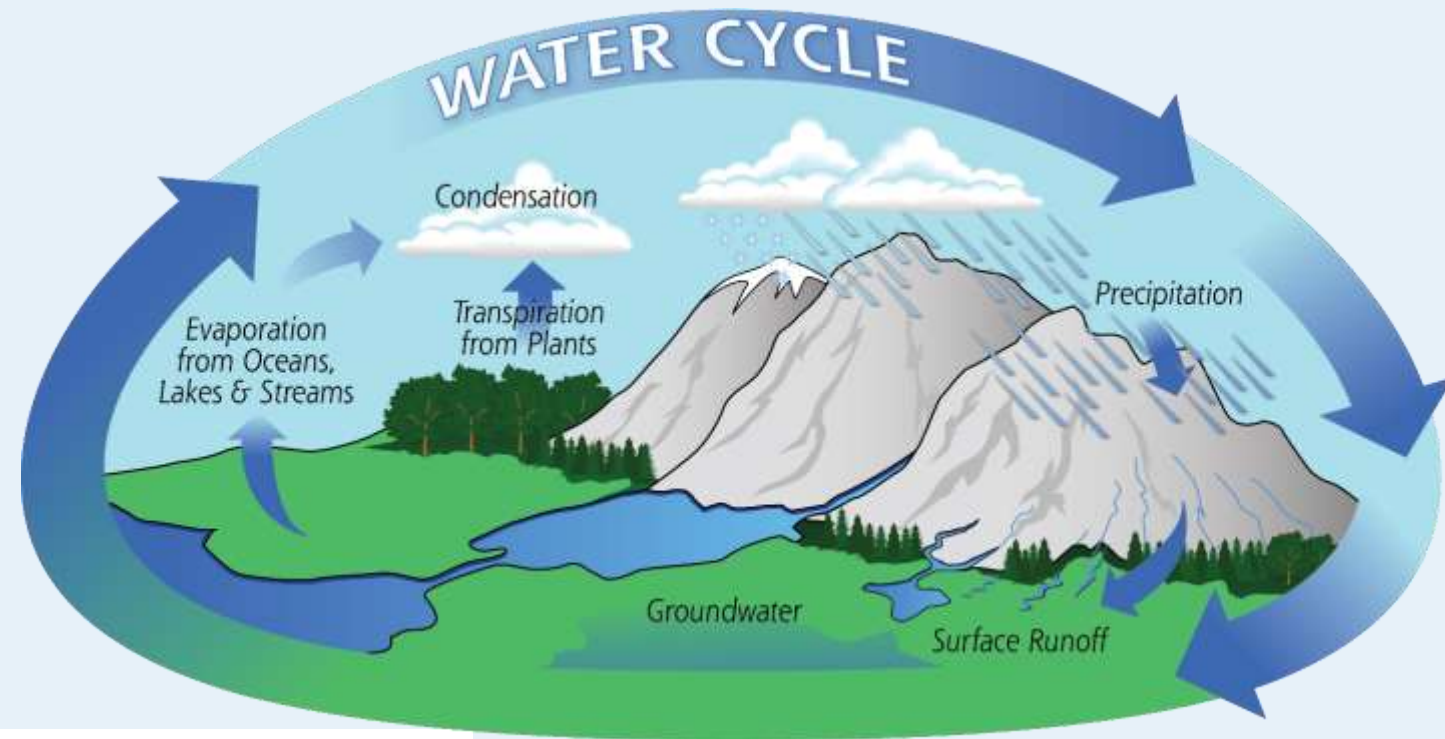


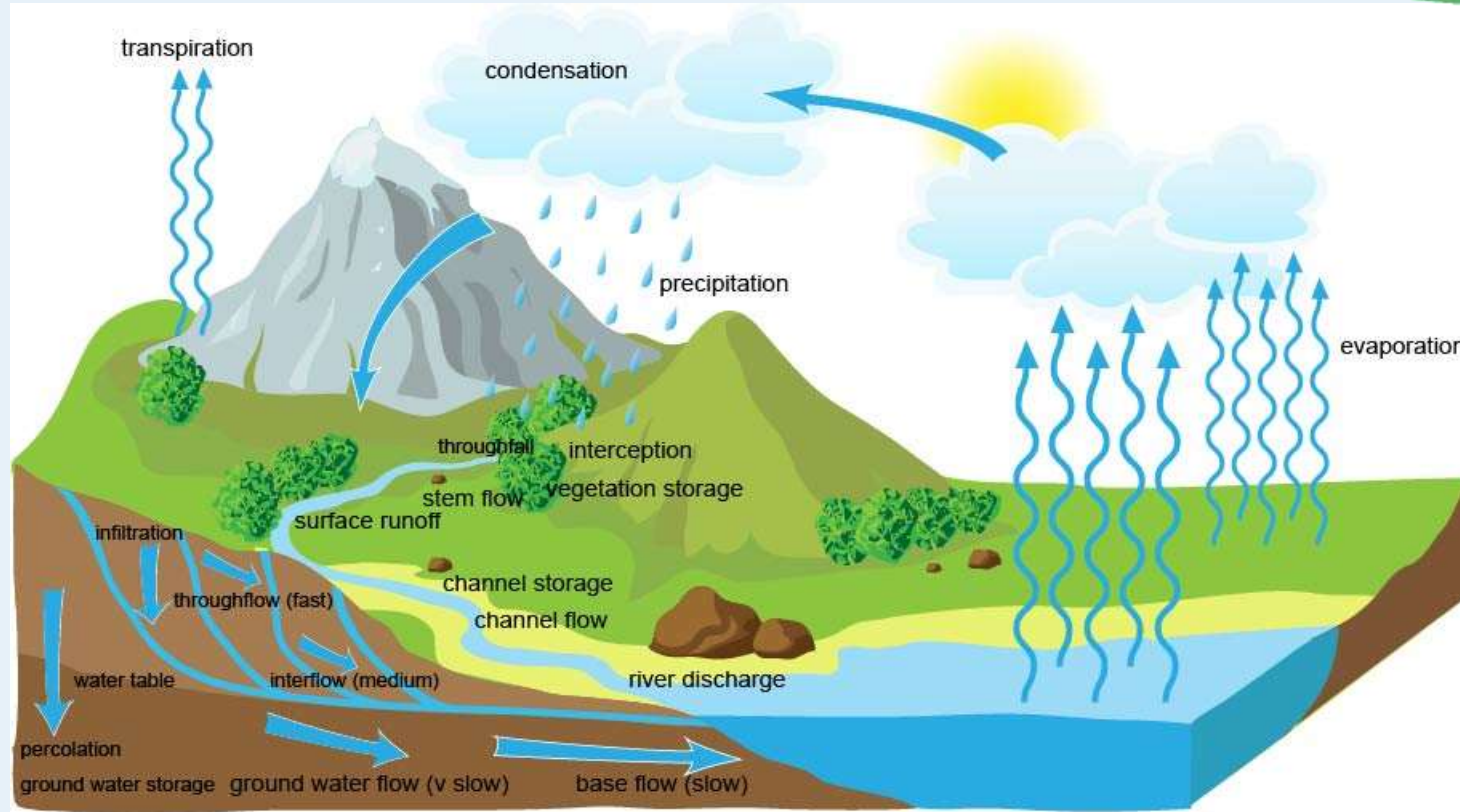
# Course Contents

1. Fluvial System
- 2. Flow mechanics**
3. Longitudinal Profile
4. Erosion processes
5. Sediment transport
6. Channel morphology
7. Floodplains
8. Terraces

