

Introduction to Water Sensitive Design and Role of some Water Sensitive Tools for Flood Control in Urban Areas

Aung Naing Soe

Assistant Engineer (IWUMD)

3rd January 2021

Processes involved in the cause of flooding

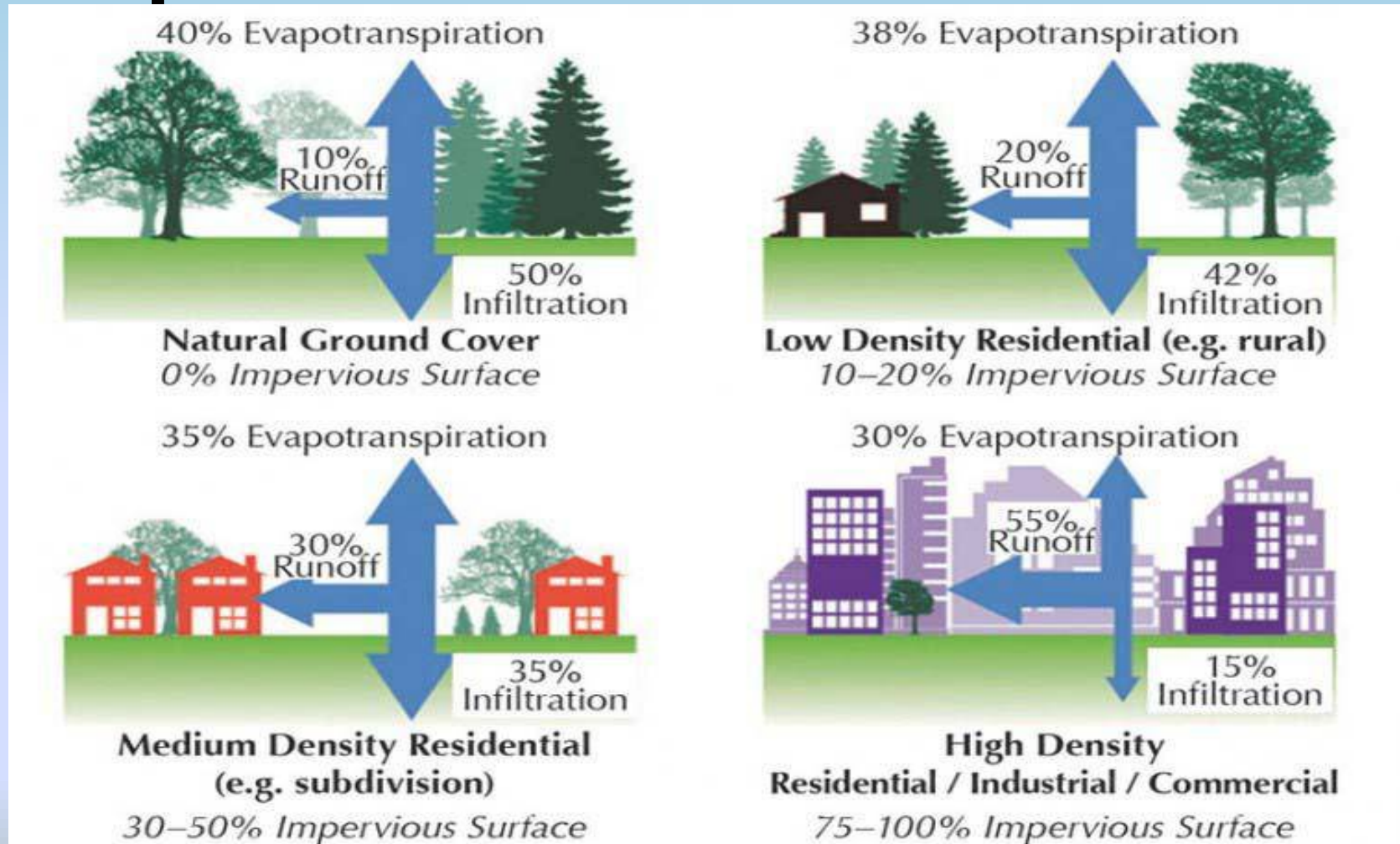
Changing land uses

```
graph TD; A[Changing land uses] --> B[Causing damages to the natural resources and assets]; B --> C[Causing unbalanced hydrologic and ecologic cycles];
```

