Municipal Storm Water

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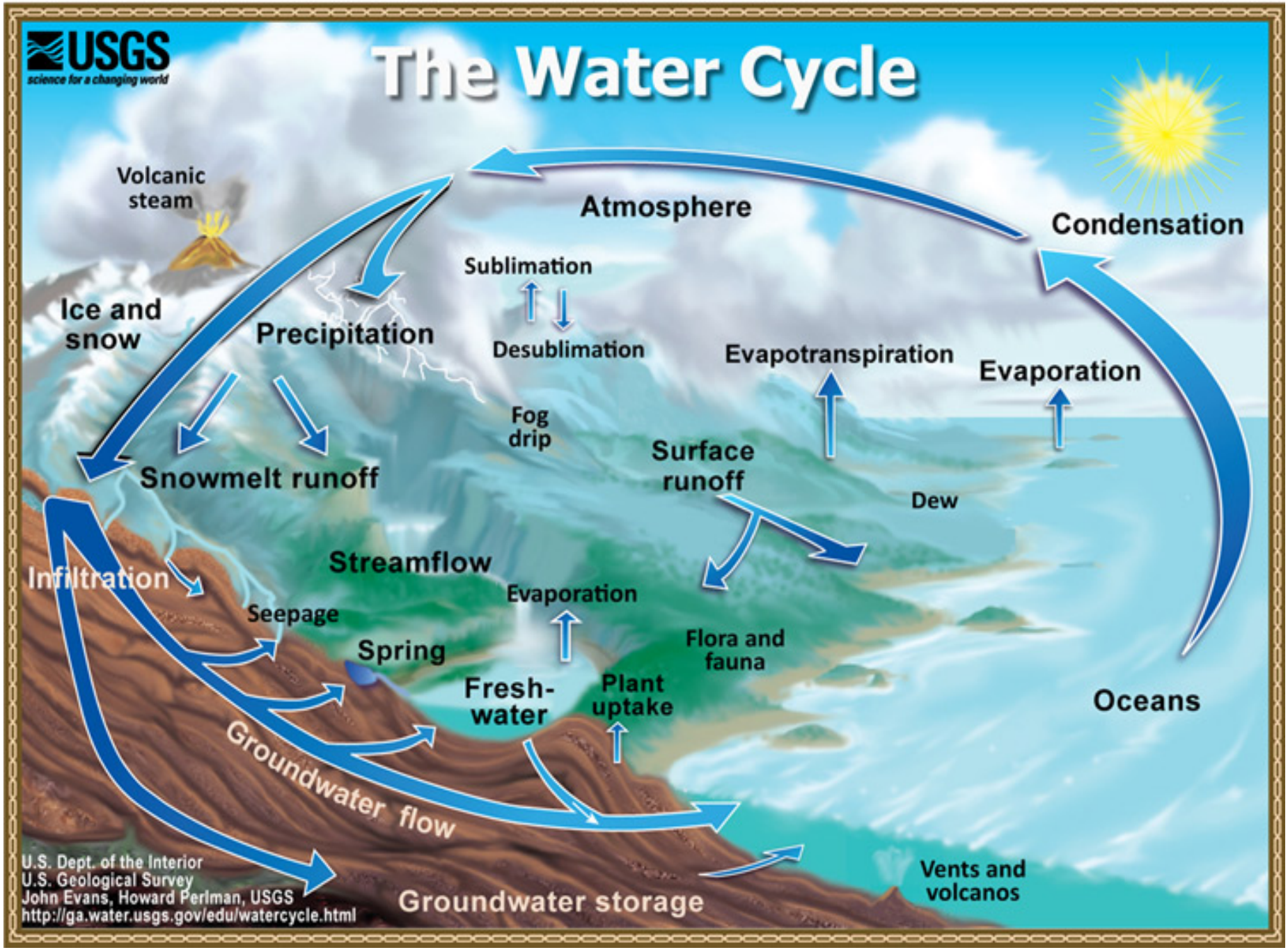

USGS
science for a changing world
The Water Cycle
Volcanic steam
Atmosphere
Condensation
Sublimation
Desublimation
Ice and snow
Precipitation
Evapotranspiration
Evaporation
Fog drip
Surface runoff
Snowmelt runoff
Dew
Streamflow
Infiltration
Evaporation
Seepage
Spring
Flora and fauna
Fresh-water
Plant uptake
Oceans
Groundwater flow
Vents and volcanos
Groundwater storage
U.S. Dept. of the Interior
U.S. Geological Survey
John Evans, Howard Perlman, USGS
http://ga.water.usgs.gov/edu/watercycle.html

MS4s

Stands for “Municipal Separate Storm Sewer Systems”

aka Storm Drains

aka Storm Water Infrastructure

Discharges to MS4s typically receive no treatment prior to discharge into receiving water (river, lake, creek, pond, etc.)