# Flow mechanics and regime

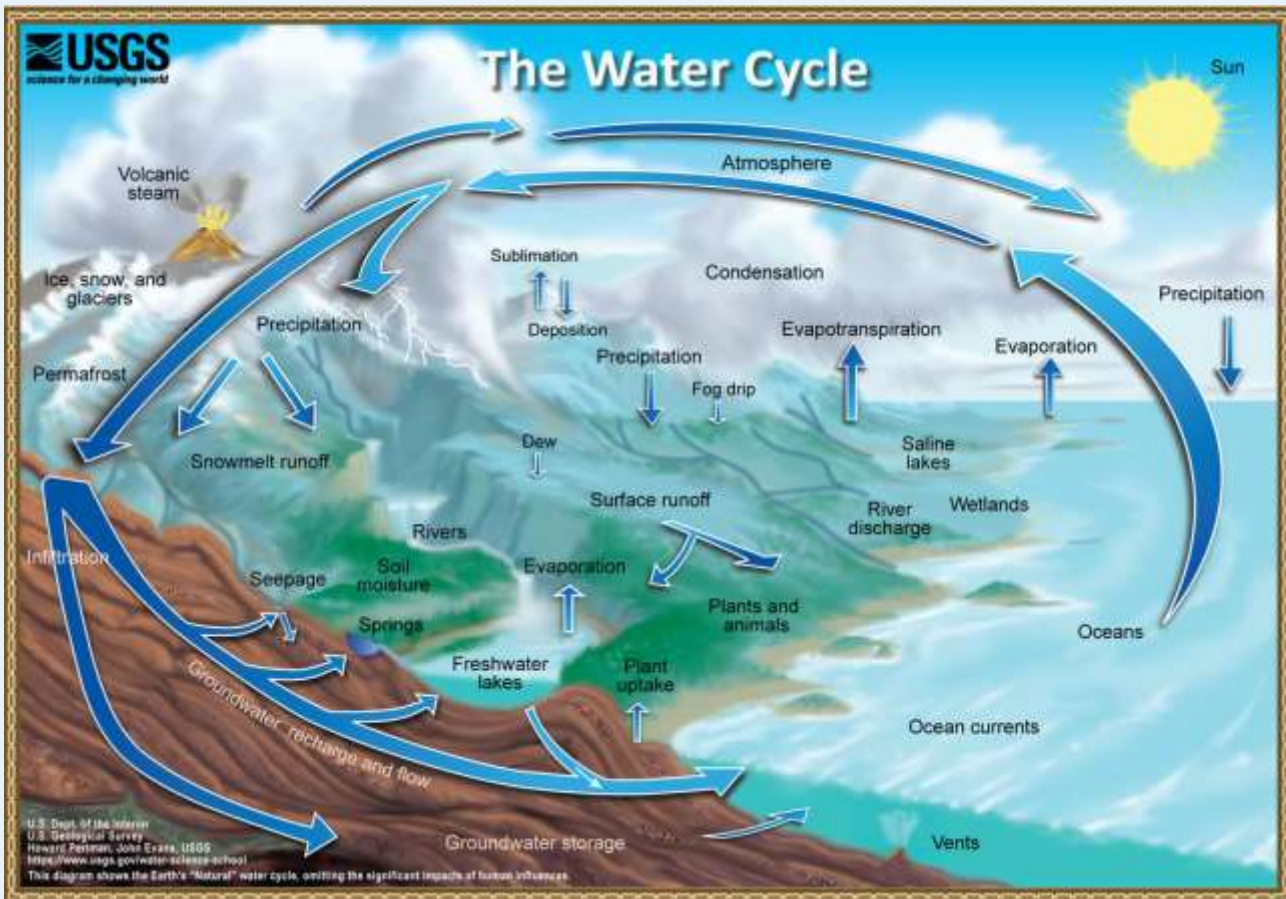


<https://gpm.nasa.gov/education/water-cycle>



<https://www.alevelgeography.com/processes-and-pathways-of-the-water-cycle/>

# Flow mechanics and regime



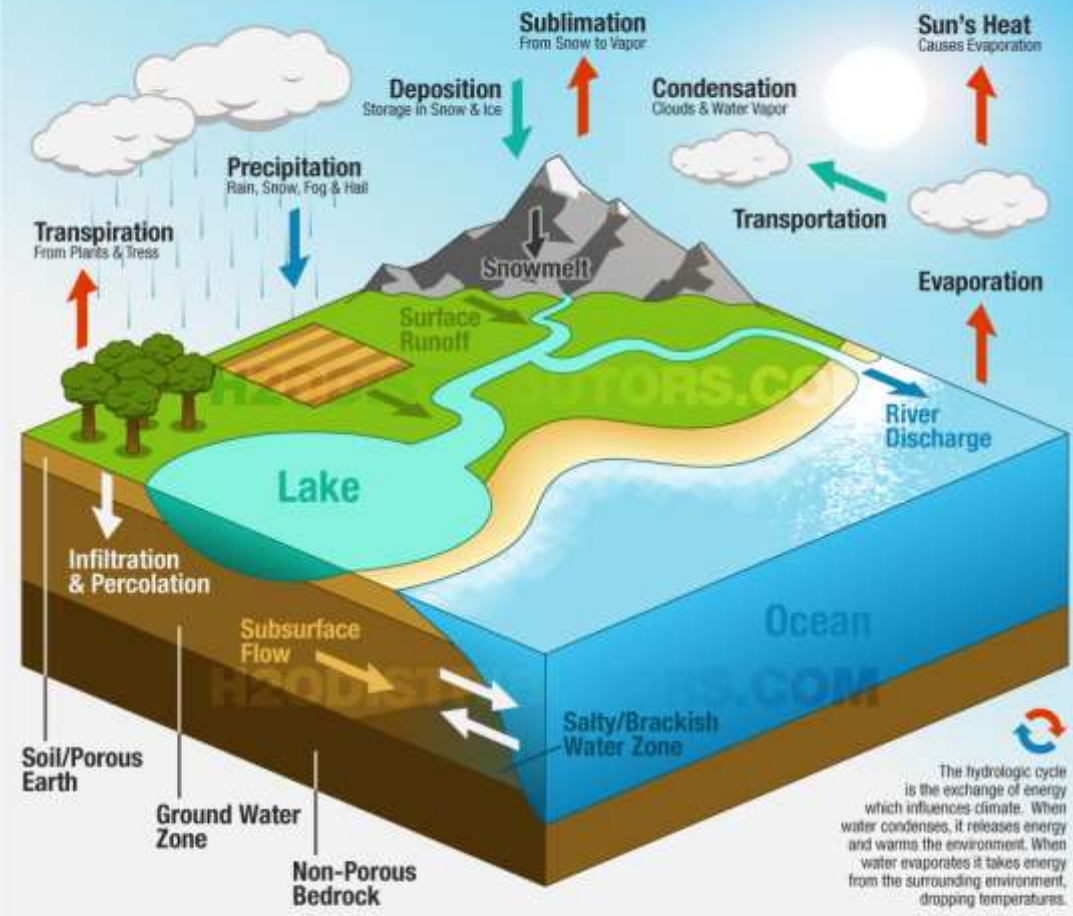
<https://www.h2odistributors.com/pages/info/info-water-cycle.asp>

[https://www.youtube.com/watch?v=oaDkph9yQBs&ab\\_channel=NASAGoddard](https://www.youtube.com/watch?v=oaDkph9yQBs&ab_channel=NASAGoddard)

## Hydrologic Cycle

The Hydrologic Cycle (also called the Water Cycle) is the continuous movement of water in the air, on the surface of and below the Earth.

- Human activities that alter the water cycle:**
- Alteration of Atmosphere
  - Construction of Dams
  - Deforestation and Afforestation
  - Water Abstraction from Rivers
  - Agriculture
  - Industry
  - Urbanization



### Process Definitions:

Condensation	Deposition	Evaporation	Percolation	Precipitation	Sublimation	Transpiration
The transformation of water vapor to liquid water droplets in the air, creating clouds and fog.	Also known as desublimation, is a thermodynamic process, a phase transition in which gas (vapor) transforms into solid (ice).	The transformation of water from liquid to gas phases as it moves from the ground or bodies of water into the overlying atmosphere.	Water flows horizontally through the soil and rocks under the influence of gravity.	Condensed water vapor that falls to the Earth's surface. Most precipitation occurs as rain, but also includes snow, hail, fog drip, graupel, and sleet.	The state change directly from solid water (snow or ice) to water vapor.	The release of water vapor from plants and soil into the air. Water vapor is a gas that cannot be seen.

