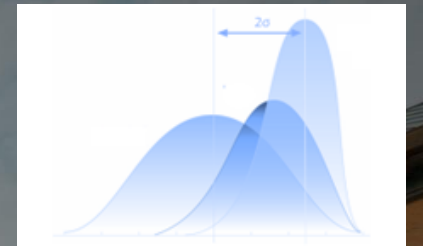
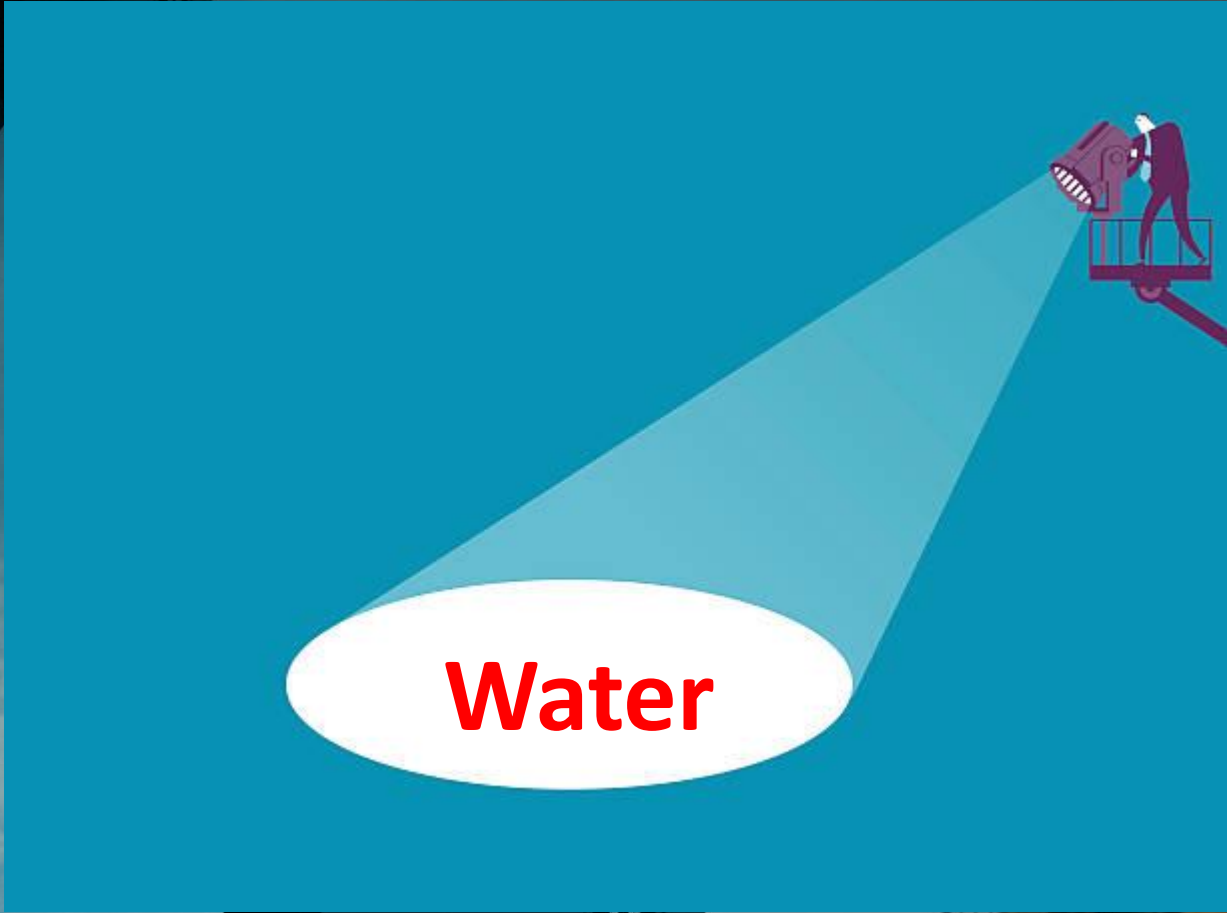


Introduction to CEE

- ~ 58 Faculty
- ~1400 students
- ~ 650 Graduate Students
- 12 MS Tracks
- Certificates in Data Science and AI
- #1 MS Online
- #1 Graduate Program
- #3 Undergraduate Program
- New BS in Env Eng.
- 16 NSF CAREER Awards





Ven Te Chow Laboratory



Critical Zone Monitoring



Ecohydraulics and Ecomorphodynamics Laboratory

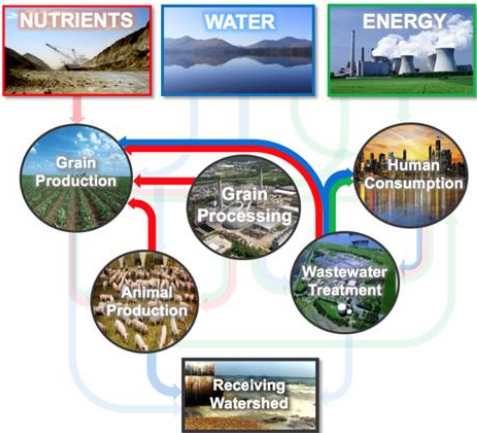
Risk Management of Infrastructure Portfolios



