

# To Remove or Not to Remove: The Tree Removal Question

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A photograph of a dense forest with vibrant green foliage. The foreground is filled with a thick carpet of ferns. Several tall, slender trees with dark trunks stand throughout the scene. The background is a dense canopy of bright green leaves, creating a sense of depth and a lush atmosphere. The lighting is soft and even, highlighting the various shades of green.

Why are we talking about trees?

A photograph of a swampy forest. The ground is covered in water, reflecting the surrounding trees and foliage. Several large, moss-covered tree trunks are visible, particularly in the center and right. The water is dark brown, and the trees are mostly green with some yellowing leaves. The text "1. Trees are amazing!" is overlaid in white on the left side of the image.

1. Trees are amazing!

2. Restoration can be invasive



A photograph of a forest with green trees and dense undergrowth, with the text "3. Our forests are stressed" overlaid in white. The scene shows a variety of trees, some with thick trunks and others with thinner stems, all surrounded by lush green bushes and grass. The sky is visible through the canopy, appearing as a pale blue. The text is centered horizontally and vertically in the image.

3. Our forests are stressed

A photograph of a large, moss-covered tree trunk in a park. A boy in a blue hoodie and jeans stands with his arms outstretched, touching the bark. A younger child in a light blue hoodie and a green hat stands nearby, holding a yellow shovel and a brown hat. The background shows a grassy area, a fence, and other trees.

## 4. Feedback from general public

I thought our tree protection measures were working well

- Minimize impacts
- Apply tree and root protection practices
- Justify removals
- Replant



# Stream restoration is the greater good. Right?

Table 1: An over-simplified comparison

Benefits	Stream	Forest/Trees
Nutrient processing	✓	✓
Erosion control	✓	✓
Habitat	✓	✓
Birds	✓	✓
Fish	✓	✓
Chesapeake Bay	✓	✓
Society	✓	✓



# Greater good at a landscape scale

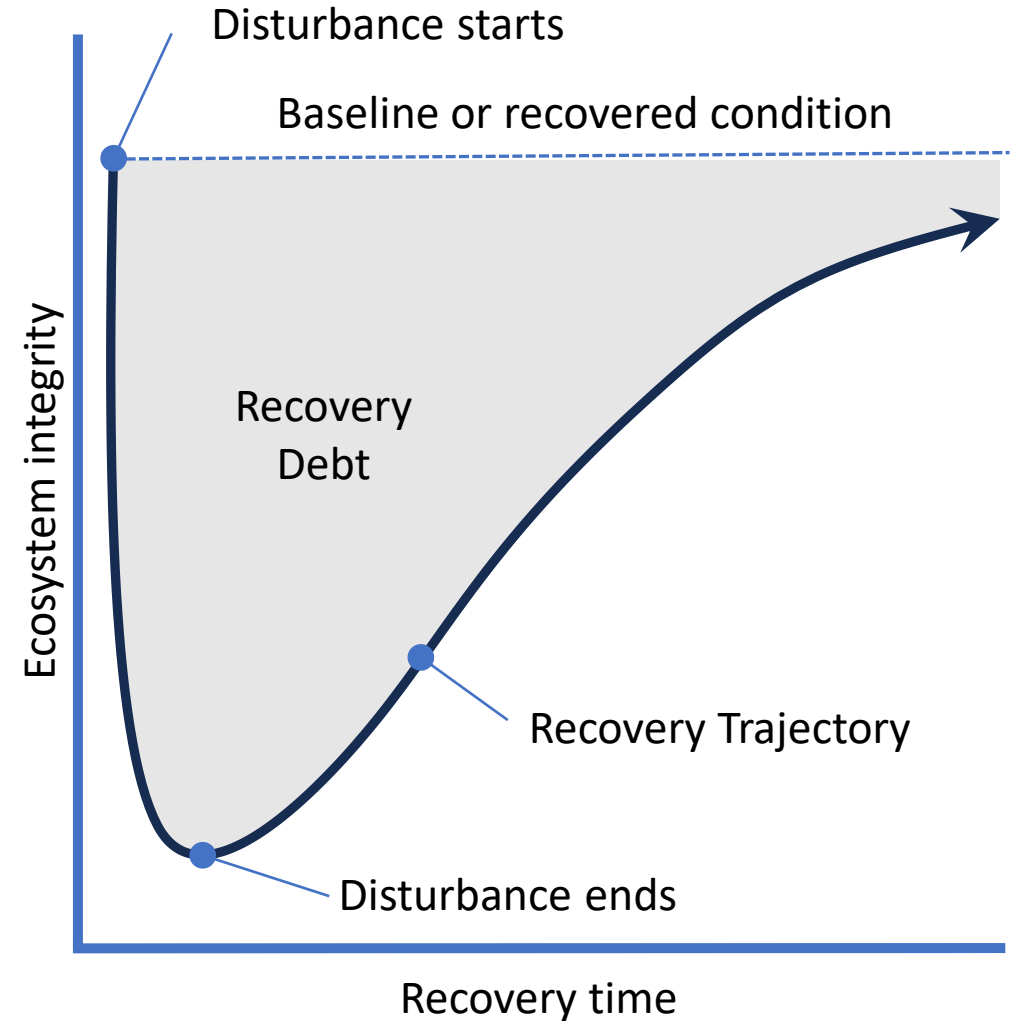


How do we weigh our impacts and justify the greater good?