Copyright © h2odistributors.com

<https://www.h2odistributors.com/pages/info/info-water-cycle.asp>

# Flow mechanics and regime

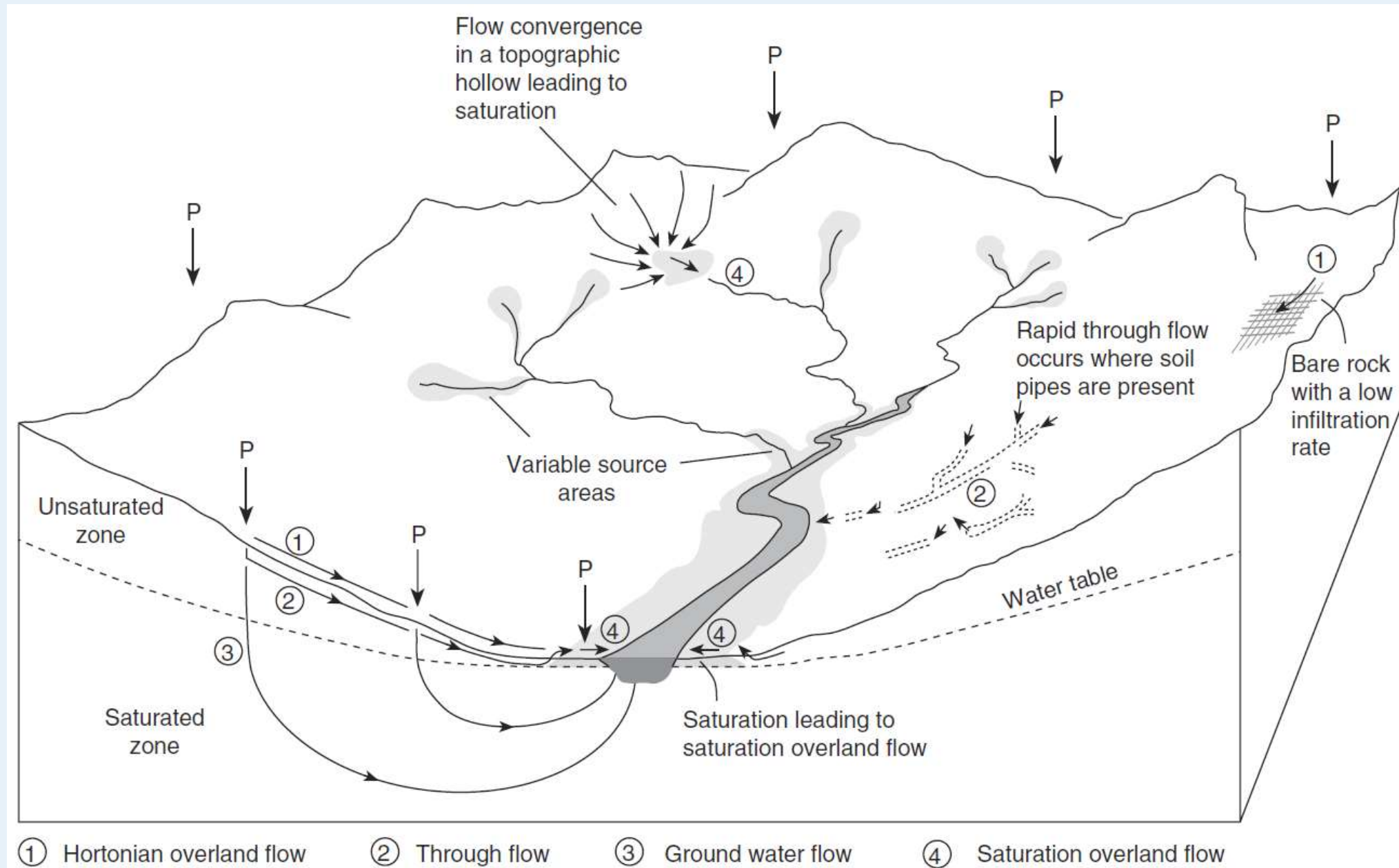
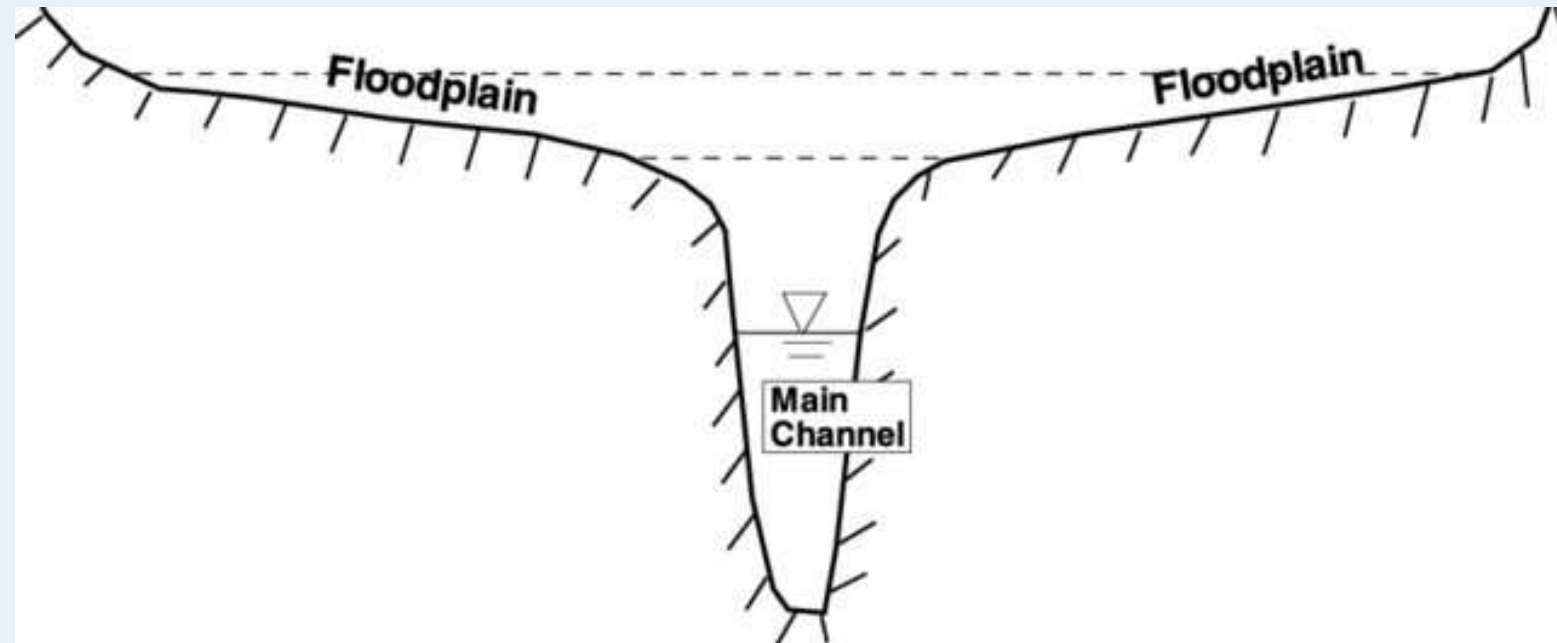


Figure 3.1 Surface and subsurface hydrological pathways.

# Flow mechanics and regime

## Flow Parameters

- Mass
- Density
- Depth
- Cross-sectional area
- Velocity
- Discharge
- Bed shear stress..

