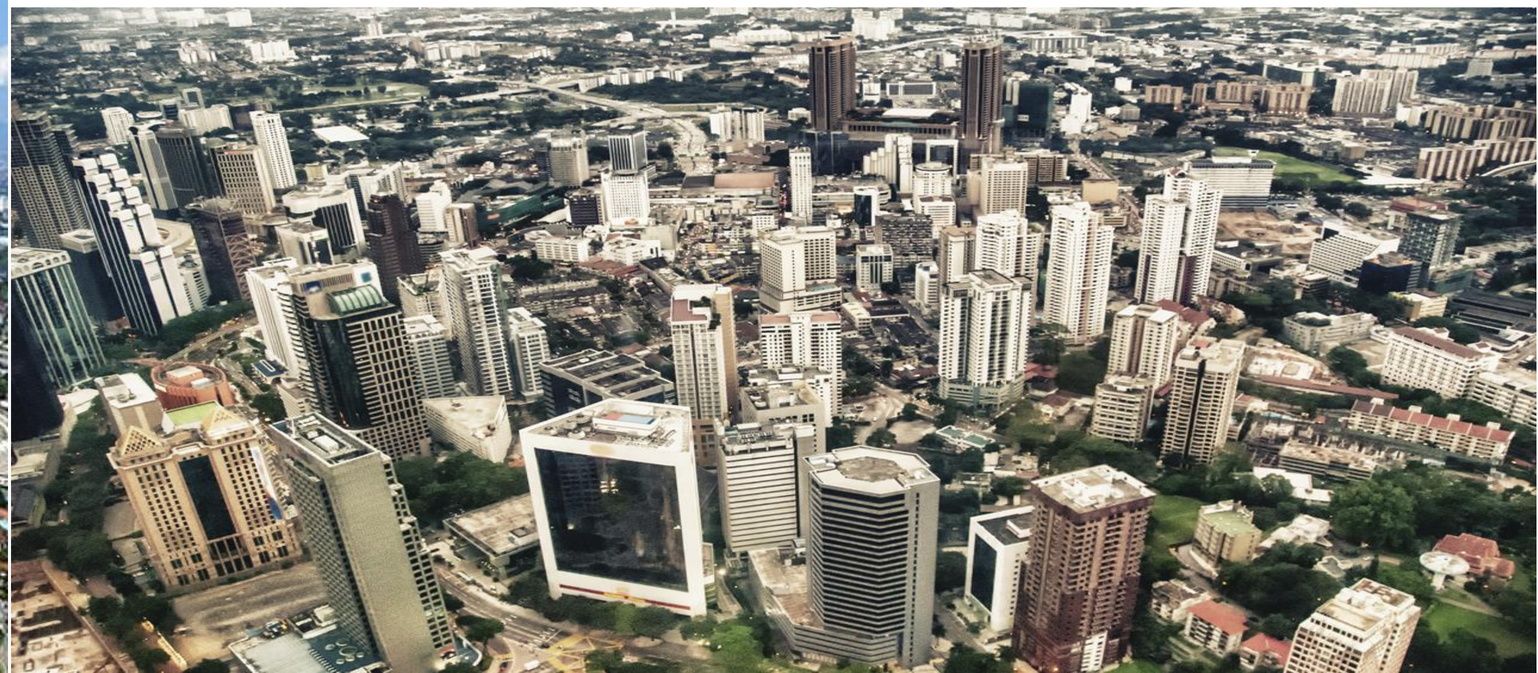
INTRODUCTION

- The developing countries in the Tropical region experiencing the highest urban growth with approximately 1 to 3% annual increase.
- By 2030, the Tropical region expected to have more urban areas than rural areas. (Meyer and Turner, 1992; United Nations, 2014).



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- In an era of rapid urbanization and climate change, the world is growing used to urban floods.

- Urban floods can cause huge of loss.

  - Even the mildest can bring traffic to a standstill and cause economic hardship for merchants and residents.

  - The worst floods drown people, spawn disease, destroy infrastructure and virtually shut down entire economies.

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- In the past, 50% of the rain seeped through the natural ground cover into the ground, 10% water runoff to rivers and drains and 40% evapotranspiration.

- Presently, due to urbanization, the green spaces have been paved over with concrete and only 15% of the rainwater infiltrates to the soil, **water runoff has expanded to 55%** and evapotranspiration is 30% of the total.

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- Cultivating urban greenery is one of the solution to mitigate climate change impacts in urban areas. (Sheweka and Mohamed, 2012).