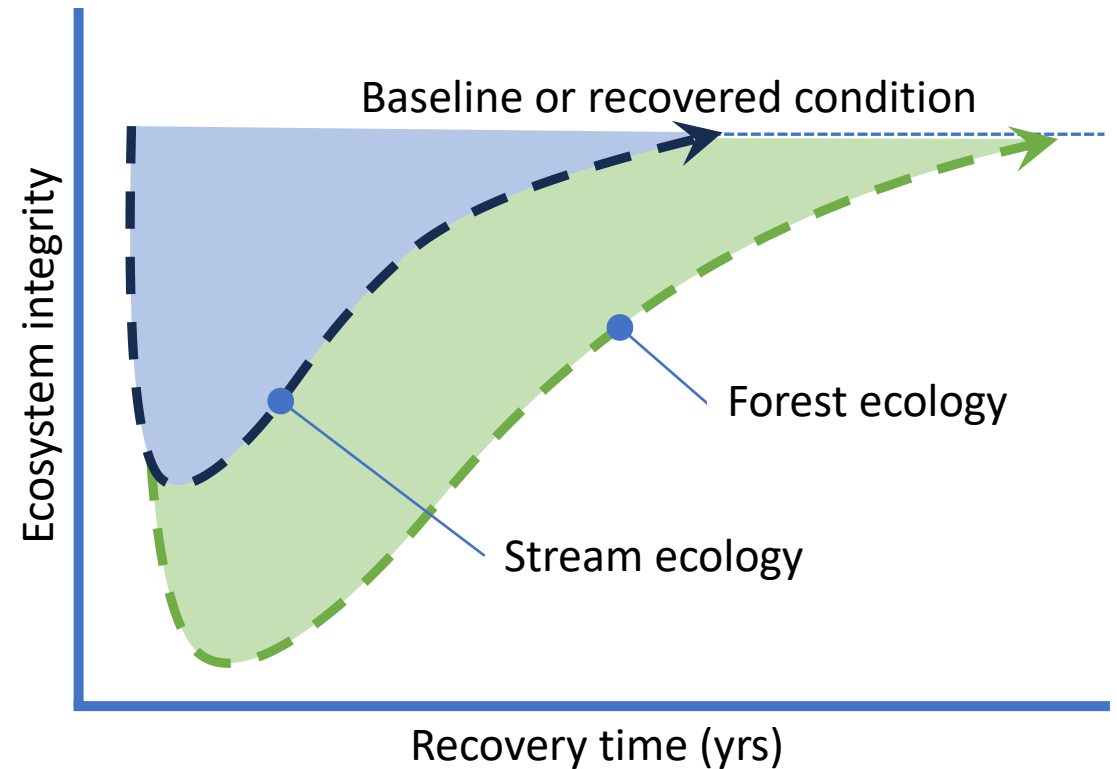
# A conceptual model

***Recovery debt*** is the “*interim reduction of biodiversity and biogeochemical functions occurring during ecosystem recovery*”  
(Moreno-Mateos, D. *et al.*, 2017)



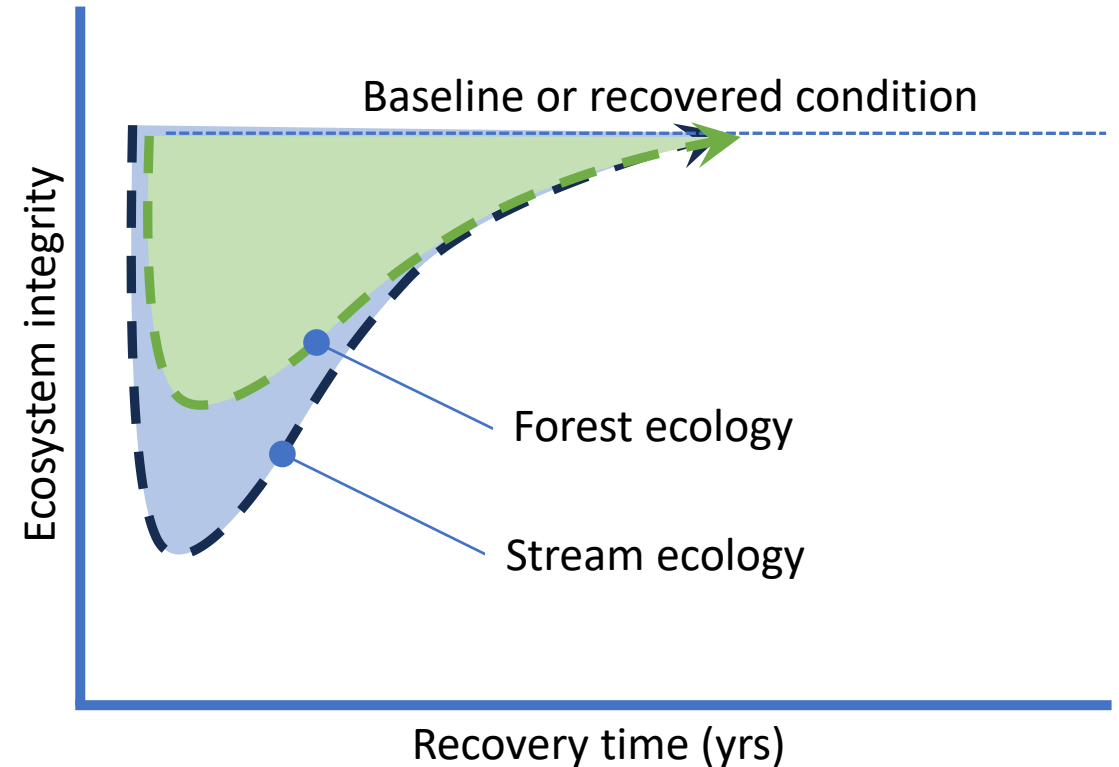
# Simple example 1: More debt accrued to forest