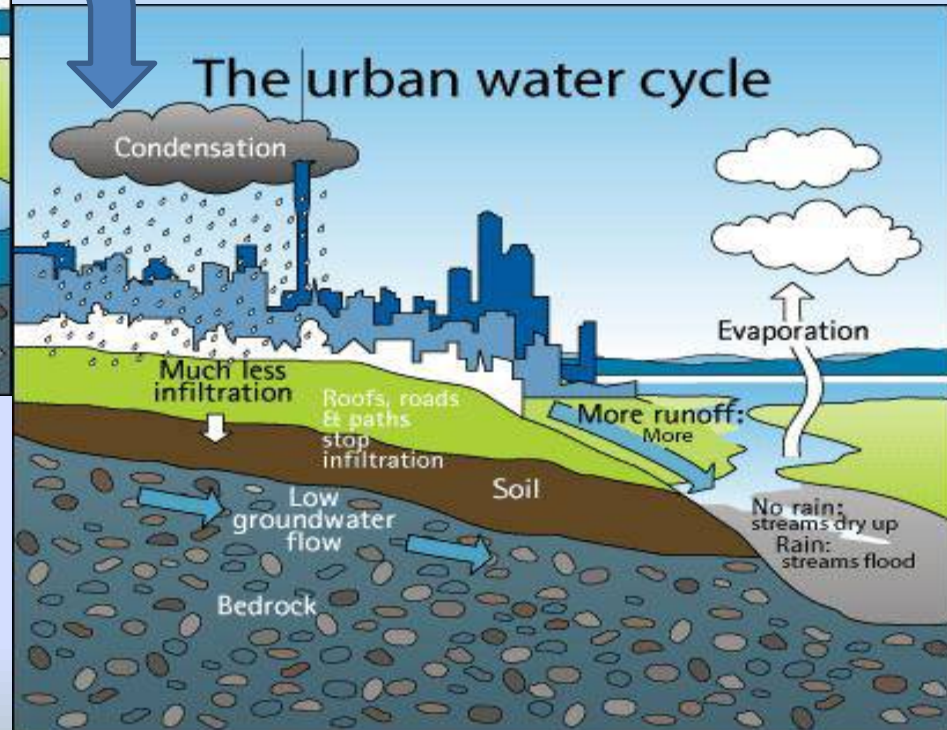
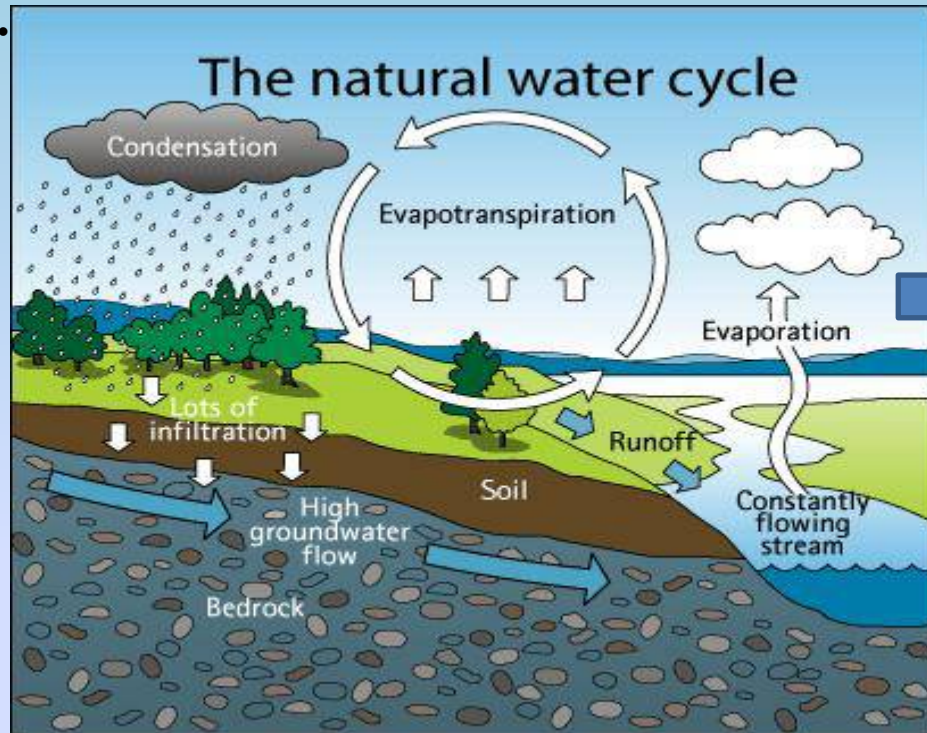
Causing damages to the natural resources and assets