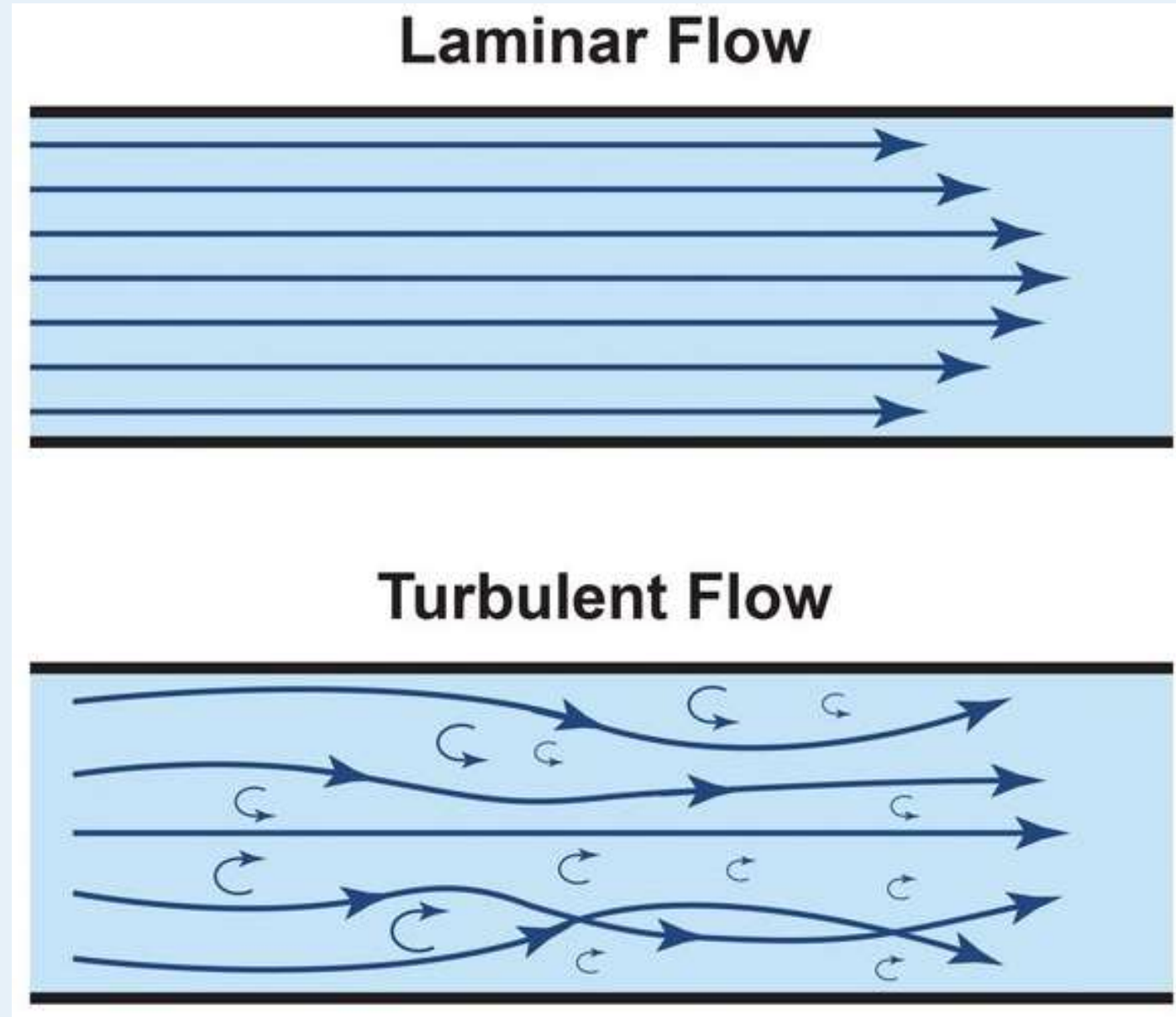


<https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2006JC003805>

# Flow mechanics and regime

## Flow Parameters

- Laminar flow
- Turbulent flow

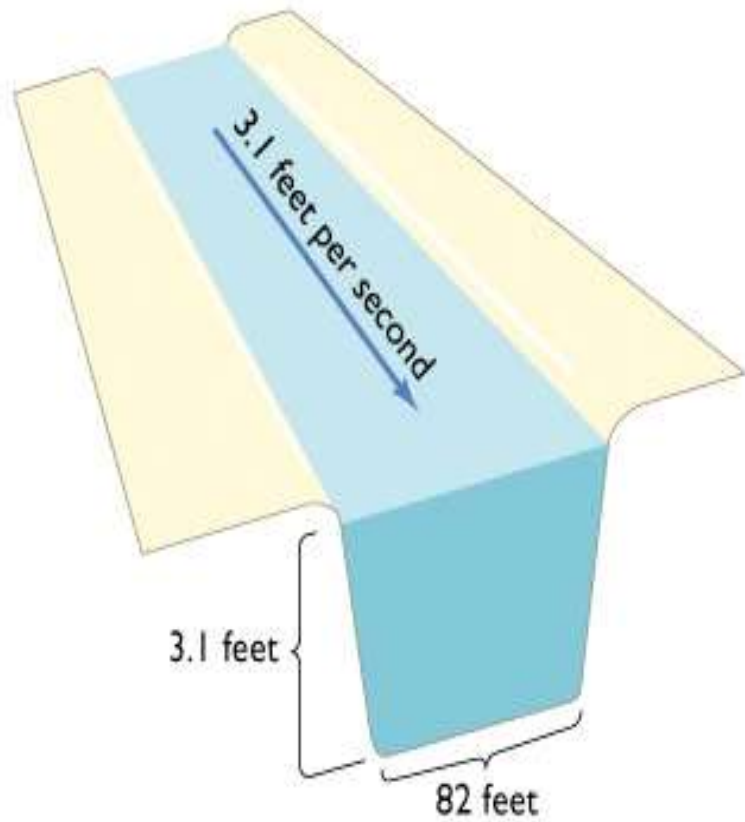


[https://www.researchgate.net/publication/337810582\\_Improving\\_the\\_Numerical\\_Stability\\_of\\_Higher\\_Order\\_Methods\\_with\\_Applications\\_to\\_Fluid\\_Dynamics?channel=doi&linkId=5deb11e792851c8364687dd3&showFulltext=true](https://www.researchgate.net/publication/337810582_Improving_the_Numerical_Stability_of_Higher_Order_Methods_with_Applications_to_Fluid_Dynamics?channel=doi&linkId=5deb11e792851c8364687dd3&showFulltext=true)