- Vertical planting recognised as an environmentally sustainable approach to tackle urban flood problem by acting as a ‘sponge’. (Pheng, 2018)

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BACKGROUND

- Malaysia is one of the developing countries in Southeast Asia. Southeast Asia is a sub-region of Asia.
- Southeast Asia is within the tropical region with temperatures above 25°C throughout the year.
- The region is strongly influenced by the Asian monsoons, which bring significant amount of rainfall to parts of Southeast Asia.

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ISSUE

- In Malaysia, urban floods have been occurring recently with unprecedented frequency and intensity, with at least three major incidents in a year.

- Limited spaces and continual population growth, it requires innovative & sustainable solution to solve rainwater runoff. **VERTICAL PLANTING!**

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Vertical greenery benefits:

- **Recycling storm water and grey water**
- Improving building energy performance
- Improving air quality
- Mitigating the urban heat island effect
- Improving visual amenity and increasing a buildings profile
- Cooling down temperatures inside and outside a building
- Restoring a diverse ecology to urban areas
- High frequency noise abatement
- Addressing the aesthetics of sustainability
- Improving public health

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Problem statement

- Conventional vertical planters are not designed to harvest big amount of rainfall.

- Tropical region received large amount of rainfall throughout the year.

- The system can only hold certain capacity & the water runoff wasted and creates flood.

Innovation

SELF-WATERING VERTICAL PLANTER

- **Self-watering Vertical planter** is an innovation designed as an alternative solution for **water runoff management** through vertical planting.

- The **Self-watering Vertical planter** not only can harvest rainwater up to 1.8 litres/ set, but it also reduces **energy consumption**.

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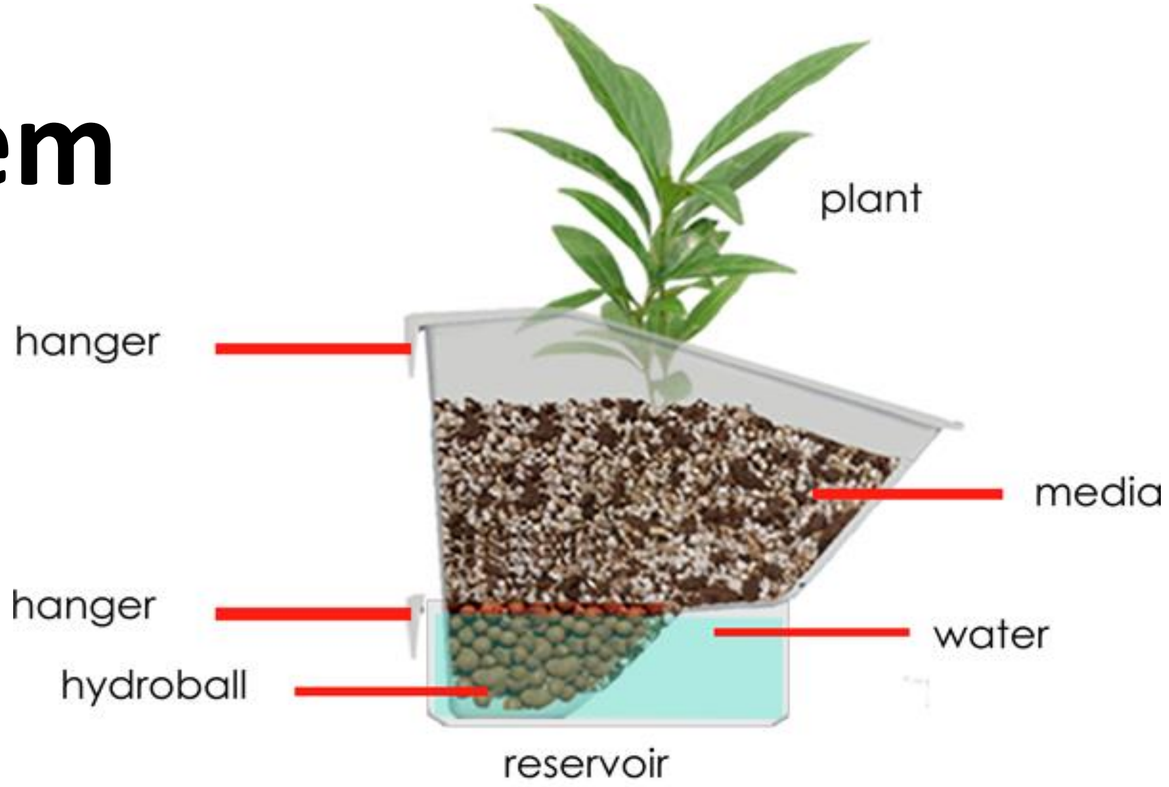
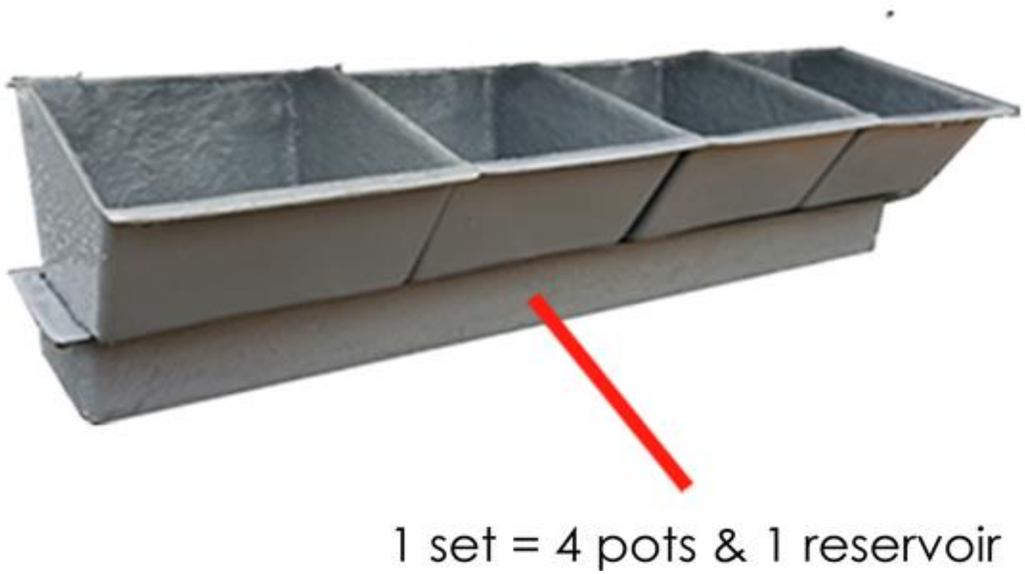
The system

