



# EMILY S. BERNHARDT

UNITED STATES

Ecologist that study the effects of global environmental change on the biogeochemistry of rivers, wetlands, and watersheds.

Chair of the Biology Department of Duke University and mentor of >50 researchers.

Co-author of > 100 publications, including an award-winning text book on biogeochemistry.

ISI Highly Cited Researcher in the field of Ecology and Environmental Science.

## HERSTORY

She got the Outstanding Postdoc Mentor at Duke for her support for women in science and her commitment to increasing the numbers of minorities in ecology. Her advice: "Everyone here is smart, distinguish yourself by being kind."

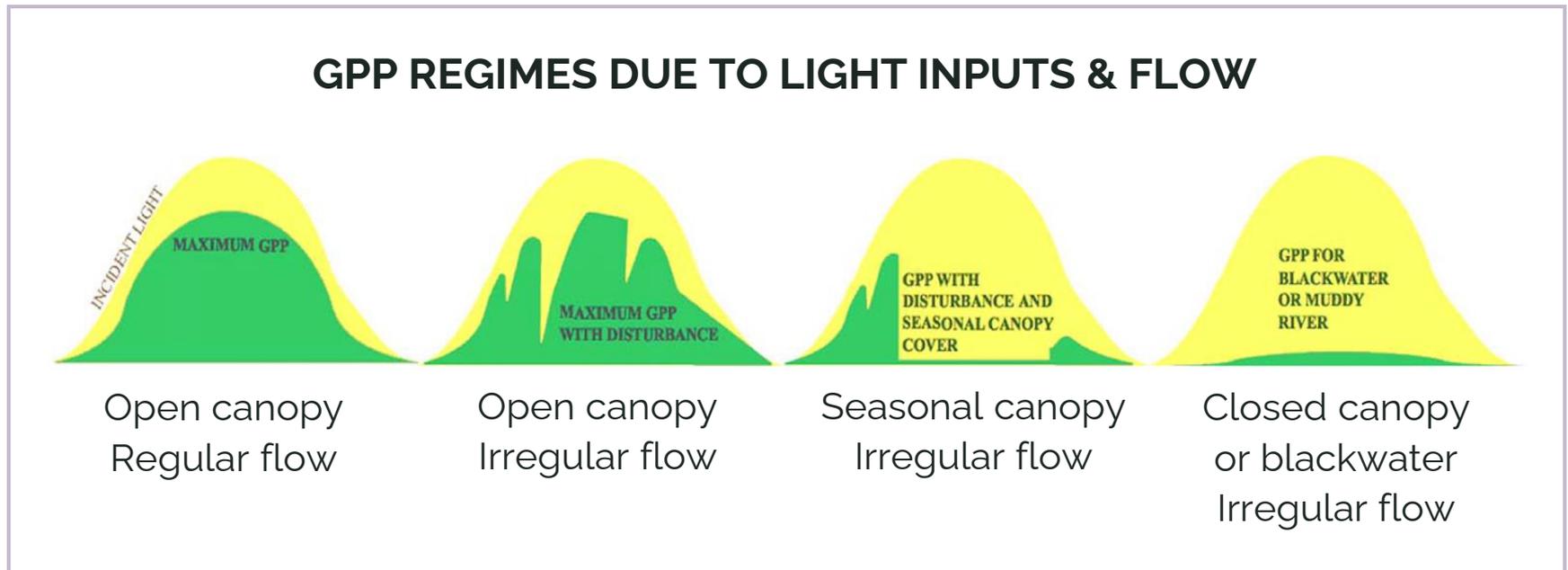
# DRIVERS OF STREAM METABOLISM

**Light inputs.** Positive related to GPP

**Temperature.** Positive related to ER

**Nutrients.** Positive related to GPP and ER

**Flow.** Either positive or negative related to GPP and ER



Emily S. Bernhardt et al. (2017). *Limnology and Oceanography*.

# SUPPLY, DEMAND & EXPORTS

Stream nutrient uptake and limitation are interconnected by relationships between nutrient supply and demand.