Designed for flood control

"Bull creek north from victory" by Junkyardsparkle - Own work. Licensed under CC0 via Wikimedia Commons

Impacts to Waterbodies

Pollution – Trash, bacteria, metals, nutrients, pesticides, oil and grease, and excessive sediment

Physical Alterations – Additions of energy from watersheds that are primarily impervious

Either of the above (or both!) can cause a waterbody to not meet one or more of its Beneficial Uses

Beneficial Uses

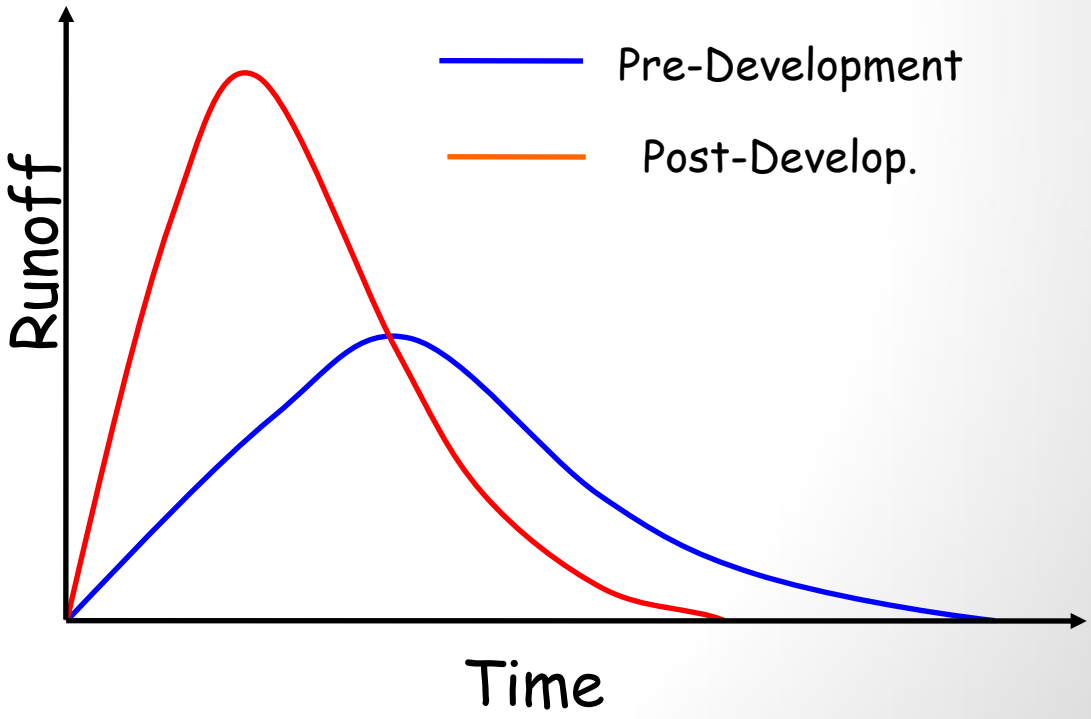
A small sampling of the Beneficial Uses that are assigned to a waterbody in a Water Quality Control Plan (aka Basin Plan)

- MUNI – Municipal and Domestic Supply
- WARM – Warm Freshwater Habitat
- AGR – Agricultural Supply
- COMM – Commercial and Sport Fishing
- REC 1 & 2 – Contact and Non-Contact Recreation
- GWR – Groundwater Recharge
- SPAWN – Fish Spawning
- IND – Industrial Service Supply
- COLD – Cold Freshwater Habitat

Hydrologic Changes

Urbanization tends to increase stormwater runoff:

- peak flows
- volume
- frequency



From Haltiner (2006)


WARNING
NO SWIMMING
AVISO

Permitting

* Authorities
  * Program Established by the Clean Water Act
  * California was designated as a delegated authority by USEPA
  * Porter-Cologne Act (State Law)

Permitting

* Permit Types
  * Individual MS4 permits
    * Phase I MS4 (over 100,000 population) – 316 permittees
    * Caltrans – 1 permittee
  * General Permits
    * Phase II MS4 (under 100,000 population, including non-traditionals) – 400 permittees
    * Construction General Permit - ~8,600
    * Industrial General Permit - ~12,000

BMPs

* Low Impact Development (LID)
  * The utilization of small distributed treatment BMPs to mimic natural hydrology (usually done on a lot-level scale)
  * The goal is accomplished through site designs that infiltrate, store, evaporate, filter, and detain runoff
* Examples included:
  * Bioswale
  * Rain Garden
  * Green Roof
  * Retention/Detention basins

Green Roof

California Academy of Sciences


Bioswale

Oil/BMP Crossover

* Oil and grease from leaking vehicles, illicit dumping and cooking oil/grease can be toxic to aquatic life directly or through lowering of Dissolved Oxygen
* Sorption and biodegradation are primary removal mechanisms
  * Vegetated BMPs have been shown to breakdown and remove hydrocarbon pollutants to some extent (biodegradation)
  * BMPs that trap soil particles (e.g. retention/detention) helps to remove oil/grease from surface waters (sorption)

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