System	Functioning	Functioning at risk	Not functioning
Stream		✓	
Forest	✓		

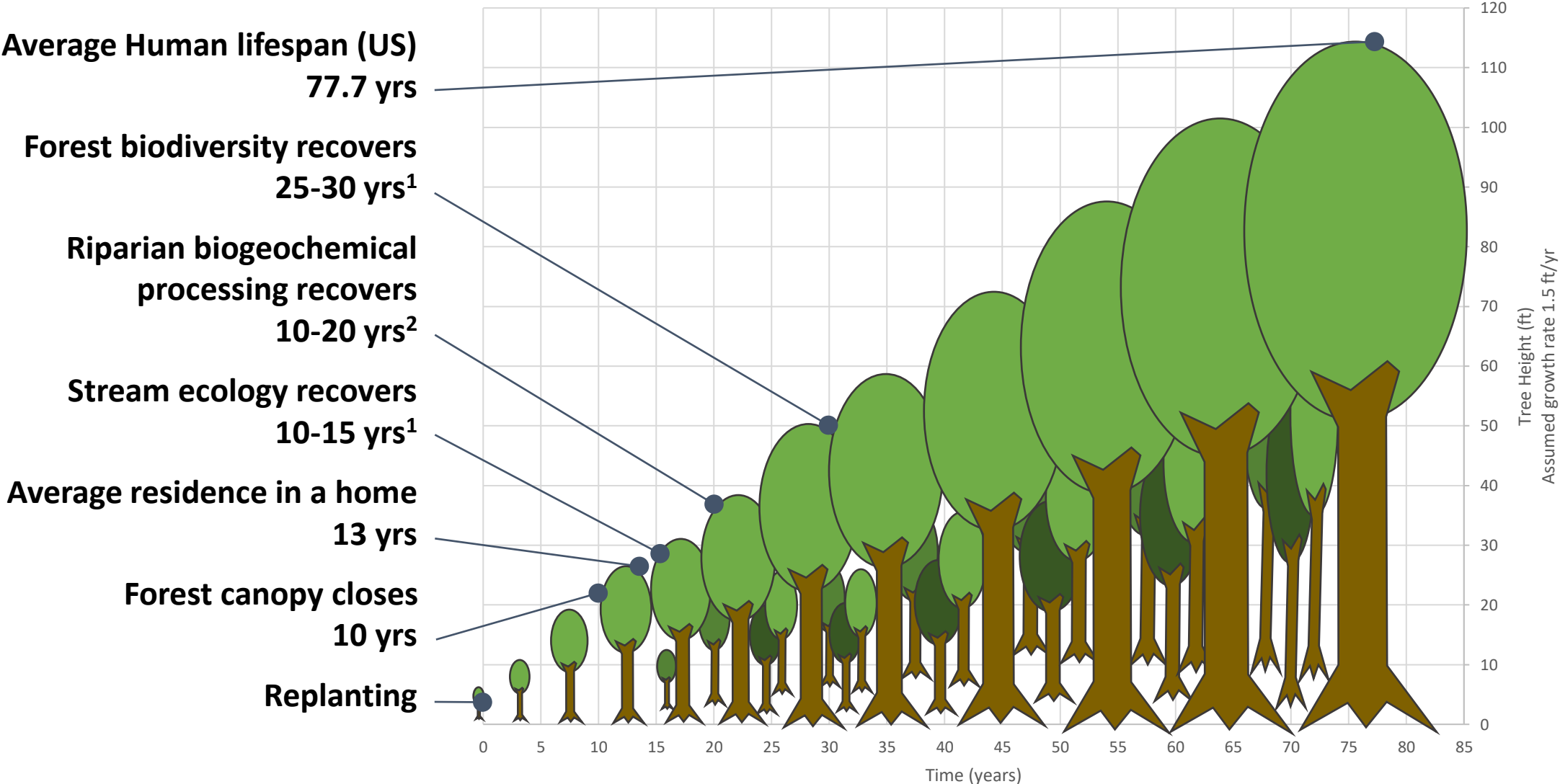


# Simple example 2: More debt accrued to stream

System	Functioning	Functioning at risk	Not functioning
Stream			✓
Forest		✓	