- Each set comprise **a reservoir** sized 15cm x 62cm x 11cm complete with overflow hole and 4 units of specially designed pots sized 15cm x 15cm x 15cm.

- This planting system using **self-watering mechanism,** the plant roots able to absorb the harvested water based on their requirement through **capillary action.**





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The Benefits

INNOVATION

Self-Watering
Vertical Planter

Sustainable water management. The reservoir able to harvest rainwater up to 1.8 litres amount of water & can provide the water to the plants up to 7 days.

Self-watering. The mechanism able the plant roots to absorb the water based on their requirement through capillary action.

Energy saving. Can be operated without pump

Even Watering. Every layer of the vertical planter received even water spread.

No Overflow. Suitable to set up indoor or outdoor

Tropical climate. Specific for Tropical region & compatible for ornamental and edible plants.

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Growth performance comparison between Conventional vs Self-watering Vertical Planter

Table 1: Assessment of the self-watering vertical planter on the growth of ***Episcia cupreata***

Treatment	Plant Height (cm)	Diameter of plant (cm)	Soil moisture content (%)	Soil pH	Aesthetic scale (1-5)	Survival rate (%)
Vertical planter						
SW vertical	9.04	21.06	6.96	7.33	4.00	1.00
Conventional Vertical	8.49	18.92	3.83	7.73	3.64	1.00
P-value	0.804 ns	0.004**	0.000**	0.195 ns	0.000**	ns

-The mean difference is significant at 5% level (P<0.05%) between SW vertical and Conventional vertical by using least significance difference. ns: non significant, *: significant at P<0.05 and **: highly significant at P<0.01.

- The result shows that Self Watering Vertical Planter produce a better width of plants with a better aesthetic appearance. Besides, it also provides a higher soil moisture contents. This shows that the system can promote plant growth as good as conventional system or even better.

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Discussion

- The Self-watering Vertical planter has been developed as an alternative to today's vertical greenery system that capable to absorb more rainwater without compromise on the plants performance.

1m^2 of this system= harvest 9 litres
100m^2 of this system= harvest 900 litres
1000m^2 of this system= harvest 9000 litres

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Summary

- The major benefit of Self-watering Vertical Planter it not only can harvest, but also can reuse rain water which can become a sustainable greenery solution to mitigate the climate change impact in urban areas.

- Potential to be implemented into “Sponge Cities” Initiative. The target: by 2020, 80% urban areas will absorb and re-use of rainwater.

- Perhaps this system can become a solution to combat urban flood impacts especially in Tropical region.

THANK YOU

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