Modeling nm - global scale



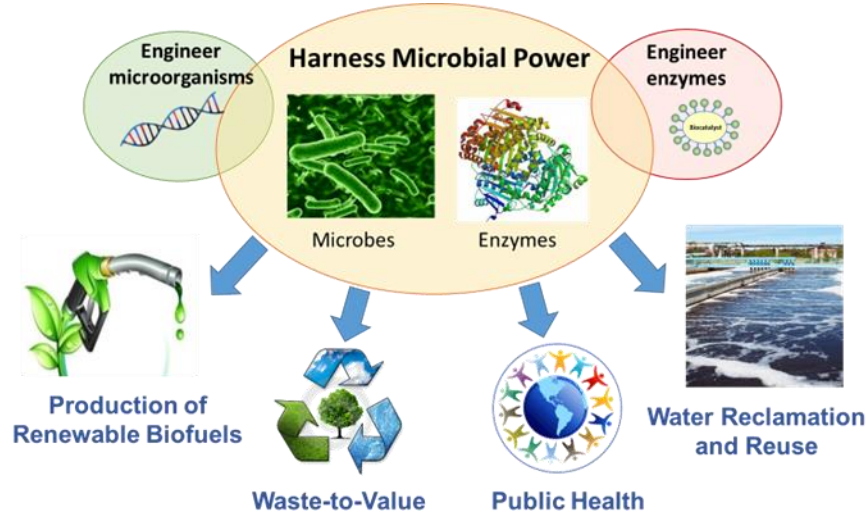
Nutrient recovery from wastewater



Remote Sensing



Molecular Biology



Groundwater contamination from a waste disposal site

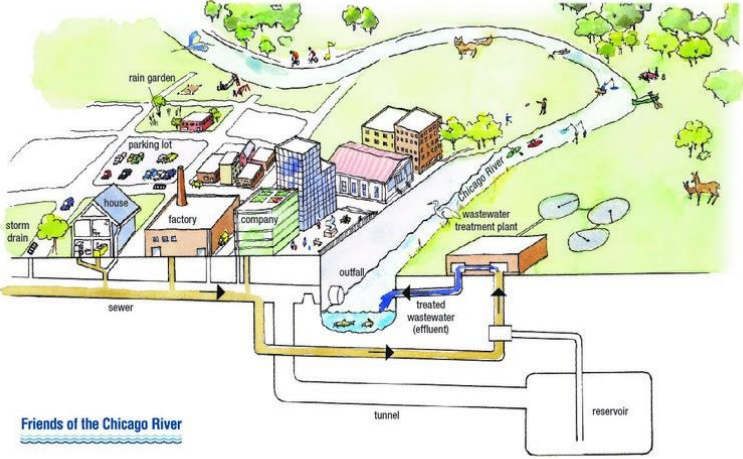


Urban Flooding Challenges

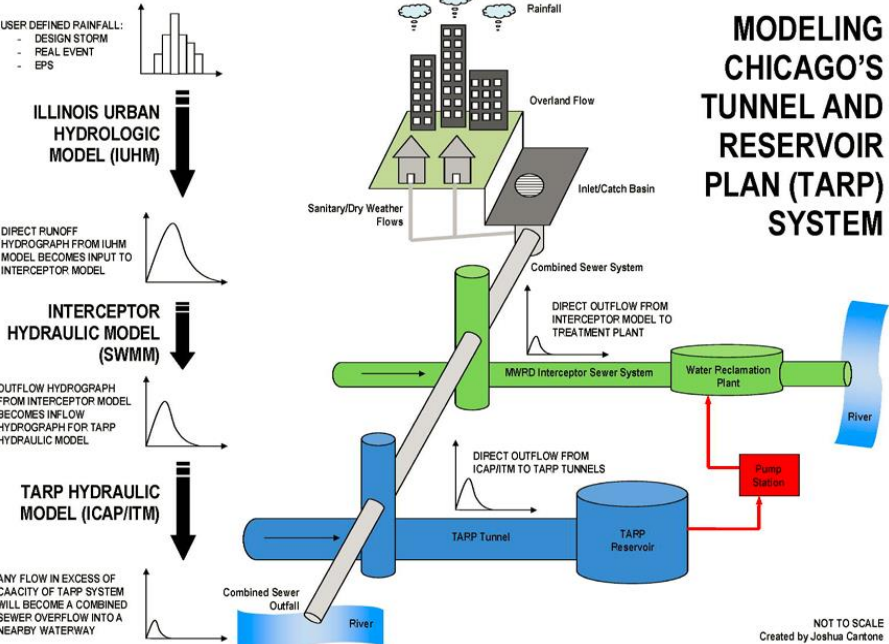
The Chicago Underground Model



How Does the System Work When It Is Dry?



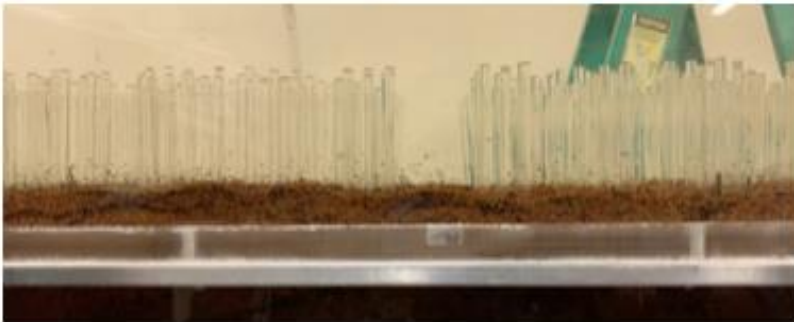
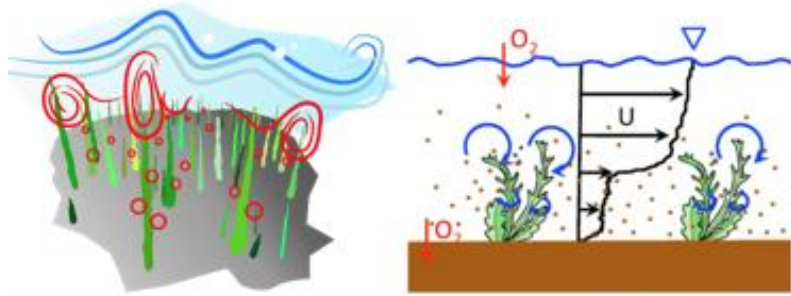
How Does the System Work When It Rains?