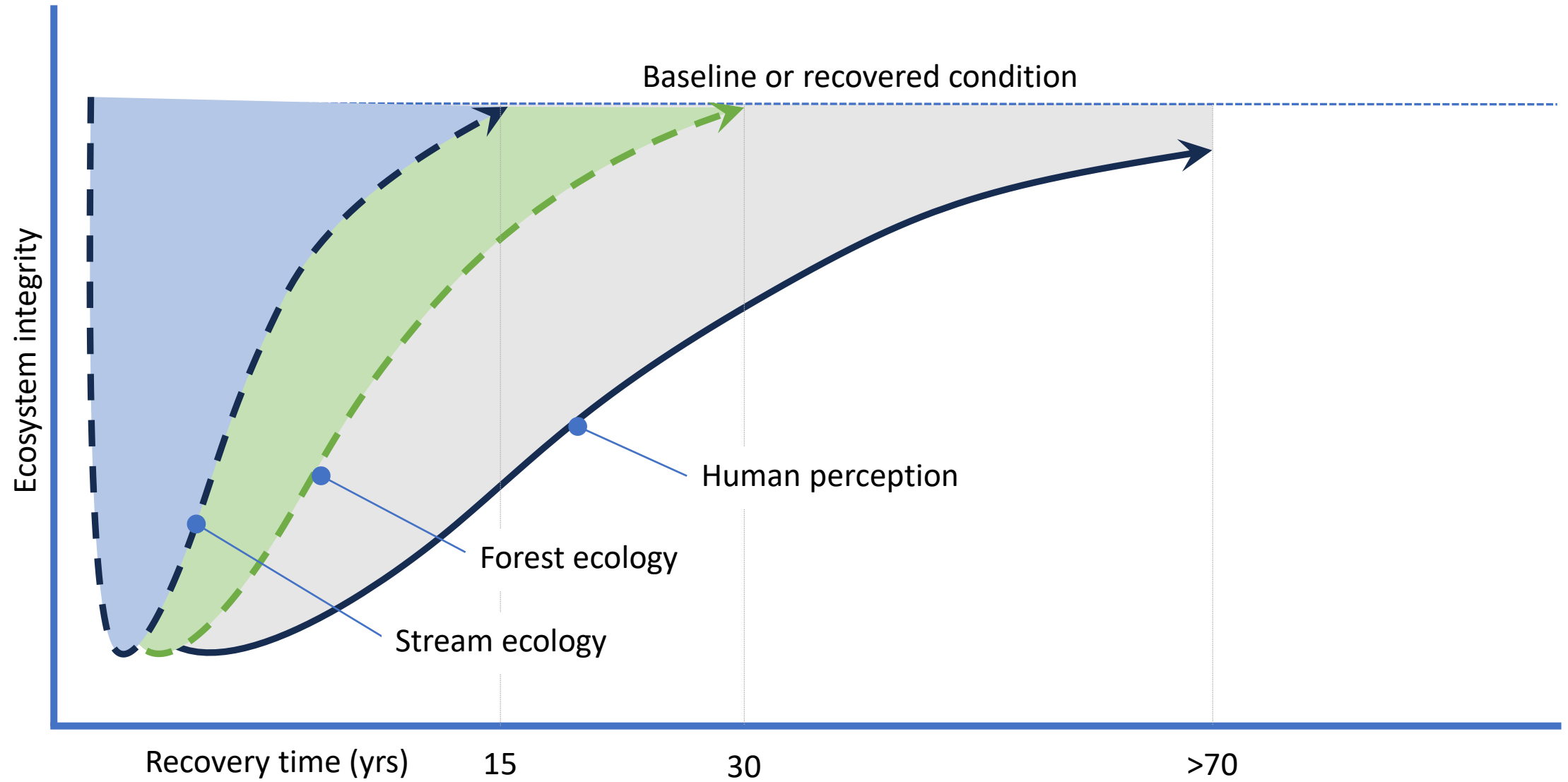


# Recovery in context



*Note: Recovery times above are based on a limited literature review and are only intended for discussion purposes.*

# Recovery in context



Can we get better at using stream credit to pay down our forest debt?

