spatial networks impact assessment library

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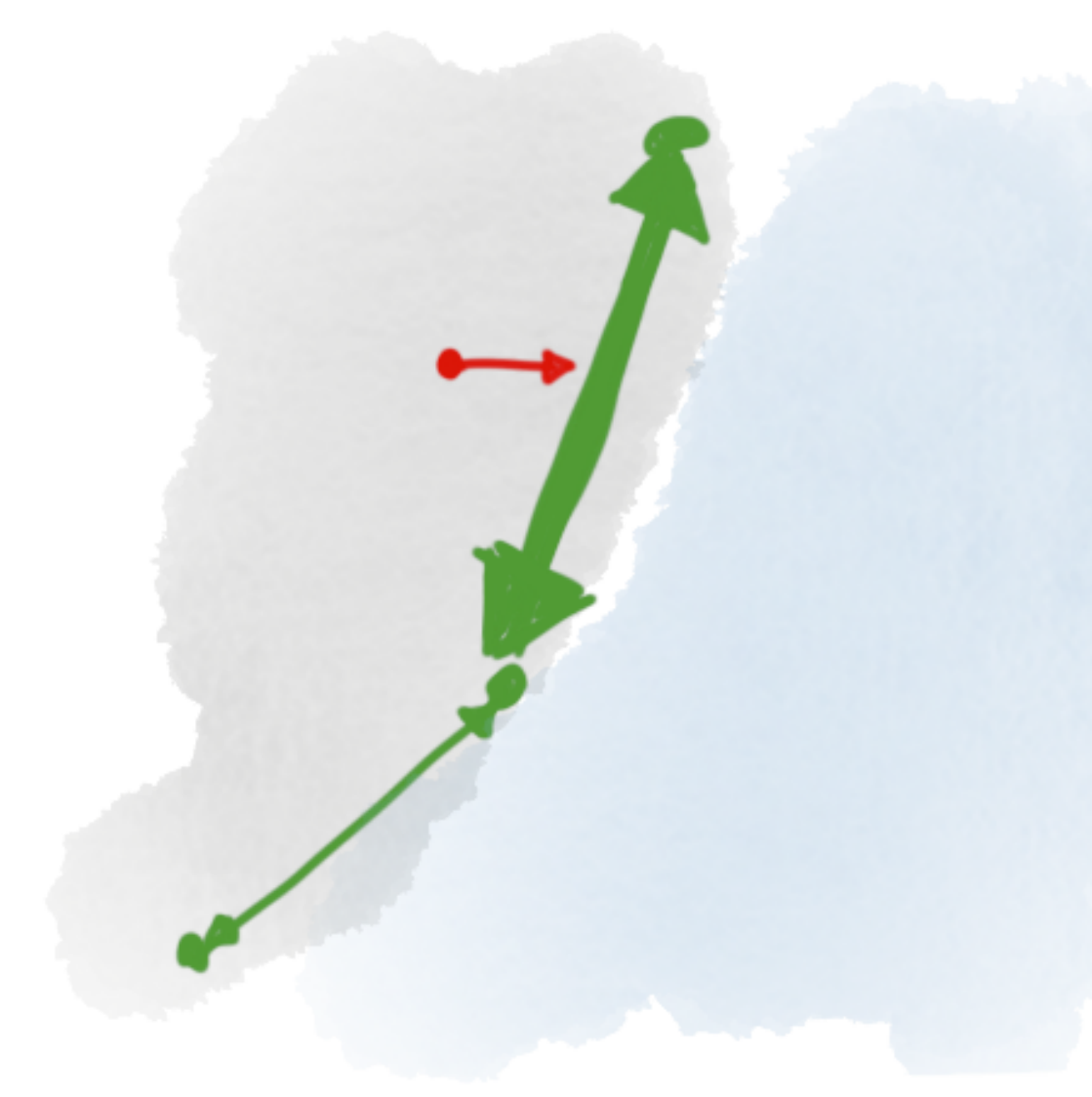Code: https://github.com/nismod/snail

Hazard maps
Flood inundation under return periods, current and future climate scenarios, other spatial climate hazards.

Infrastructure networks
Energy, transport, water systems linked to population and economic activity.

Infrastructure services
Network models of service provision give knock-on effects and indirect impacts of individual asset failure.

Fragility ∩ Exposure = Vulnerability
Hazards of varying intensity will lead to direct damage to infrastructure assets.

With or without direct damage, there may also be a period of service disruption.

Δ Service Provision = Criticality
Calculate impact of the failure of a single asset on overall service provision.

Probability × Impact = Risk
Introduce options to improve resilience, asset fragility, backups or redundancy, means of reducing the duration of service disruption.