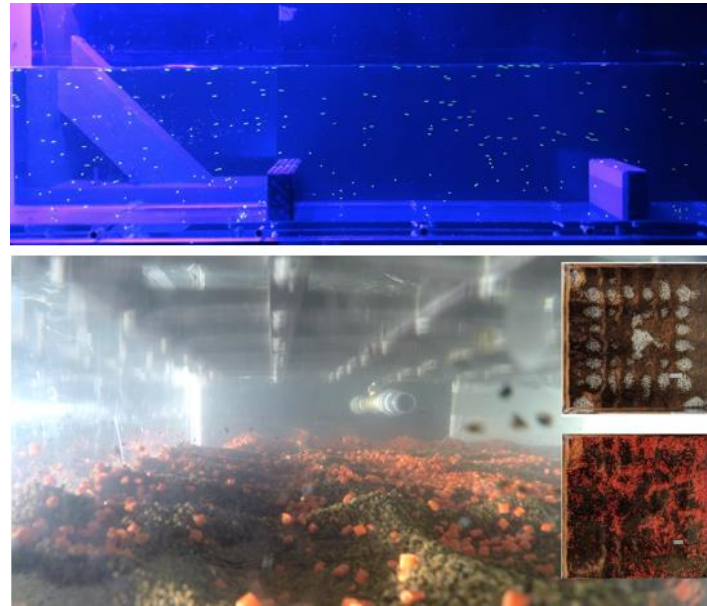
NOT TO SCALE
Created by Joshua Cartone

Environmental Fluid Mechanics

*Flow-biota interactions.
Sediment dynamics &
gas transfer*



*Transport of organisms and plastic
debris in rivers and coastal areas*



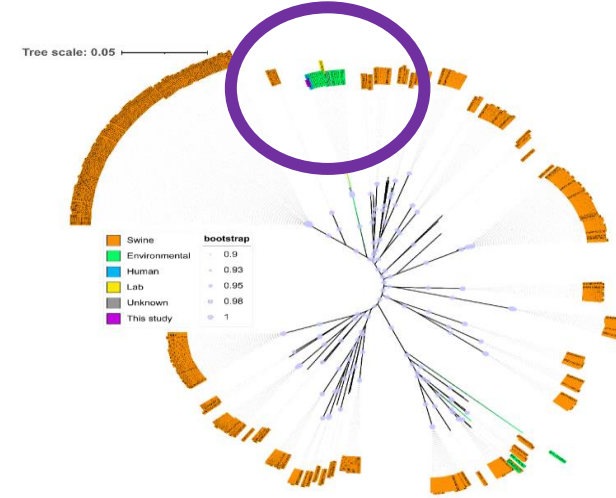
*Assessment of nature-based features
for coastal protection*



Environmental Genomics

Whole genome sequencing to reveal environmental source of antibiotic resistant pathogen

NASA showed contaminant plume spreading with Hurricane flood waters in a region with many livestock farms



Bacteria's origin was traced to the many small local rivers and streams in the area – meaning that ***Salmonella enterica* is already established in the natural environment aided by warmer temperatures.**

Environmental Synthetic and Molecular Biology

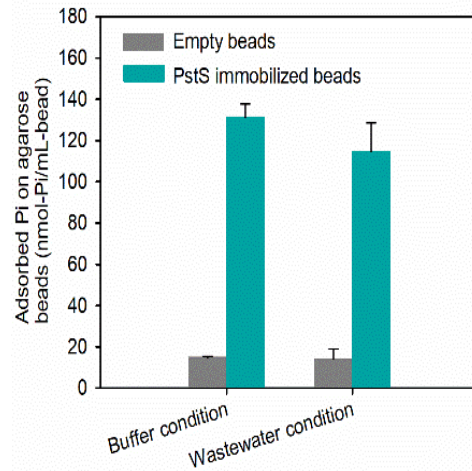
Engineer biomaterials for P recovery



Enrich and Recover

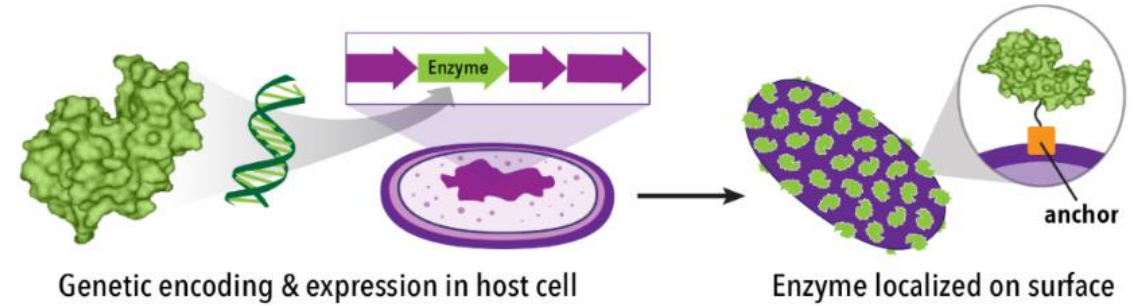
Engineered biomaterial for conversion and sorption

Recovered phosphate

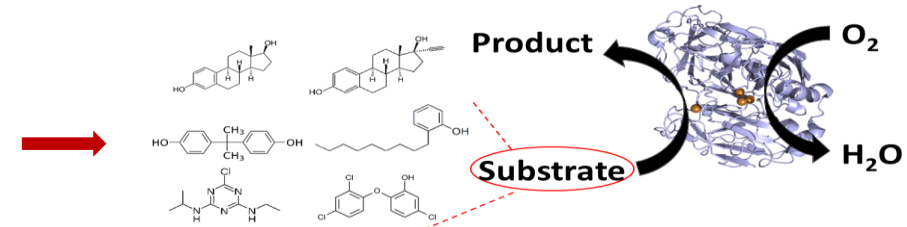


Zhu, B., et.al., *Trends in Biotechnology*
 Chen, Y., et.al. *Environ. Sci. Technol.*,
 Wu, Y., et. al., *Biotechnol. Bioer*
 Zhu, B., et.al., *Environ. Sci. Tech*

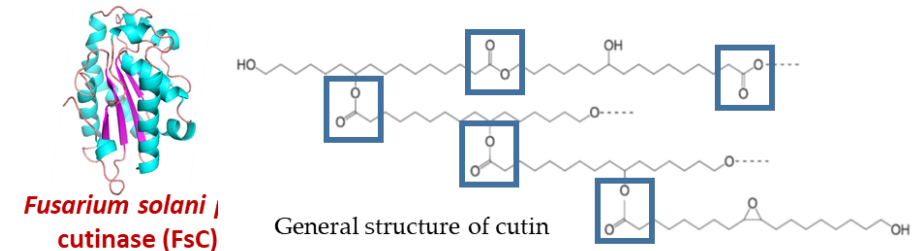
Engineering biocatalysts for degrading emerging contaminants