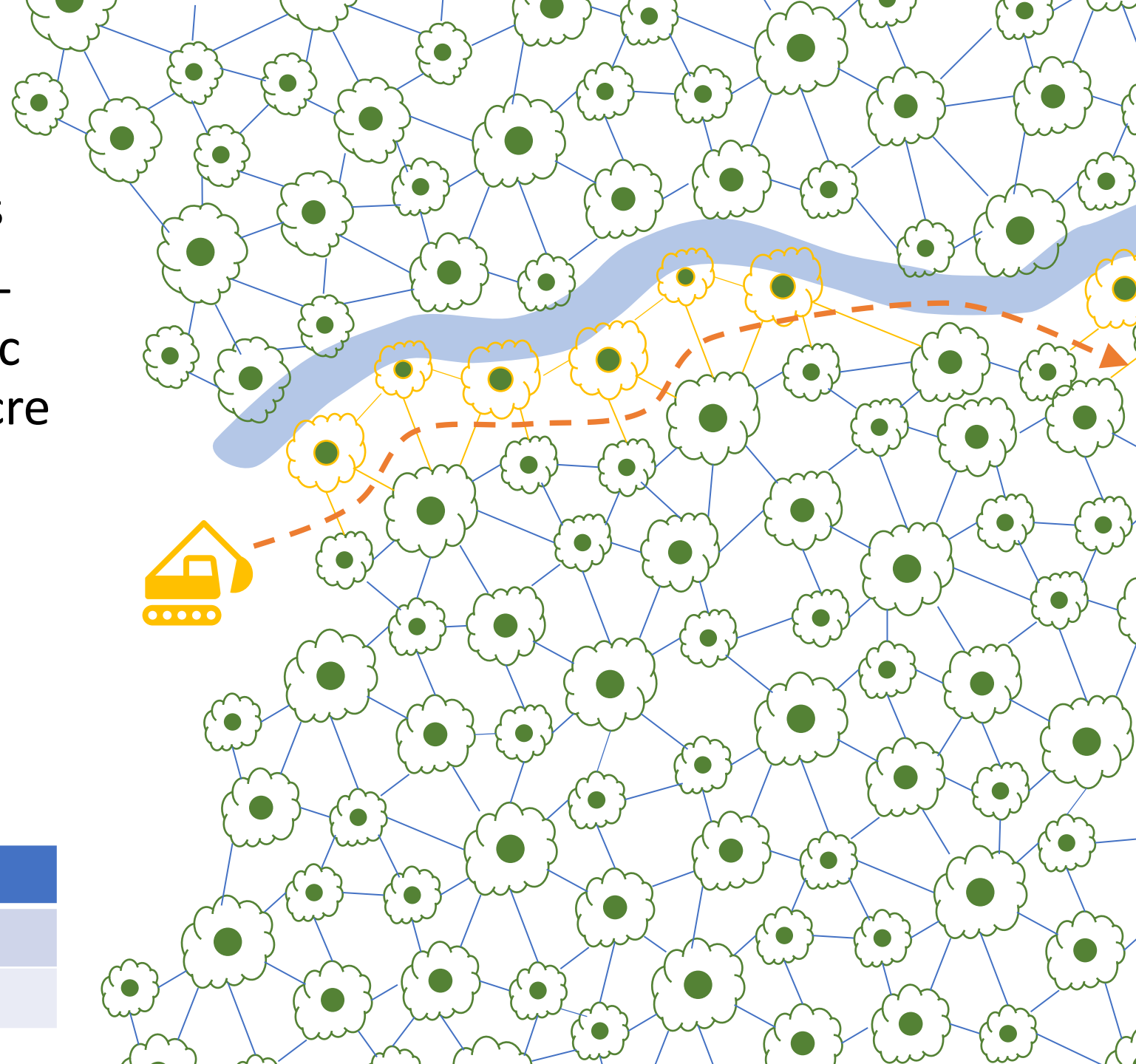




# Impact scenario 1:

- On alignment spot repairs
- Focus on pockets of small-scale disturbance to mimic natural process: +/- 0.1 acre patches
- Some trees can become isolated and stressed
- Lowest recovery debt
- Quickest recovery