Causing unbalanced hydrologic and ecologic cycles

Relationship between imperviousness and runoff volume



Natural Water Cycle vs Urban Water Cycle



<https://travellingacrosstime.com/2015/08/18/water-cycle>

<https://www.lrng.org/doctype/playlist/i-see-green-3/activity/the-water-cycle-and-its-impact-in-my-neighbourhood-and-city>

Water Sensitive Design (WSD)

- What is WSD?
 - The design of any development emphasizing on the *protection and minimizing the destruction of natural resources and their related ecosystem services*
- The WSD approaches have been employed in Australia since nearly 3 decades ago
- Similar approaches have been used in USA and the UK as Low Impact Development (LID) and Sustainable Drainage System (SDS) respectively
- ❖ *WSD = design of structures by mimicking the processes and phenomena of both natural hydrology and ecology*

Some applicable WSD tools

1) Pervious paving

- Pervious concrete
- Paving stones
- Porous asphalt
- Grass pavers



<https://www.skyfilabs.com/project-ideas/permeable-concrete>



<https://www.pacificpavingstone.com/blog/favorite-permeable-paving-manufacturers-landscapes-streetscapes>

• Function

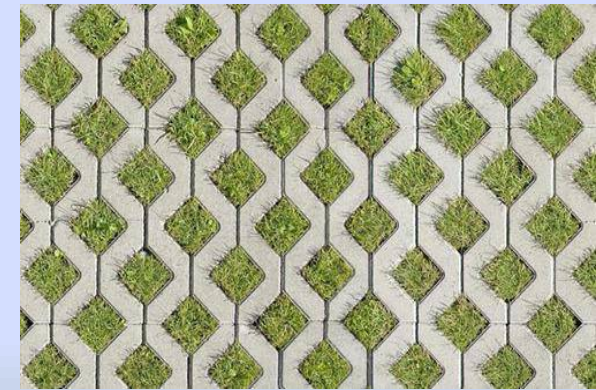
- Infiltration

• Where we can use?

- Walkways
- Driveways
- Parking lots



<https://www.porousasphalt.co.uk/>

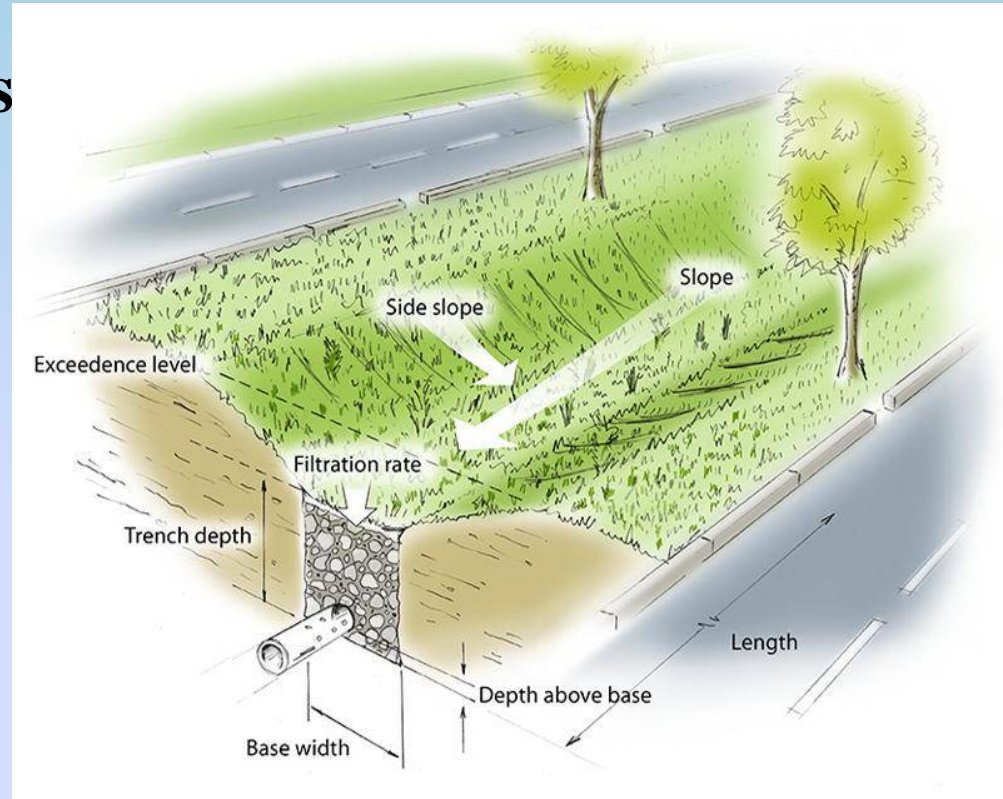


<https://www.indiamart.com/proddetail/grass-paver-blocks-8440019662.html>

Some applicable WSD tools

2) Vegetated swales/ Bioswales

- Function
 - Improving storm water quality
 - Infiltration
 - Conveyance
- Where we can use?
 - Roadsides of highways
 - Street sides of residential areas
 - Parking lots