# Flow mechanics and regime

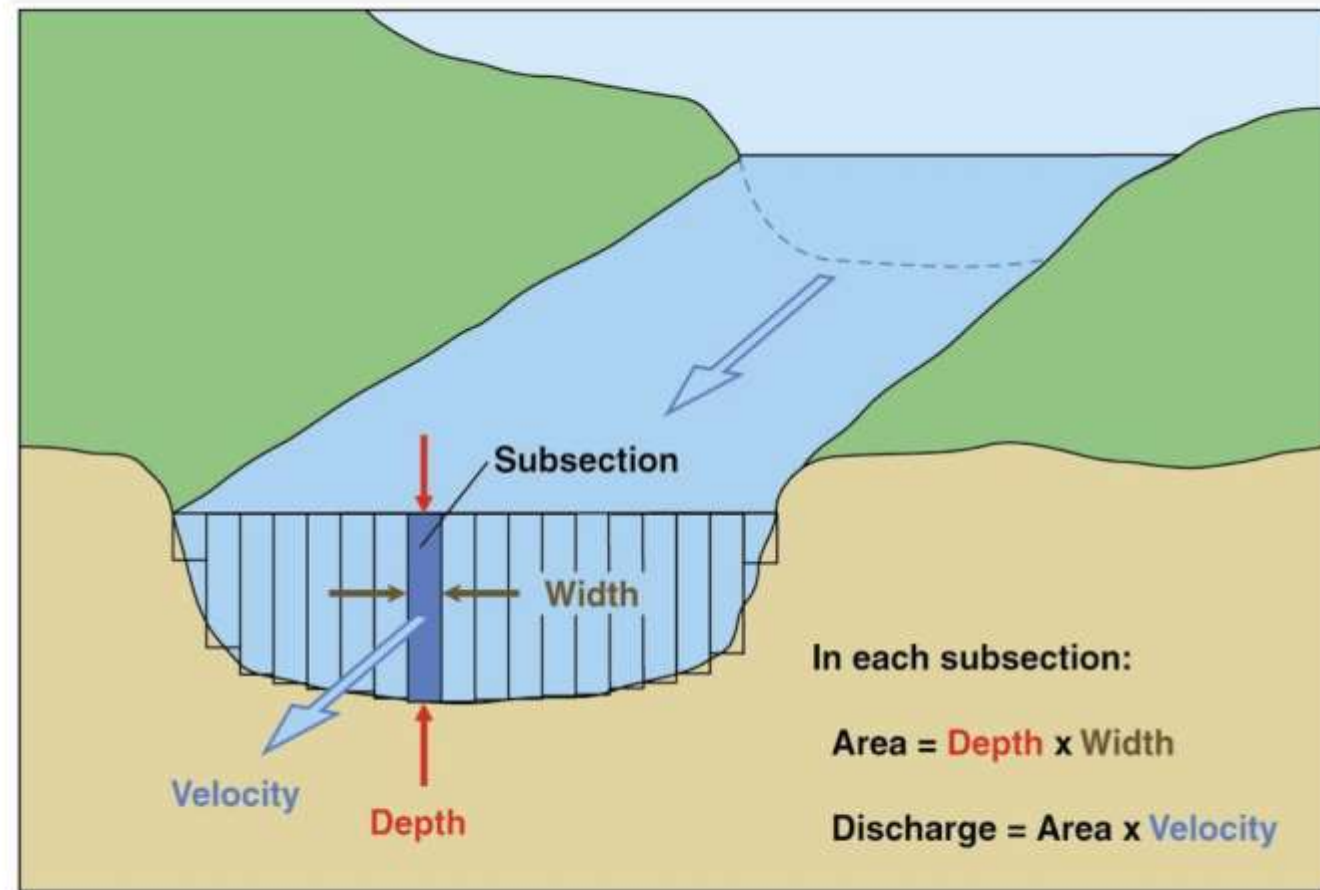
## River discharge

discharge = area x velocity

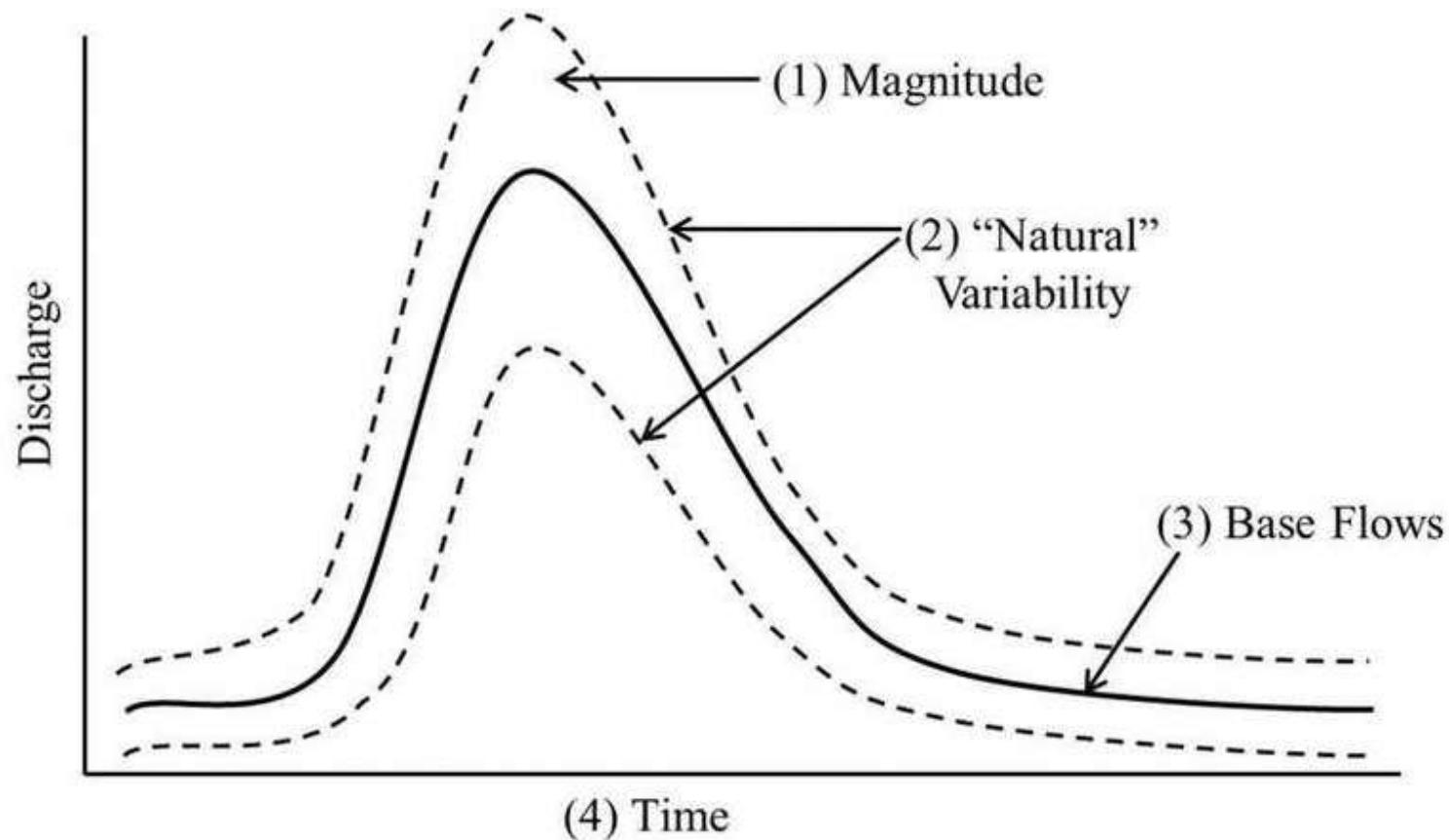


(b) River at high level

Cross-sectional area high:  
 $3.1 \text{ feet} \times 82 \text{ feet} = 254.2 \text{ feet}^2$   
Velocity high: 3.1 feet/s  
Discharge high:  
 $254.2 \text{ feet}^2 \times 3.1 \text{ feet/s} = 788.02 \text{ feet}^3/\text{s}$