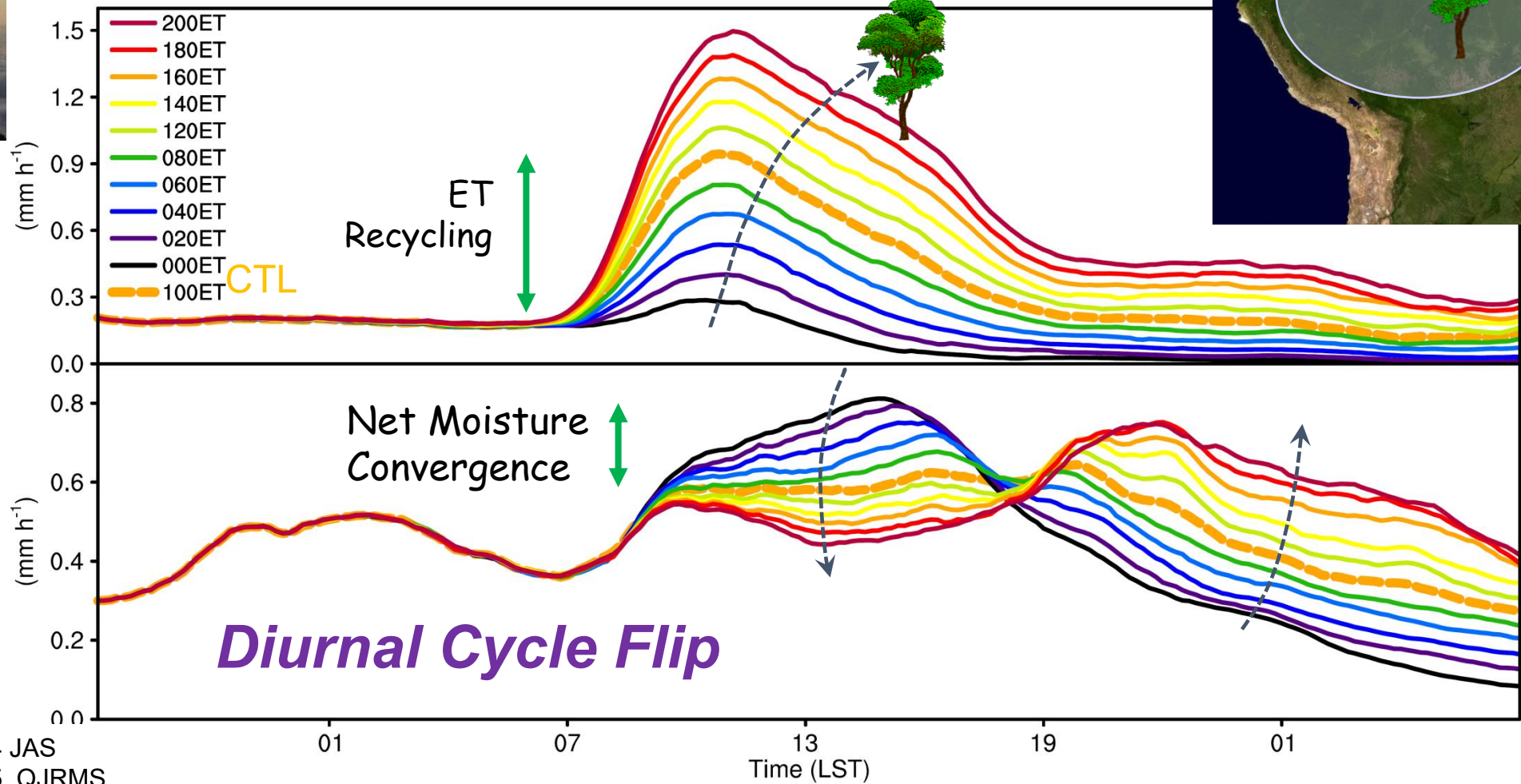
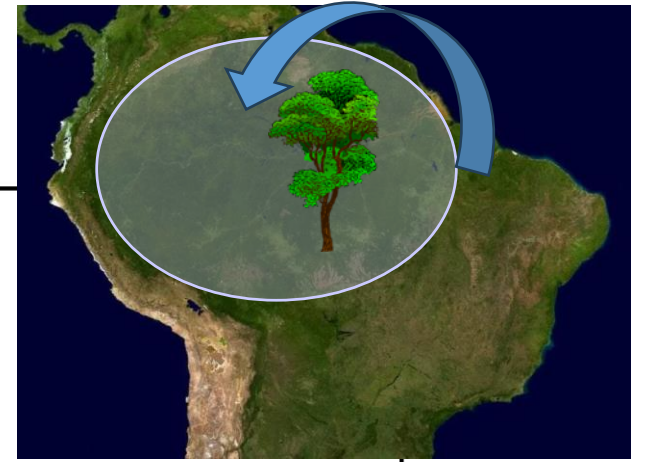
Surface display laccase for oxidoreduction