<https://help.innovyze.com/display/XDH2016v1/Swale>

Some applicable WSD tools

3) Bioretention devices

- Rain gardens
- Tree pits/boxes
- Green roof systems



• Function

- Improving storm water quality
- Temporary detention
- Infiltration

<https://sites.google.com/site/fokstormwater/managing>

- stormwater-in-joco.com/desoto-rain-garden

• Where we can use?

- Urban retrofits
- Rooftop drainage
- Parking lot islands



[https://3dwarehouse.sketchup.com/model/](https://3dwarehouse.sketchup.com/model/acf6b9cd-fdd6-425b-8443-834f24bf9e33/Tree-Pit)

[acf6b9cd-fdd6-425b-8443-834f24bf9e33/Tree-Pit](https://3dwarehouse.sketchup.com/model/acf6b9cd-fdd6-425b-8443-834f24bf9e33/Tree-Pit)



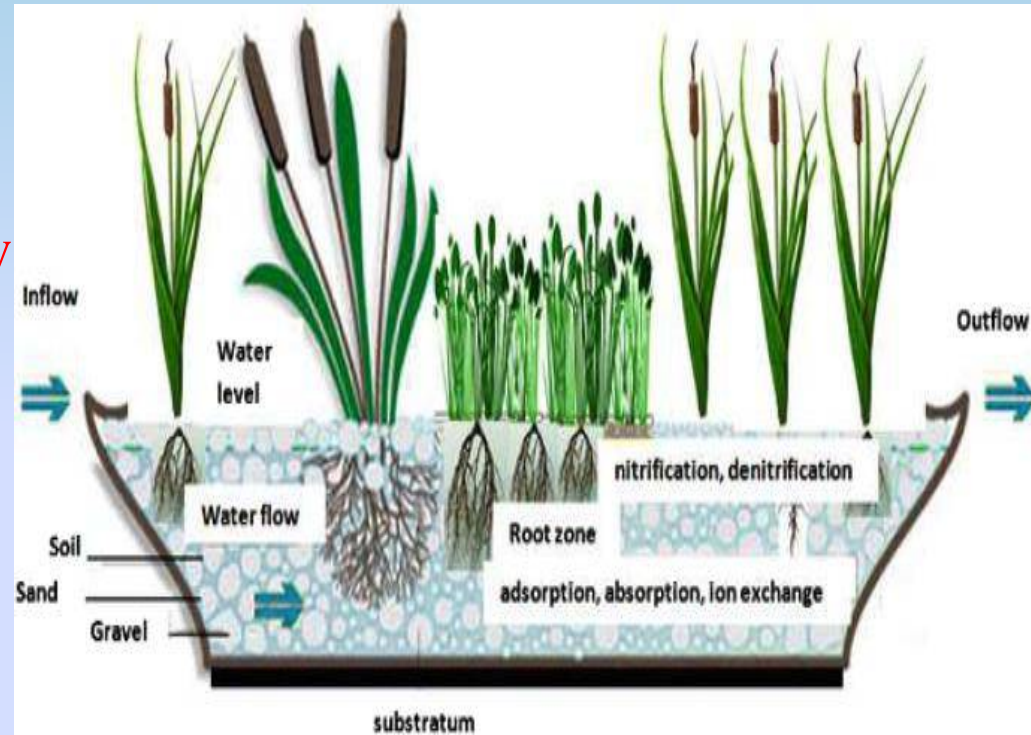
[https://www.arch2o.com/7-reasons-](https://www.arch2o.com/7-reasons-green-roof/)

[green-roof/](https://www.arch2o.com/7-reasons-green-roof/)

Some applicable WSD tools

4) Constructed wetlands

- Function
 - Improving storm water quality
 - Infiltration
 - Longer residency of runoff
 - Wildlife habitats
- Where we can use?
 - Wherever possible including residential areas if geographical conditions favor to construct



<https://link.springer.com/article/10.1007/s11356-019-04816-9>

THANK YOU