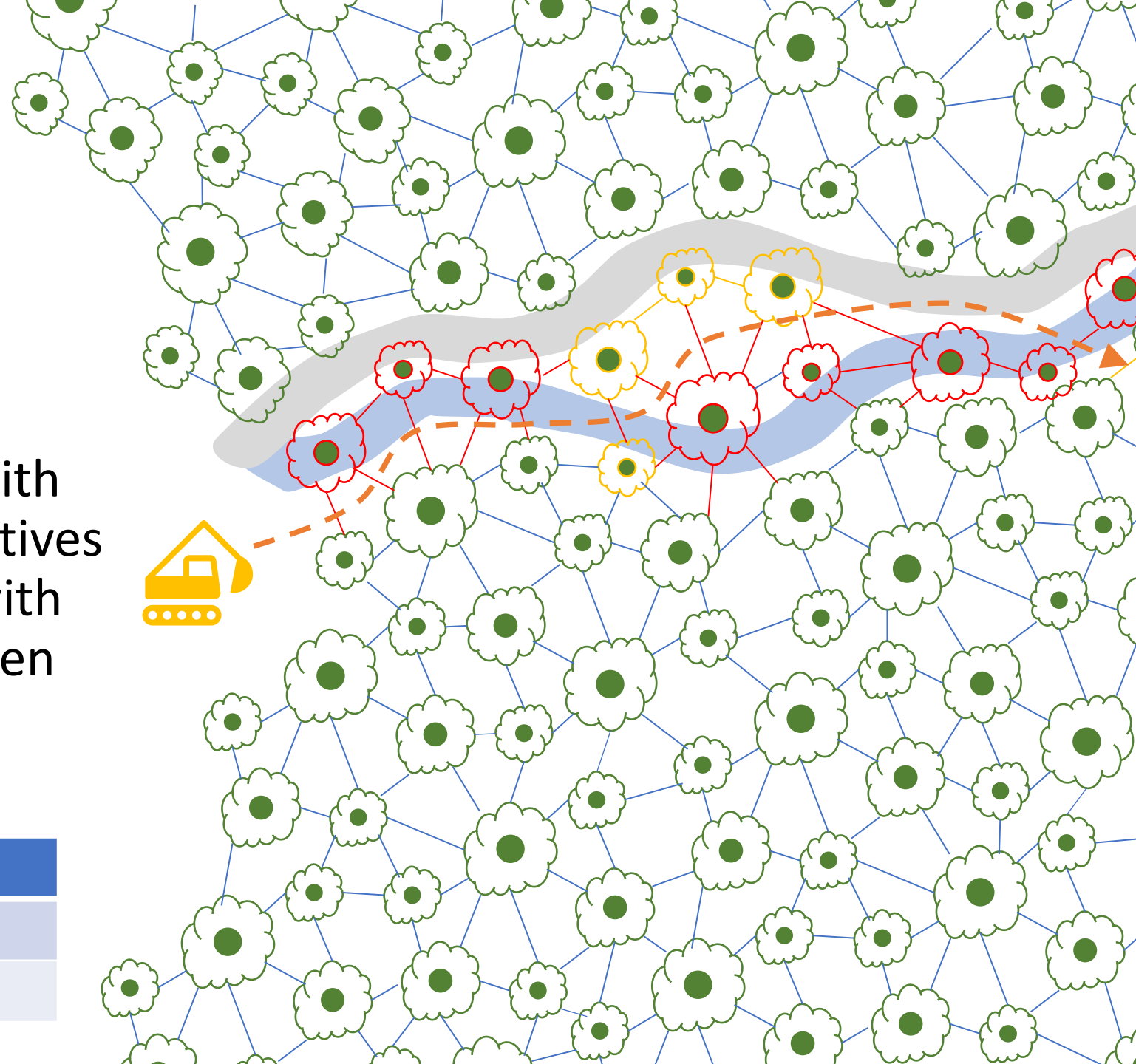
System	Func.	FAR	NF
Stream		✓	✓
Forest	✓	✓	✓



## Impact scenario 2:

- Realignments and minor floodplain grading
- Results in a corridor of disturbance (less natural)
- Coordinate disturbance with forest management objectives
- 0.1- to 0.5-acre pockets with narrower corridors between
- Moderate recovery debt