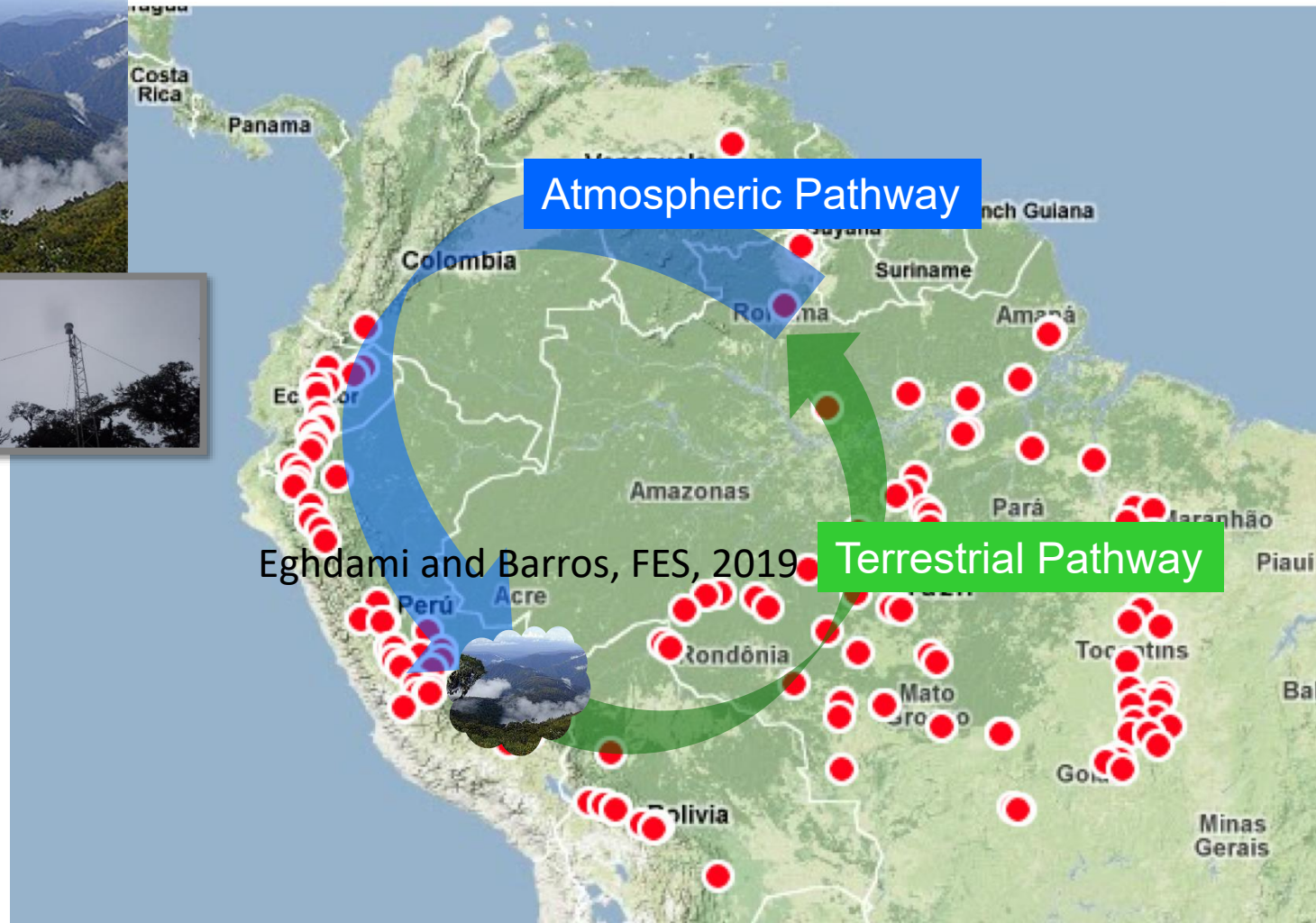
Surface display cutinase for hydrolysis



Long Range Impacts of Amazon Deforestation on the Diurnal Cycle of Rainfall in the Andes

