Coupling of carbon and nitrogen cycles in Appalachian streams: the role of dissolved organic nitrogen

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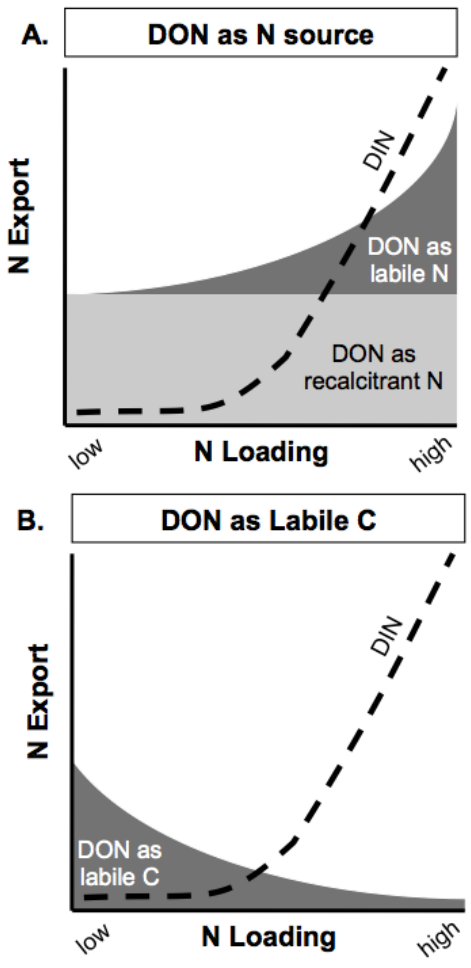
- Dissolved organic nitrogen (DON) is the dominant form of N loss from forested watersheds and accounts for ~75% of annual N fluxes from terrestrial to aquatic systems globally.
- Anthropogenic N pollution can result in sharp increases in dissolved inorganic nitrogen (DIN) losses at high rates of N loading.
- Our understanding of how DON losses from forested watersheds change under elevated N loading is elementary. Two hypotheses have been proposed:
  - (1) DON losses are invariant to human alteration of N availability,
  - (2) DON losses will increase with increasing N availability. [Panel A at right].
- Through repeated surveys of streamwater chemistry across sites spanning a large gradient of N deposition rates, we found that DON concentrations declined significantly in most cases. [Panel B, right]
- With additional support from laboratory bioavailability assays, we find that heterotrophic demand for labile carbon can result in a decline in DON concentrations when increases in N availability results in a shift towards greater carbon limitation of heterotrophic metabolism.



Lutz BD, Bernhardt ES, Roberts BJ, Mulholland PJ (2011) Examining the coupling of carbon and nitrogen cycles in Appalachian streams: the role of dissolved organic nitrogen. *Ecology* 92:720-632, doi: 10-1890/10-0899.l.

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