Shifts in water availability due to environmental flow

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Backgrounds

The e-flow (EF) has been considered as a promising approach to sustainable water systems. The persistent antagonism between EF and other water demands is questionable.

Methodology

We introduce a mathematical framework at the intersection of resilience and disturbances.

Results

- When increasing EF from 20% to 40%, upstream, midstream, and downstream WW are increased by 2070, 874, and 243 million m^3.
- Upstream, midstream, and downstream have sub-boundary areas of 73.35%, 74.54%, and 75.70%.
- Under current WW and EL conditions, the Yangtze River will collapse within 2200 when EF falls below 30%.

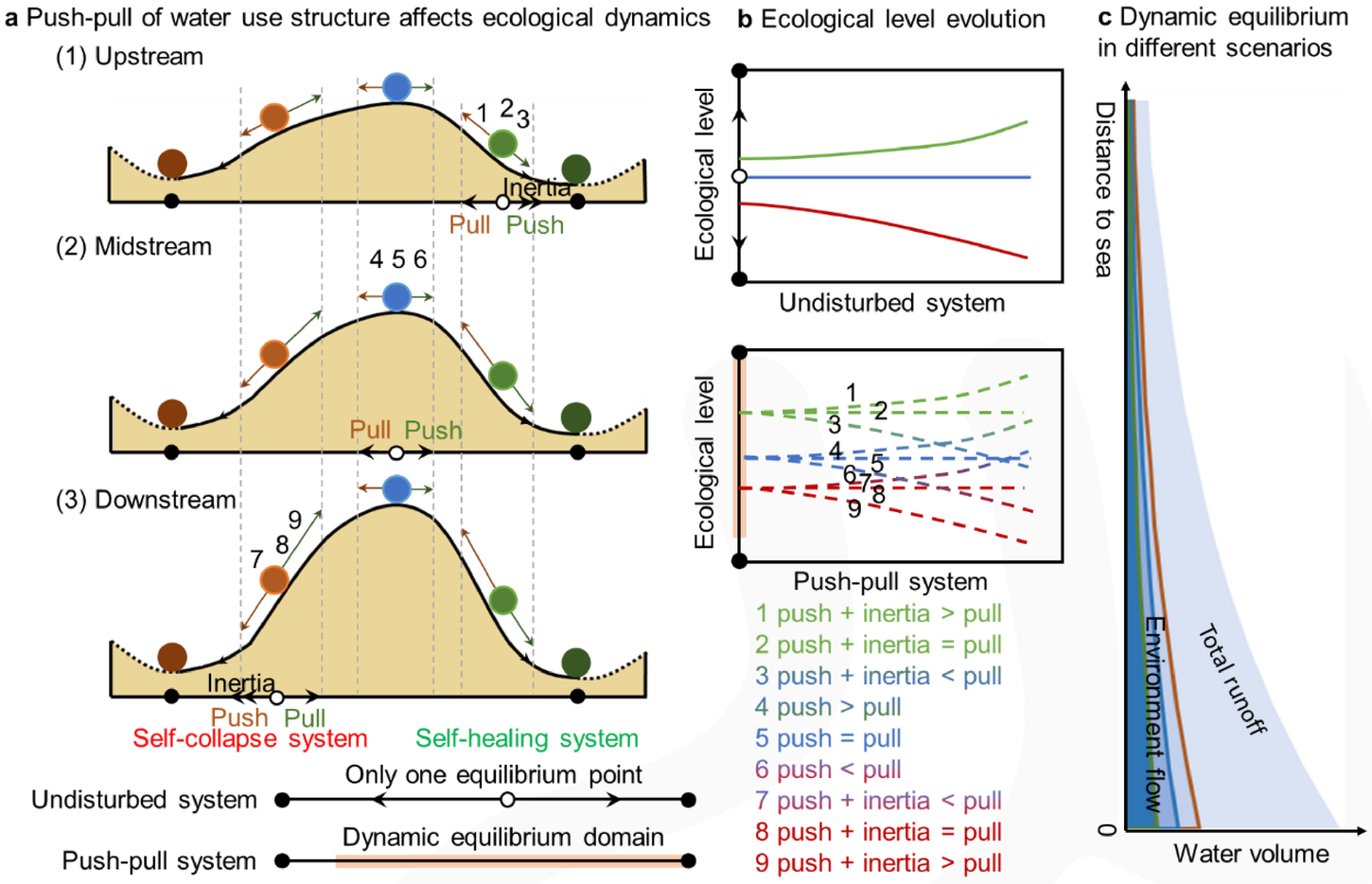

Fig. 1 | Human behavior affects river ecological dynamics.