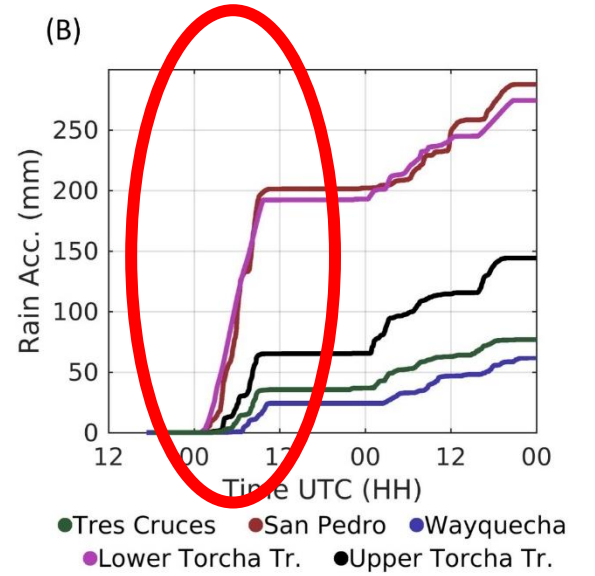


Sun and Barros, 2014 JAS
Sun and Barros, 2015, QJRMS



Eghdami and Barros, FES, 2019

Terrestrial Pathway



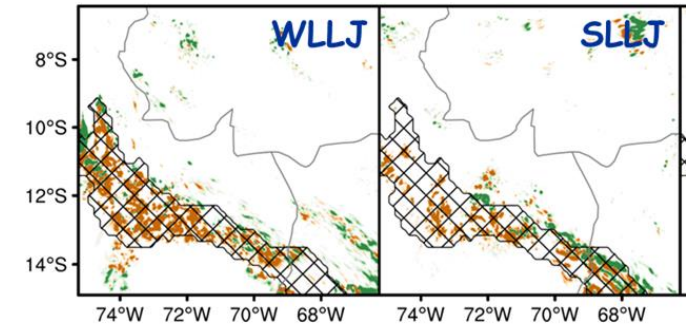
www.dams-info.org

Eghdami and Barros, FES, 2019
Barros, 2013

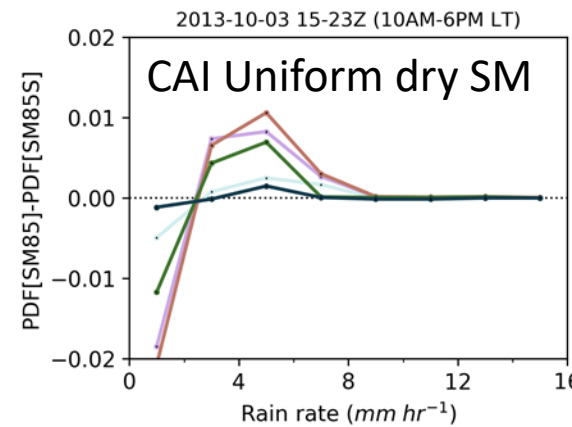
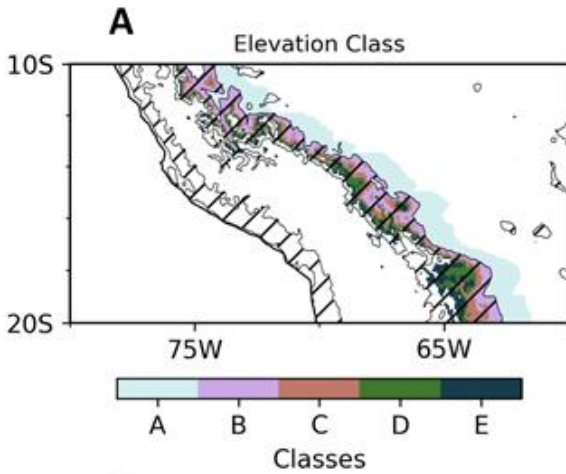
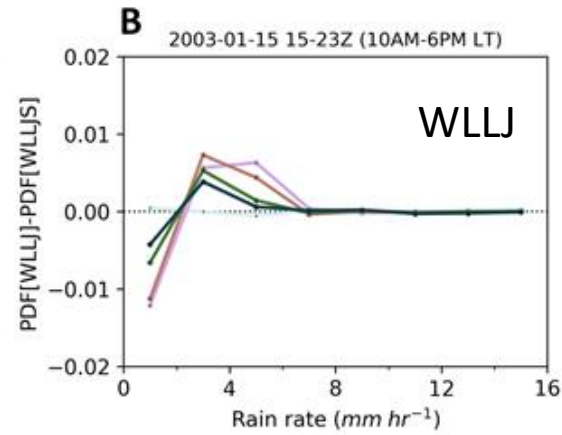
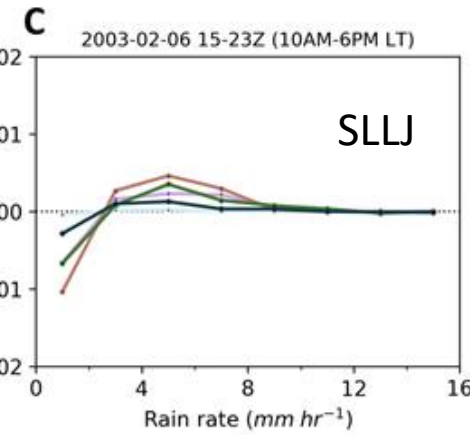
Deforestation in the Andes Foothills



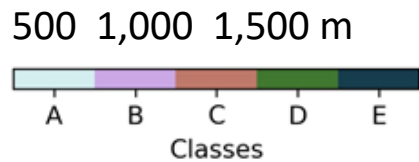
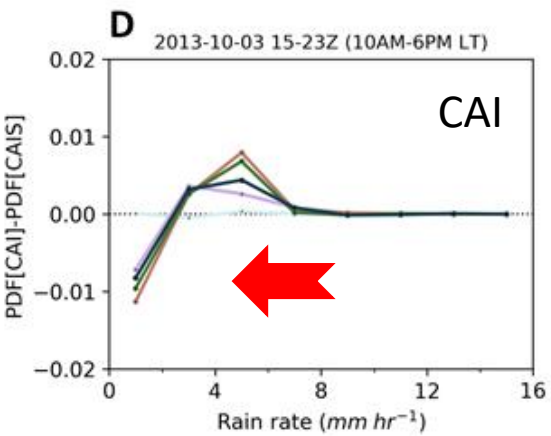
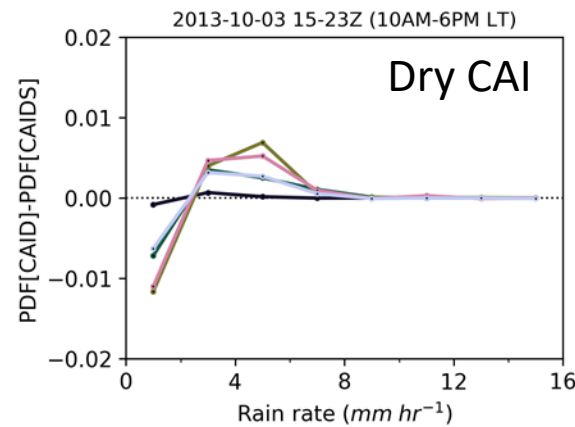
-50% Monsoon Rainfall 

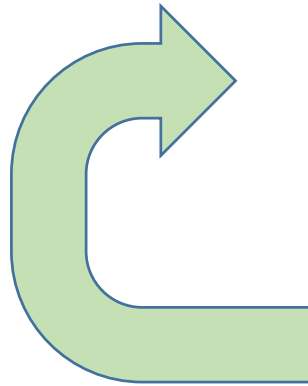
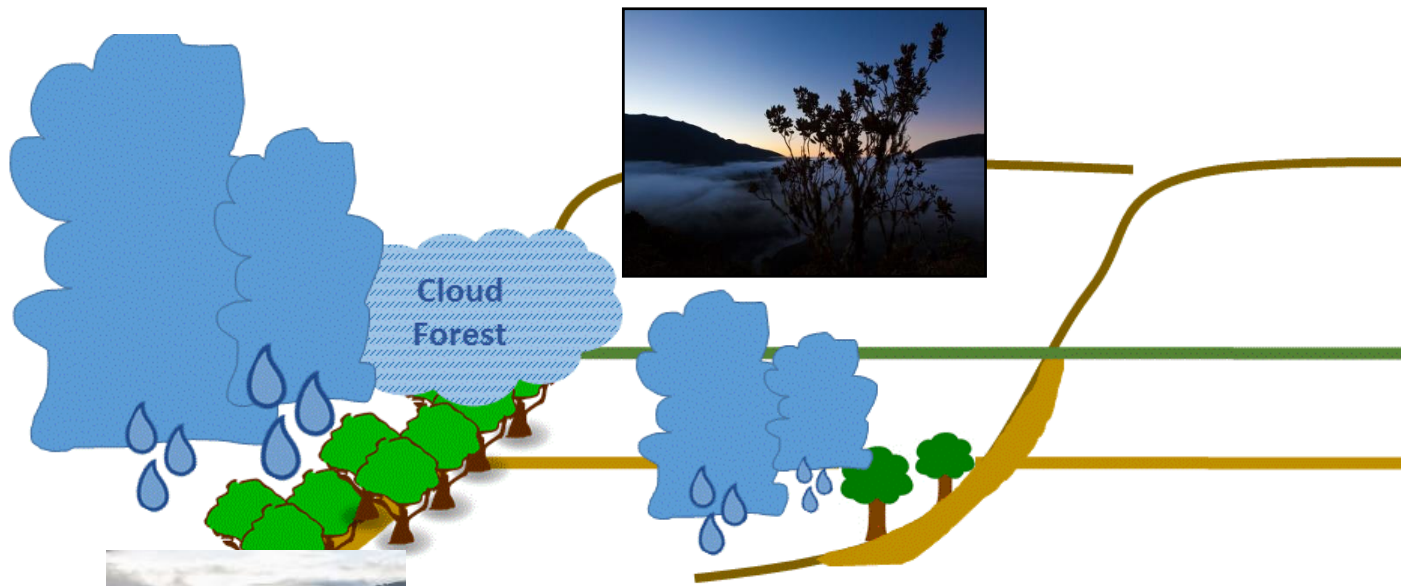