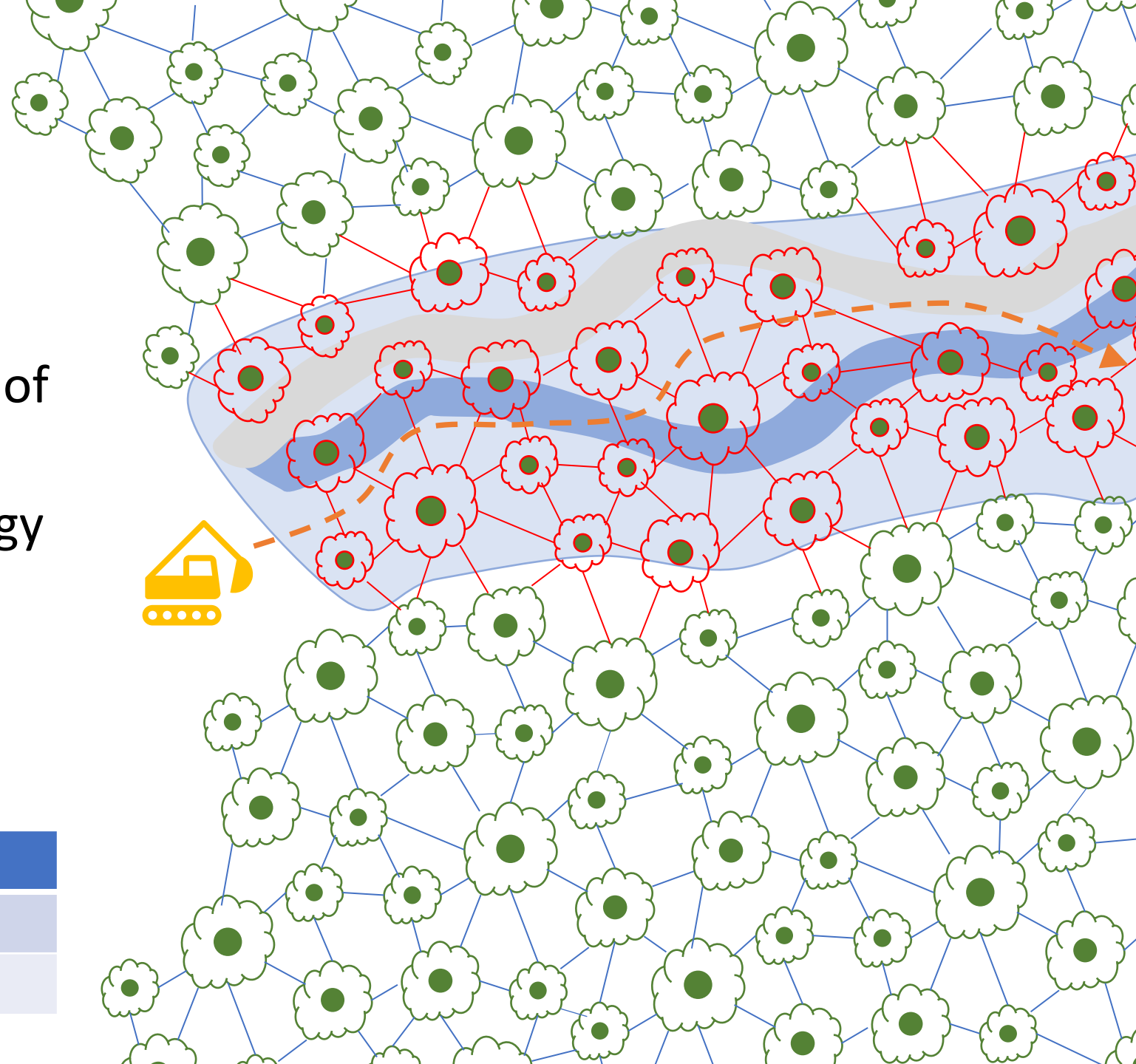
System	Func.	FAR	NF
Stream		✓	✓
Forest		✓	✓



# Impact scenario 3:

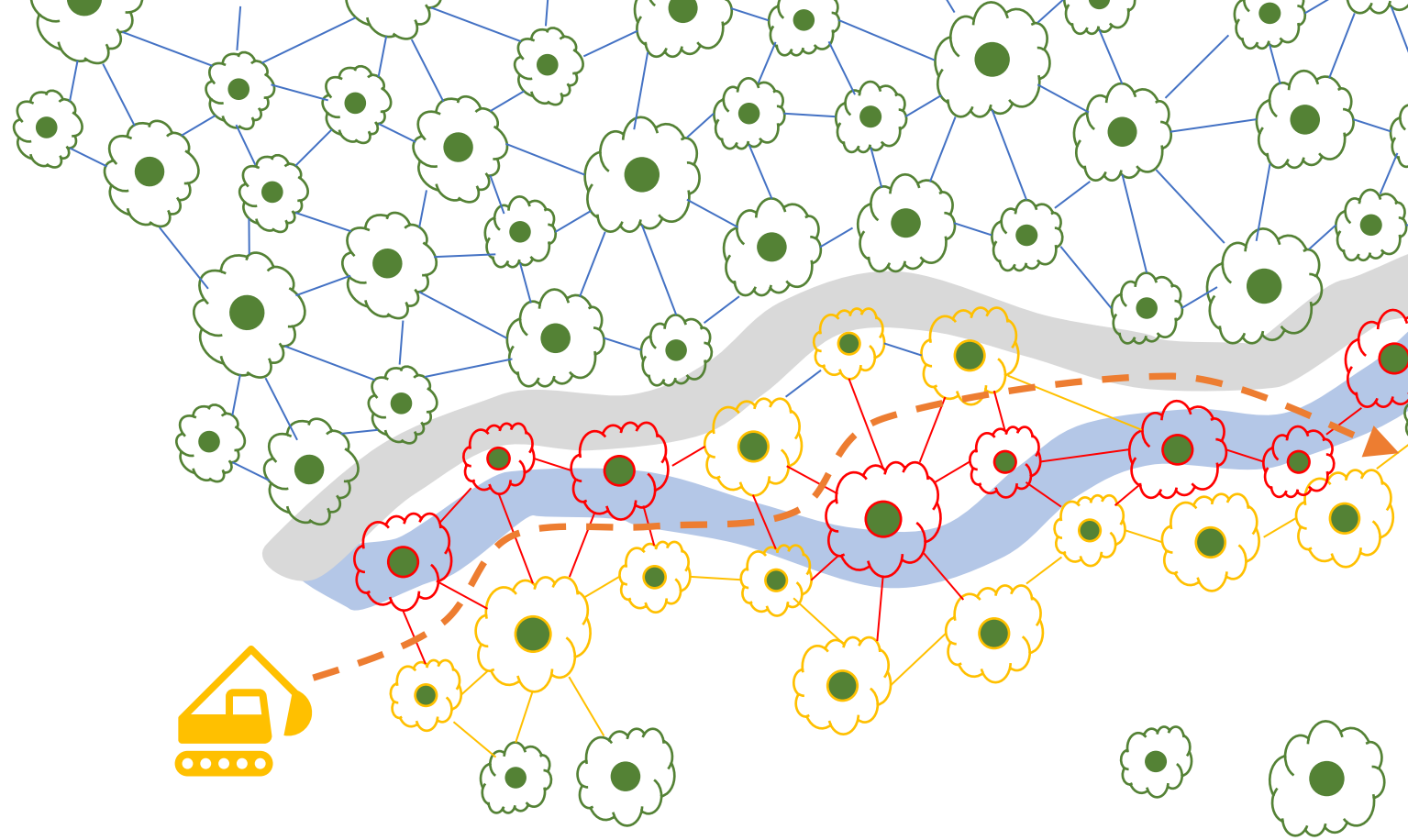
- Major realignment and floodplain excavation
- Results in a wide corridor of disturbance (un-natural)
- Invest in replanting strategy to expedite recovery
- High recovery debt