Fig. 2 | Different of the Yangtze River basin.

Conclusion

This perspective that considers human behavior complements the insights gained from resilience quantification approaches. Our results support the implementation of EF as part of the post-2020 eco-restoration framework.

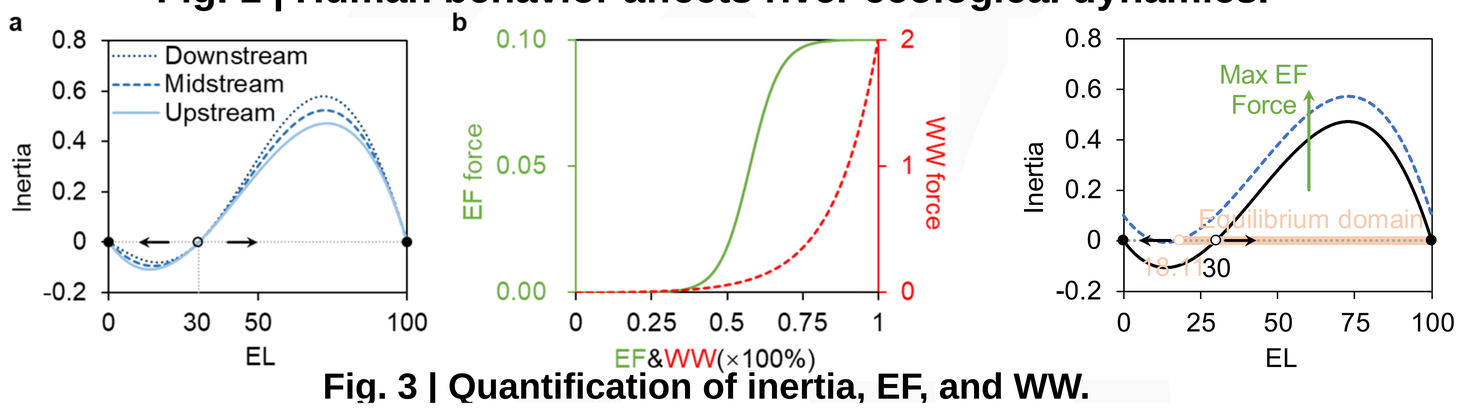

Fig. 3 | Quantification of inertia, EF, and WW.

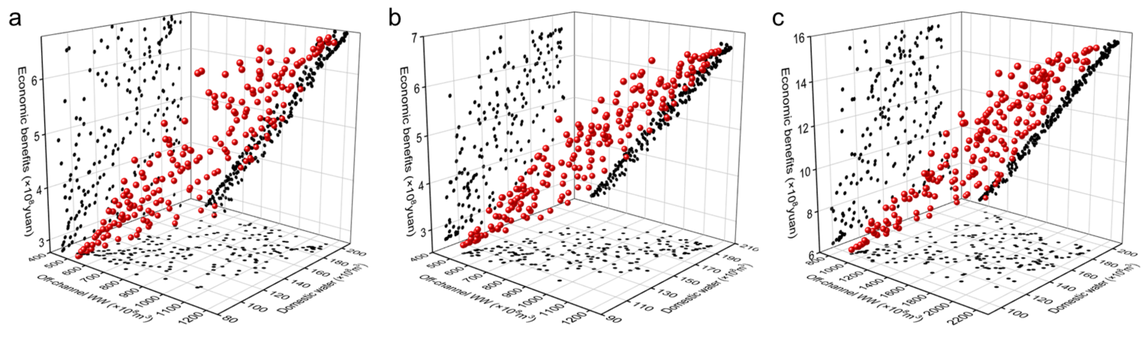

Fig. 4 | Pareto frontiers depicting optimal EF.

