Natural Climate Solutions in the United States

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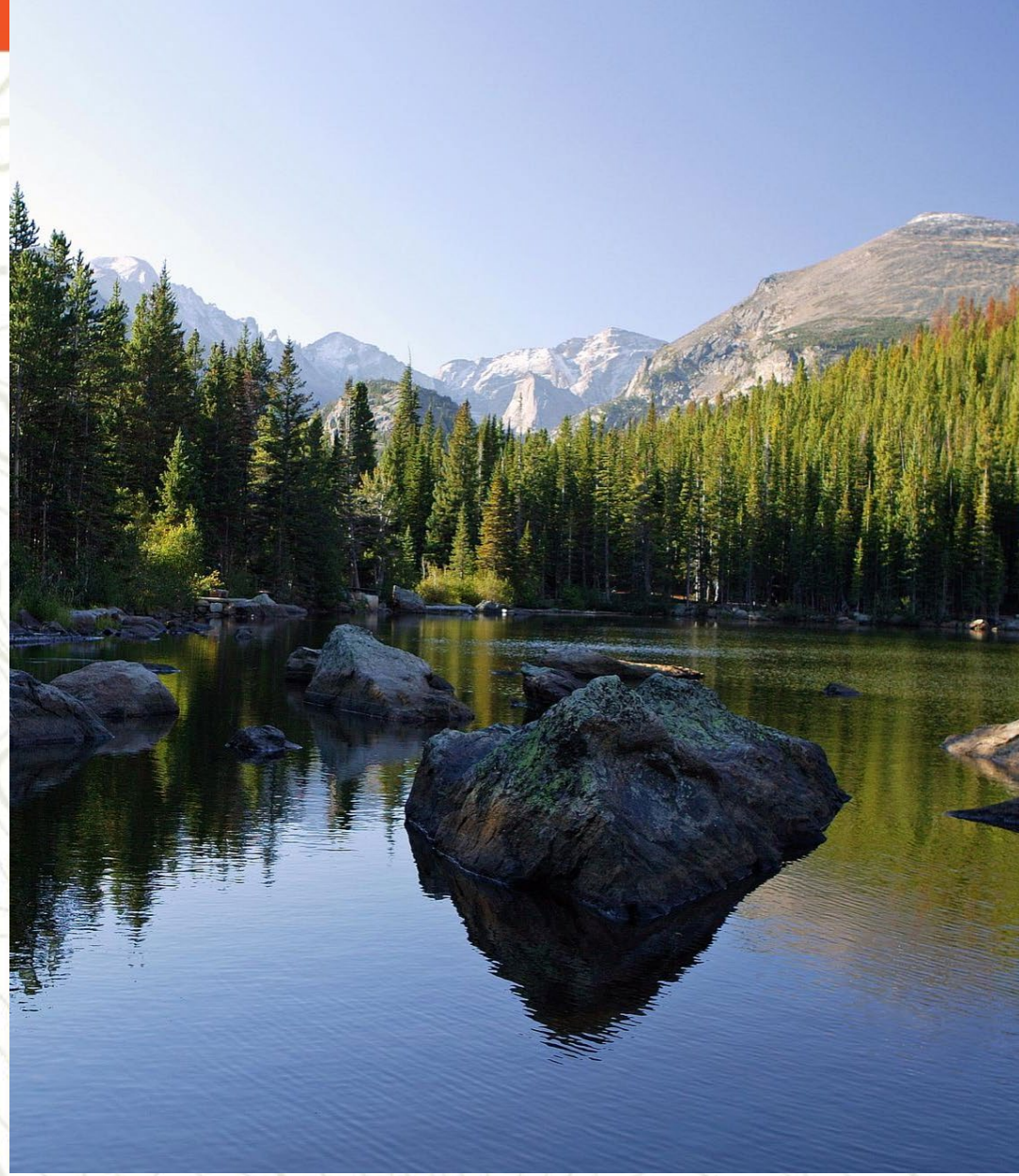
What are Natural Climate Solutions?

- **Nature-based Solutions (NBS) –** actions that incorporate natural features and processes to protect, conserve, restore, sustainably use, and manage natural or modified ecosystems to address socio-environmental challenges while providing measurable co-benefits.
- **Natural Climate Solutions (NCS)–** a subset of nature-based solutions that store carbon and/or avoid greenhouse gas emissions while providing additional co-benefits.
- **Co-benefits** - the cumulative positive impacts on human well-being, ecosystems, and biodiversity resulting from NBS implementation.



Definitions Sourced from the DOI

Categories of NCS

- Avoided emissions and protection of ecosystems
  - protection is an immediate and significant way to reduce emissions with enormous co-benefits
- Improved stewardship and management of lands
  - benefits from improved management can be easier to achieve than restoration
- Restoration of native habitats
  - restoration has the most technical potential, but benefits are delayed and it is more expensive than protecting and managing existing natural carbon stores

Cook-Patton, S.C., Drever, C.R., Griscom, B.W. et al. Protect, manage and then restore lands for climate mitigation. Nat. Clim. Chang. 11, 1027–1034 (2021). https://doi.org/10.1038/s41558-021-01198-0

Diverse Ecosystems bring Diverse benefits

- In 2019, forest land, harvested wood products, and urban trees in the U.S. accounted for a net uptake of ~775.7 MMT of CO2 eq. (~11% of 2019 US GHGs)
- Federal rangelands offer potential sequestration of 16.6 MMT of carbon dioxide each year.
- Climate-smart ag practices could sequester 100-200 MMT/yr by 2050.
- Freshwater wetlands in North America absorb about 123 MMT of carbon per year, and store about 161 billion metric tons of carbon in their soil and vegetation.