System	Func.	FAR	NF
Stream		✓	✓
Forest		✓	✓



## Impact scenario 4:

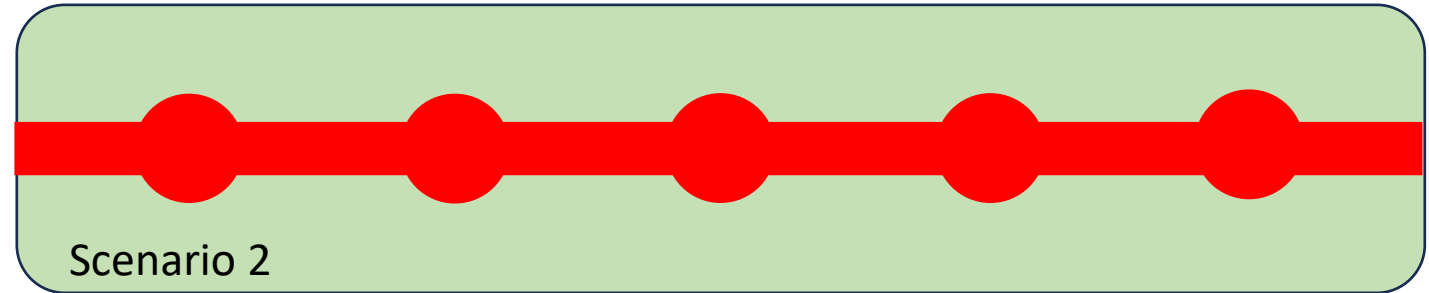
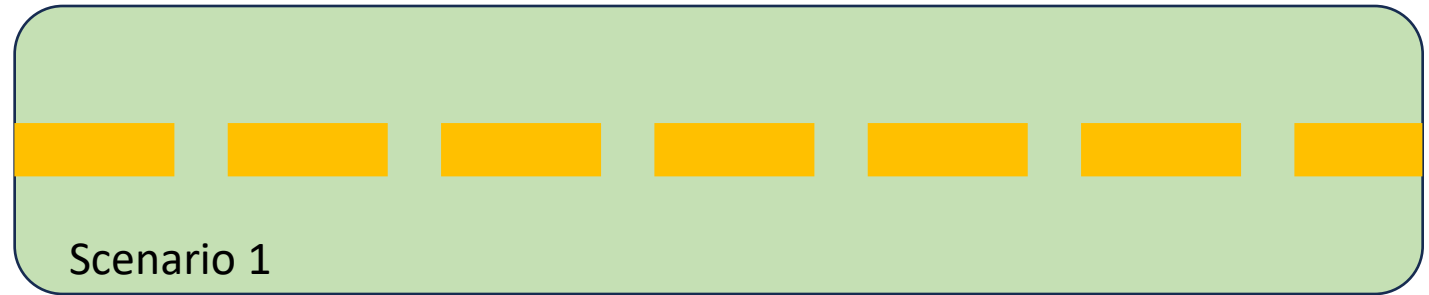
- Activities on forest edge
- Can isolate pockets of trees and expand edge effect
- Focus on preserving core forest
- Moderate recovery debt



System	Func.	FAR	NF
Stream		✓	✓
Forest	✓	✓	✓

# The bottom line

- Mind the project footprint
- Mimic scales of natural disturbance
- Landscape context matters
- Settle your debts



# Questions?

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**Just.**

*Restore the Earth and Inspire Ecological Stewardship*



# References

1. Moreno-Mateos, D. *et al.* Anthropogenic ecosystem disturbance and the recovery debt. *Nat. Commun.* **8**, 14163 doi: 10.1038/ncomms14163 (2017).
2. Wood, K. *et al.* Tree Trade-Offs in Stream Restoration: Impacts on Riparian Groundwater Quality. *Urban Ecosyst.* 25(3): 773–795. doi:10.1007/s11252-021-01182-8 (2022).