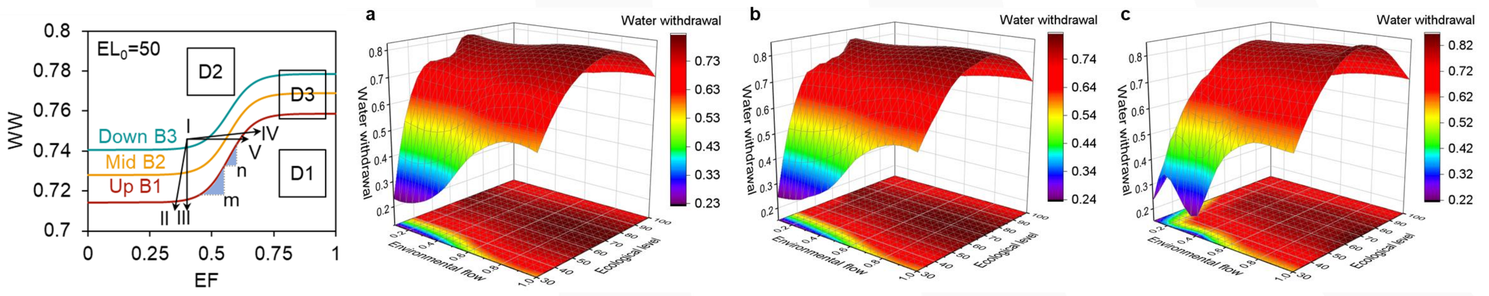

Fig. 5 | Resilience boundaries.

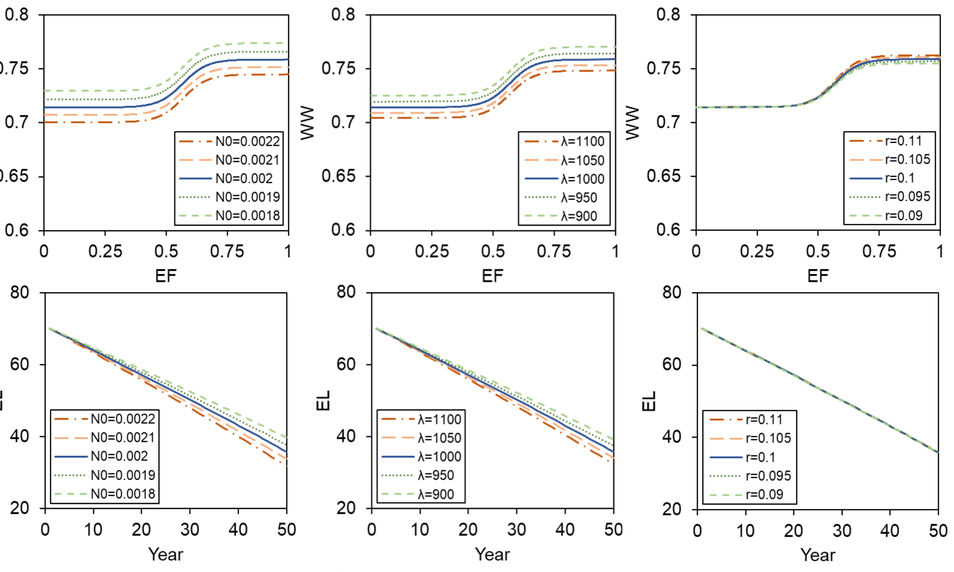

Fig. 7 | Sequential adjustments to free parameters.

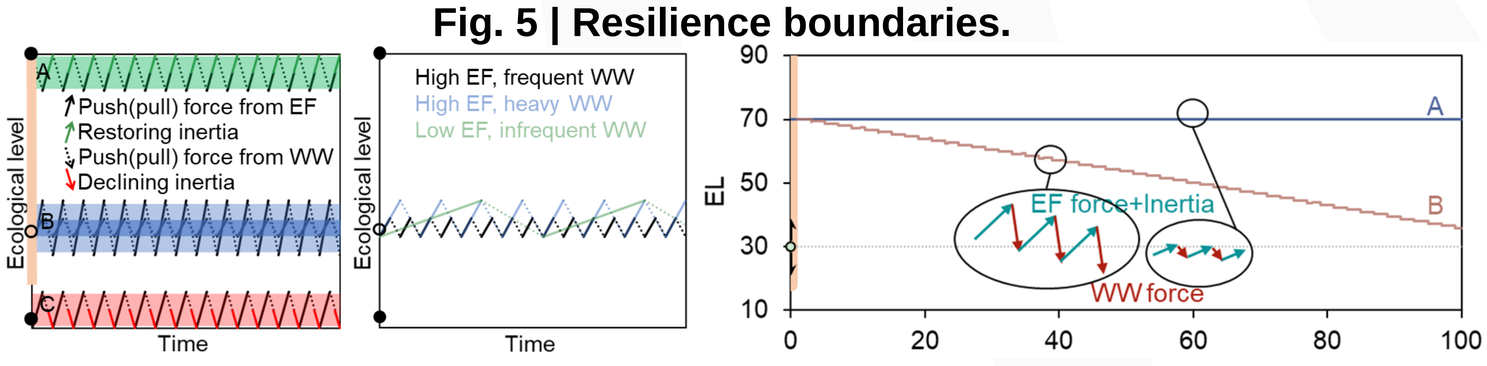

Fig. 6 | Eco-evolution in different scenarios.