Domke, Grant M.; Walters, Brian F.; Nowak, David J.; Smith, James, E.; Nichols, Michael C.; Ogle, Stephen M.; Coulston, J.W.; Wirth, T.C. 2021. Greenhouse gas emissions and removals from forest land, woodlands, and urban trees in the United States, 1990–2019. Resource Update FS–307. Madison, WI: U.S. Department of Agriculture, Forest Service, Northern Research Station.

Kolka, R., Trettin, C., Tang, W., Krauss, K., Bansal, S., Drexler, J., Wickland, K., Chimner, R., Hogan, D., Pindilli, E., Benscoter, B., Tangen, B., Kane, E., Bridgham, S., Richardson, C., Cavallaro, N., Shrestha, G., Birdsey, R., Mayes, M. A., ... Zhu, Z. (2018). Chapter 13: Terrestrial Wetlands. Second State of the Carbon Cycle Report. U.S. Global Change Research Program. https://doi.org/10.7930/SOCCR2.2018.Ch13

Olander, L., D. Cooley, and C. Galik. 2010. The Potential Role for Management of Public Lands in Greenhouse Gas Mitigation and Climate Policy. Duke Nicholas Institute for Environmental Policy Solutions

Mulligan, J., et al. 2020. CarbonShot: Federal Policy Options for Carbon Removal in the United States. Working Paper. Washington, DC: World Resources Institute.

Trees are not always the answer

- Afforestation is not reforestation.
- **Afforestation** is the planting of trees where forests did not exist before or have not existed for centuries.
  - For example planting trees in grasslands or rangelands
- **Reforestation** focuses on restoring damaged or destroyed forests, or planting trees where forests previously existed.
- While planting trees can sequester carbon, we must be careful not to harm native habitats and species

Briske, D.D., Vetter, S., Coetsee, C. and Turner, M.D. (2024), Rangeland afforestation is not a natural climate solution. Front Ecol Environ, 22: e2727. https://doi.org/10.1002/fee.2727

Urban Forests and NCS

- In cases such as increasing tree cover in cities, carbon sequestration is the co-benefit, while the increased health of communities and local wildlife is the direct benefit.
- Trees can have human health benefits by lowering surface temperatures in cities.
- Urban trees also provide key habitat for species, all while sequestering carbon.
- Urban trees in the continental US currently store an estimated 643 MMT of carbon.

Knight, T., S. Price, D. Bowler, et al. 2021. How effective is 'greening' of urban areas in reducing human exposure to ground-level ozone concentrations, UV exposure and the 'urban heat island effect'? An updated systematic review. *Environmental Evidence* 10, 12.

Nowak, D.J., Greenfield, E.J., Hoehn, R.E. and Lapoint, E., 2013. Carbon storage and sequestration by trees in urban and community areas of the United States. Environmental pollution, 178, pp.229-236.

Conniff, Richard. Trees Shed Bad Rap As Accessories to Crime, *Environment Yale*.

NBS for Climate Adaptation

- Alongside mitigating climate change, nature-based solutions can be an important way of adapting to impacts of climate change.
- By restoring, managing, and protecting key ecosystems you can help reduce communities' vulnerability to natural disasters, water scarcity, and food insecurity.
- As climate change increases the intensity of storms, NBS deployed in wetlands and coastlines can be highly effective and cheaper than alternative gray solutions.
- Prevention is more affordable than recovery.

Chausson, A., Turner, B., Seddon, D., Chabaneix, N., Girardin, C.A., Kapos, V., Key, I., Roe, D., Smith, A., Woroniecki, S. and Seddon, N., 2020. Mapping the effectiveness of nature-based solutions for climate change adaptation. Global Change Biology, 26(11), pp.6134-6155.

NCS in Carbon Dioxide Removal (CDR)

- CDR is intended for permanent carbon storage or reuse.
- NCS can be an important part of the CDR puzzle if they are:
  - Permanent
  - Additional
  - Verifiable
  - Enforceable
- NCS and CDR are most likely to meet these conditions when they are designed, implemented, managed in partnership with Indigenous peoples and local communities.
- While NCS for carbon storage can be less permanent than engineered solutions, they are immediately ready for large scale deployment, and typically have co-benefits.
- Engineered approaches to CDR do not bring the suite of additional ecosystem services offered by well-implemented and managed NbS.

Seddon, N., Chausson, A., Berry, P., Girardin, C.A., Smith, A. and Turner, B., 2020. Understanding the value and limits of nature-based solutions to climate change and other global challenges. *Philosophical Transactions of the Royal Society B*, *375*(1794), p.20190120.

Nature-based Solutions to Climate Change Guidelines, 2024. Nature-based Solutions Initiative, University of Oxford

IPCC Factsheet CDR :WGIII 6AR I

NCS are scalable, proven, and deliver wins for communities, wildlife, and our climate.

Learn more: https://www.nwf.org/Our-Work/Climate/Climate-Change/Policy/Natural-Solutions