Sun and Barros, JAS 2015

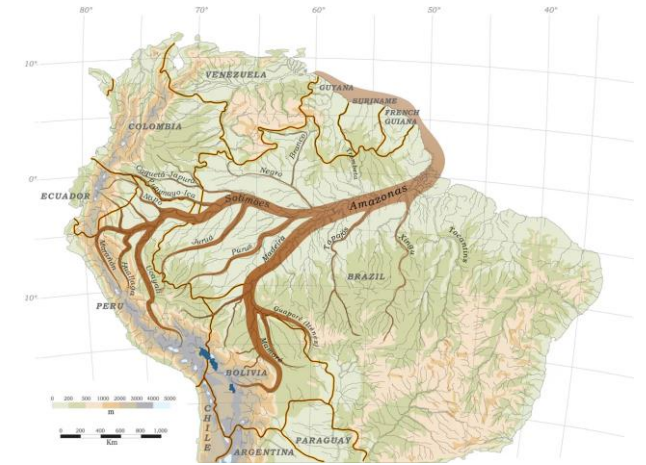
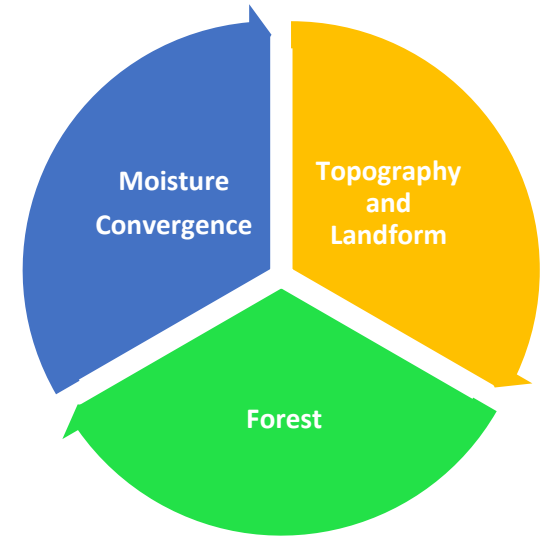


Eghdami and Barros, 2020



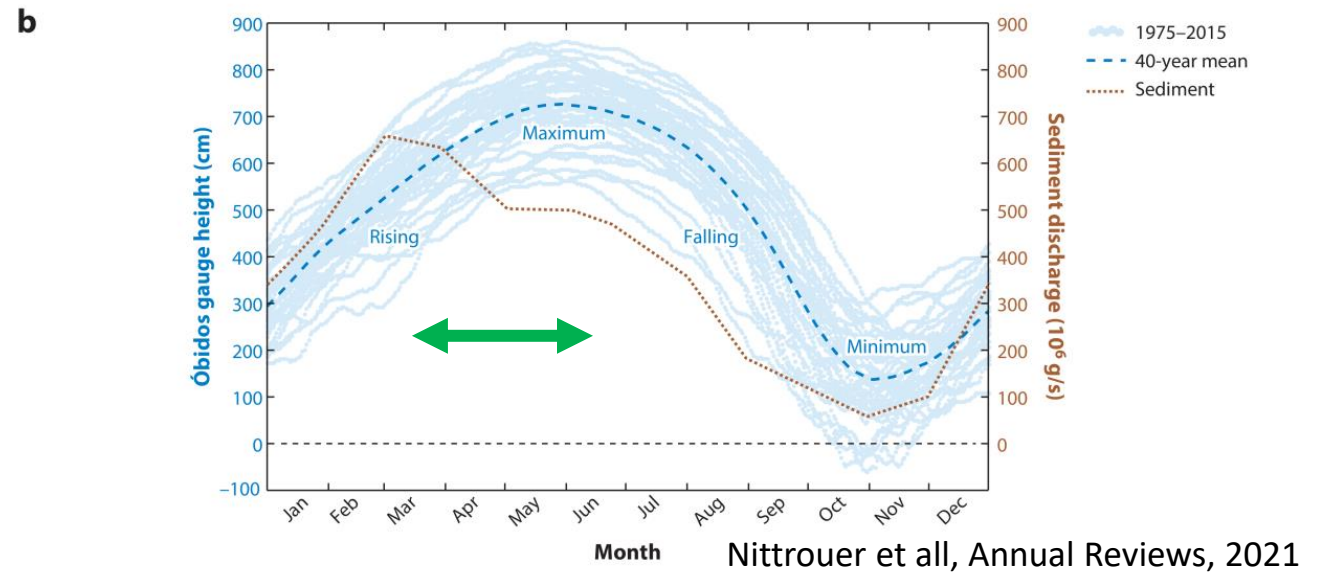
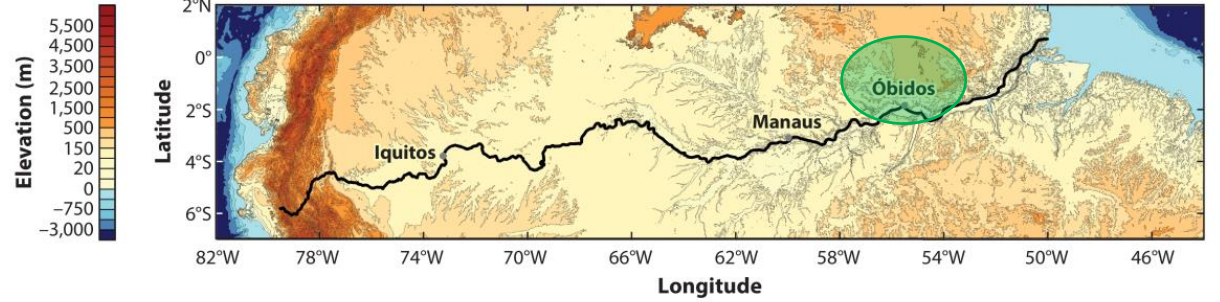
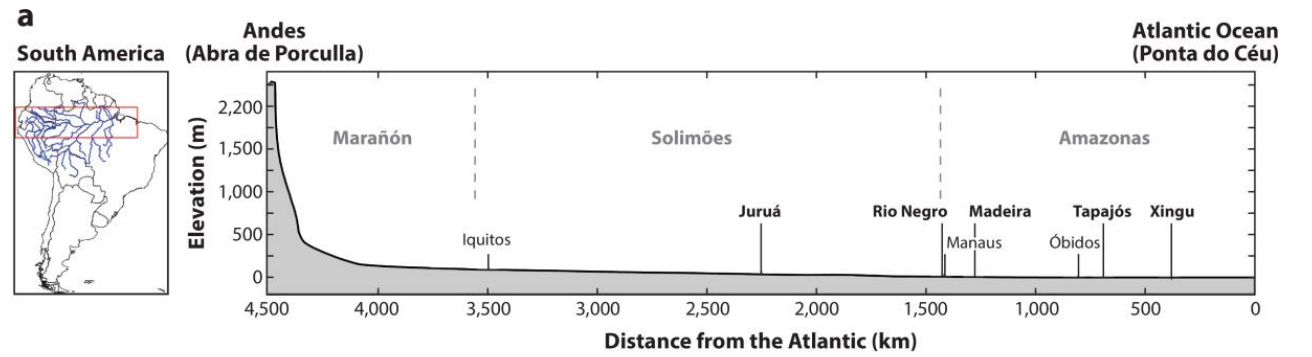