- **Supply > Demand:** High concentration or export of elements; low or nil retention of elements in streams (e.g storm events)
- **Supply < Demand :** Low concentration or export of elements; high retention of elements in streams

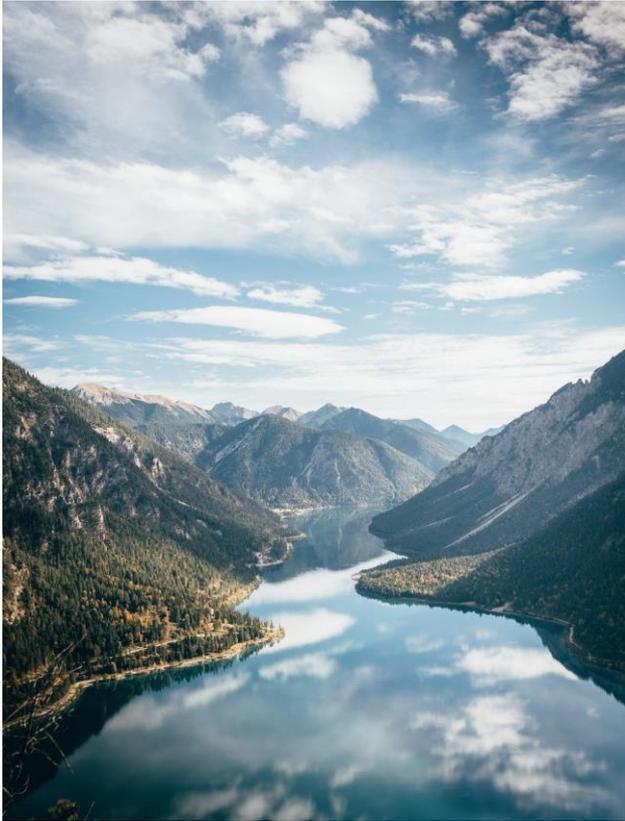
Month	Supply (g N/m <sup>2</sup> /d)	Demand (g N/m <sup>2</sup> /d)	Nitrate (mg N/L)
April	3.18	0.10	0.14
August	5.48	1.80	0.43
November	0.19	0.12	0.03

## Example

Seasonal variation in stream nitrate concentration as a result of changes in both nitrate supply and demand.

# ECOSYSTEM CONTROL POINTS

Areas of the landscape that exerts disproportionate influence on the biogeochemical behavior of the ecosystem under study.



**Permanent:** Sustained high activity due to constant reactants supply and appropriate environmental conditions.

**Activated:** Sporadic high activity when the supply of limiting reactants increases or the environmental conditions are optimal.

**Export:** Sporadic high export rates. Reactants accumulate until a hydraulic gradient or threshold is overcome.

**Transport:** Sustained high export rates.

Conceptual idea from:  
Emily S. Bernhardt et al. (2017). *Ecosystems*

# RELEVANT CONTRIBUTIONS

**Bernhardt, E. S.**, Heffernan, J. B., Grimm, N. B. et al. (2018). The metabolic regimes of flowing waters. *Limnology and Oceanography*, 63, S99-S118.

**Bernhardt, E. S.**, Blaszcak, J. R., Ficken, C. D., Fork, M. L., Kaiser, K. E., Seybold, E. C. (2017). Control points in ecosystems: moving beyond the hot spot hot moment concept. *Ecosystems*, 20, 665-682.

Covino, T. P., **Bernhardt, E. S.**, Heffernan, J. B. (2018). Measuring and interpreting relationships between nutrient supply, demand, and limitation. *Freshwater Science*, 37, 448-455.

**Bernhardt, E. S.**, Likens, G. E., Hall, R. O. et al. (2005). Can't see the forest for the stream? In-stream processing and terrestrial nitrogen exports. *Bioscience*, 55, 219-230.

**Bernhardt, E. S.**, Palmer, M. A., Allan, J. D. (2005). Synthesizing US river restoration efforts. *Science*, 308, 636-637.

LOOKING  
FOR MORE?

**You can find more information about her story and research at:**

<http://bernhardtlab.weebly.com>

[http://en.wikipedia.org/wiki/Emily\\_Bernhardt](http://en.wikipedia.org/wiki/Emily_Bernhardt)

<http://freshwater-science.org/news/presidents-environment-being-kind>