# Flow mechanics and regime



- (1) Large and peak floods allow access to floodplains at the right time for spawning fish, vegetation recruitment, flushing sediment
- (2) Overall flow variation maintains habitat (channel and floodplain)
- (3) Base flows provide adequate wetted habitat
- (4) Timing used as cues for organismal life history characteristics

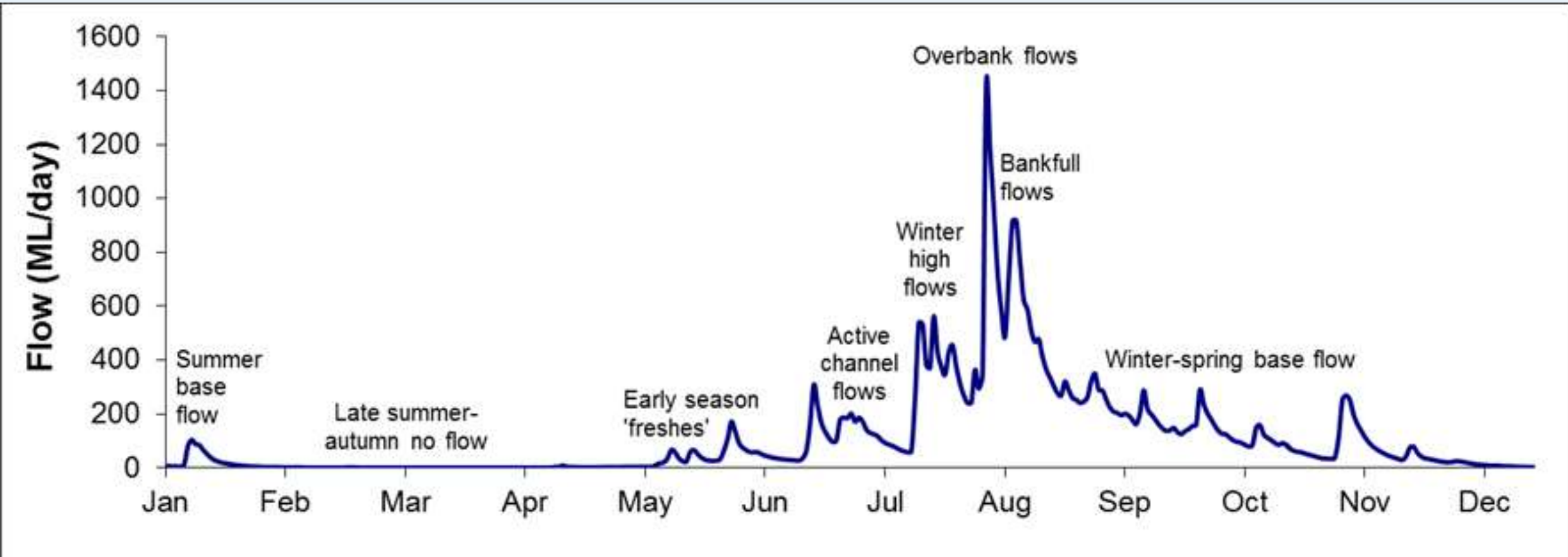
## Flow regime components:

- Magnitude
- Frequency
- Duration
- Predictability
- Rate of change or flashiness