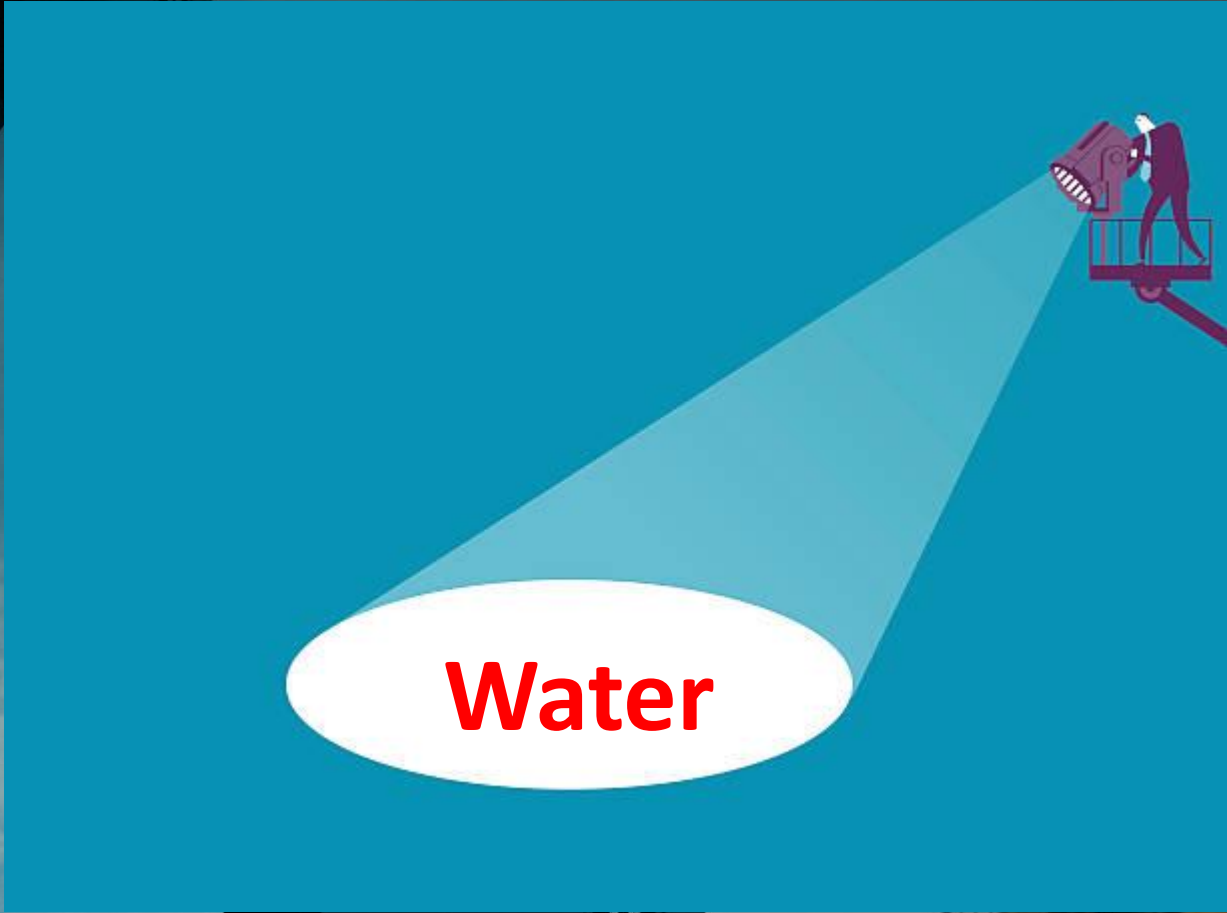
- Decreased Rainfall
- Shift to Light Rainfall
- Decrease Infiltration
- Decrease Runoff
- Stress Vegetation
- **Decrease in Material Fluxes**



Barros, 2013

Natural and Manmade Long Range Water Cycle Feedbacks





Thank you!