Summarise and prioritise options, calculate benefits of avoiding potential losses.
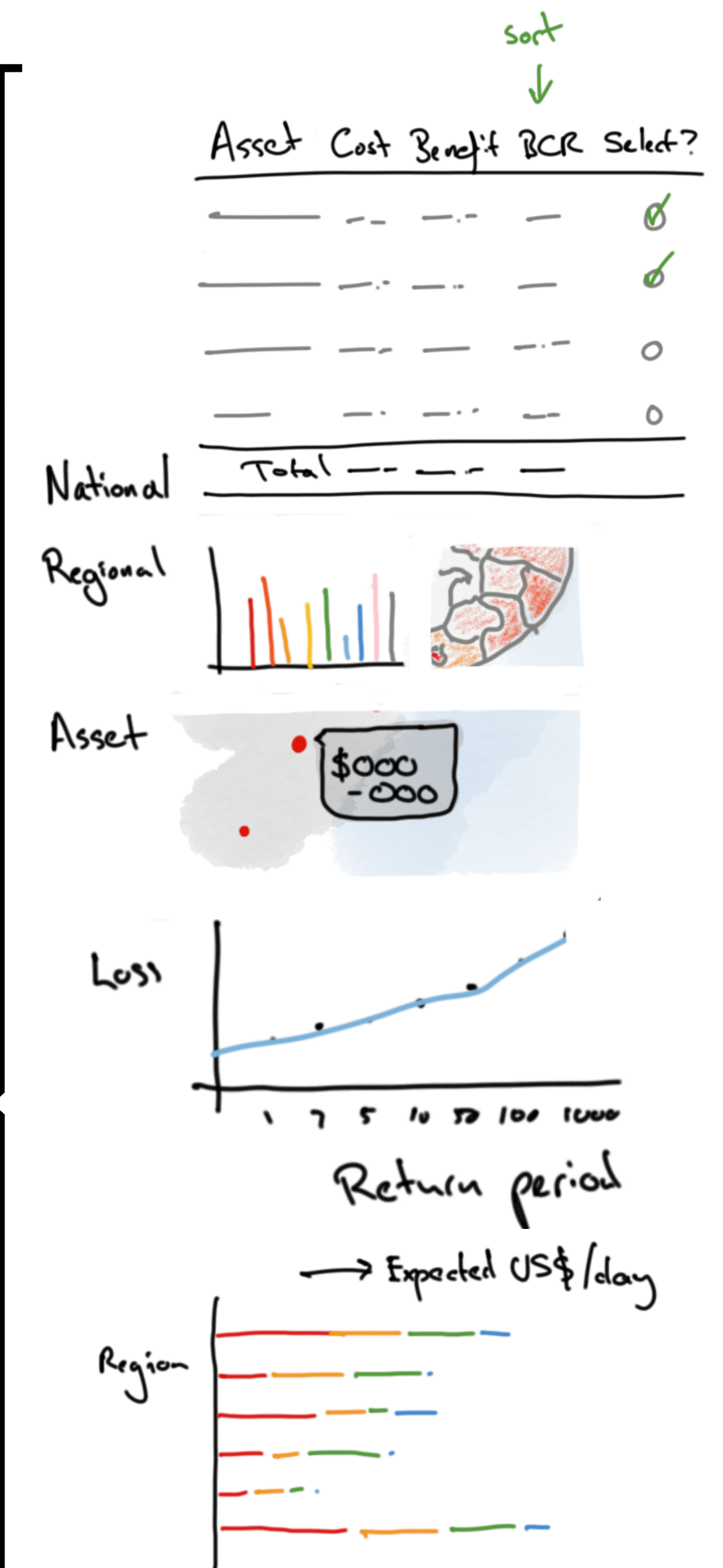
Software sustainability
We began work on this library after having conducted a number of analyses [1,2,3] which have developed both the methodology and the toolkit used to implement it. Scripts written for specific studies allow for narrow reproducibility of specific analysis. The library aims: to specify clear data requirements and possible outputs; to provide robust and efficient methods for spatial network analysis; and to be more readily reusable and teachable for similar use in other contexts.

References
[1] Oh et al. (2020) Addressing Climate Change in Transport: Volume 2: Pathway to Resilient Transport. World Bank. DOI: 10.1596/32412.
[2] Pant et al. (2019) Planning for transport resilience under a changing climate. International Symposium for Next Generation Infrastructure. Buenos Aires.
[3] Pant et al. (2020) Resilience study research for National Infrastructure Commission: Systems analysis of interdependent network vulnerabilities. Environmental Change Institute, University of Oxford. Available at: https://www.nic.org.uk/wp-content/uploads/Infrastructure-network-analysis.pdf