# Flow mechanics and regime

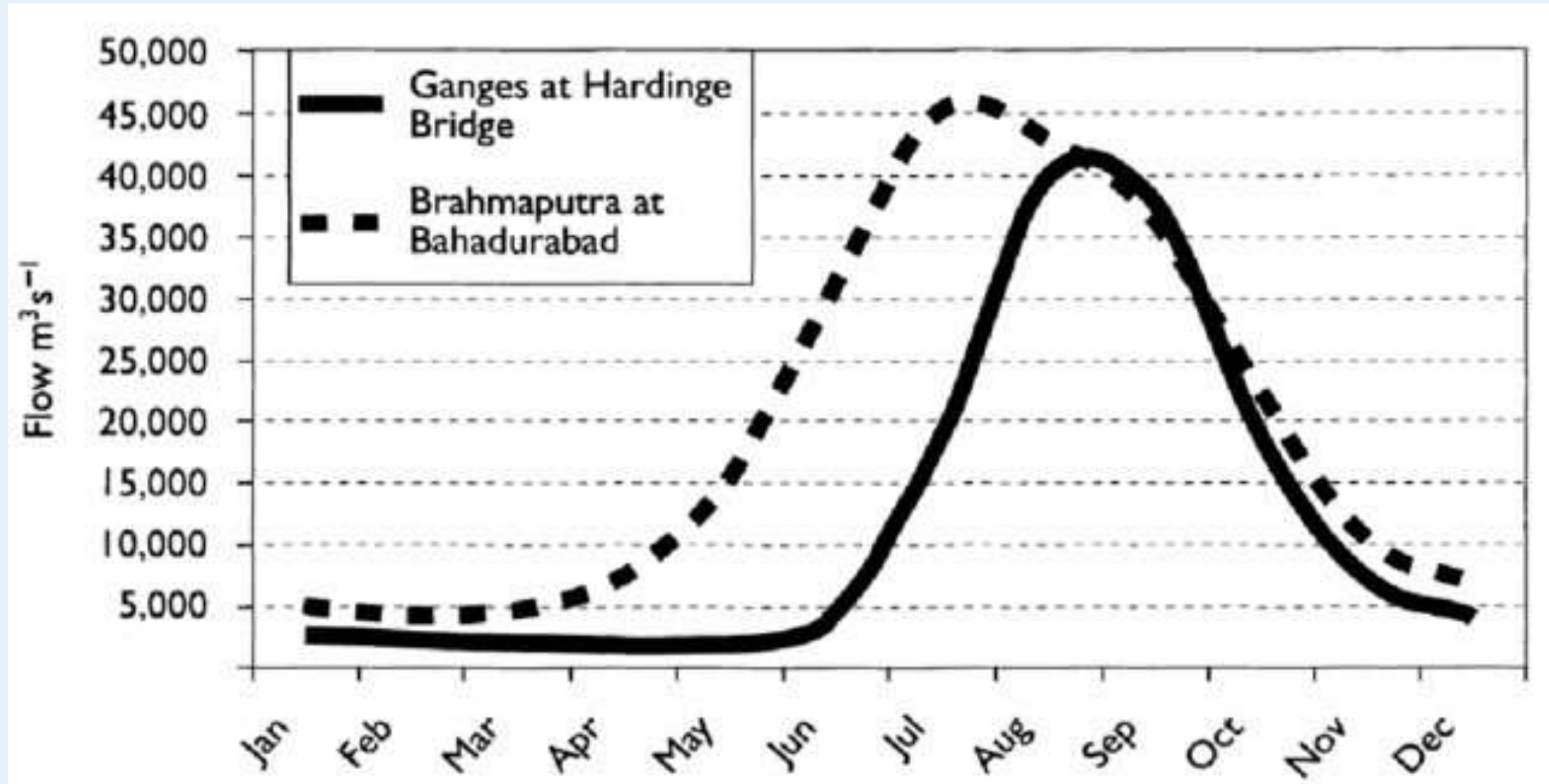
## Hydrograph



<https://www.water.wa.gov.au/water-topics/waterways/threats-to-our-waterways/altered-flow-regimes>

# Flow mechanics and regime

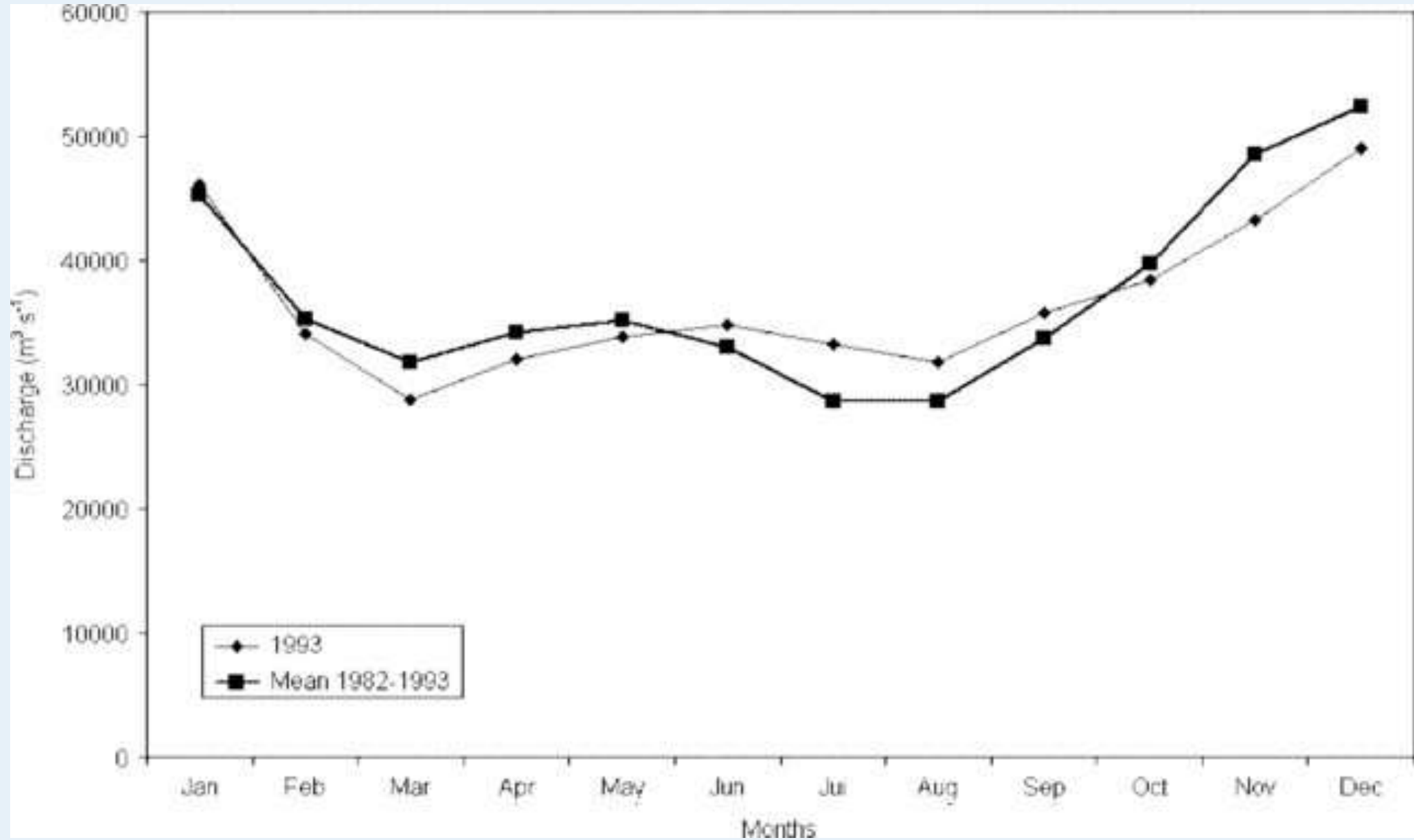
## Hydrograph



Ganj

# Flow mechanics and regime

## Hydrograph



Kongo