

Water-energy-environment nexus under different urbanization patterns: a sensitivity-based framework for identifying key feedbacks

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Backgrounds

In the context of urbanization, water, energy, and environment (W-E-E) systems are increasingly connected thus can be profiled as a W-E-E nexus.

Methodology

This paper proposes a sensitivity-based framework consisting of four components. Community sensitivity serves as the missing link, tying together two feedback loops driven by economy and environment.

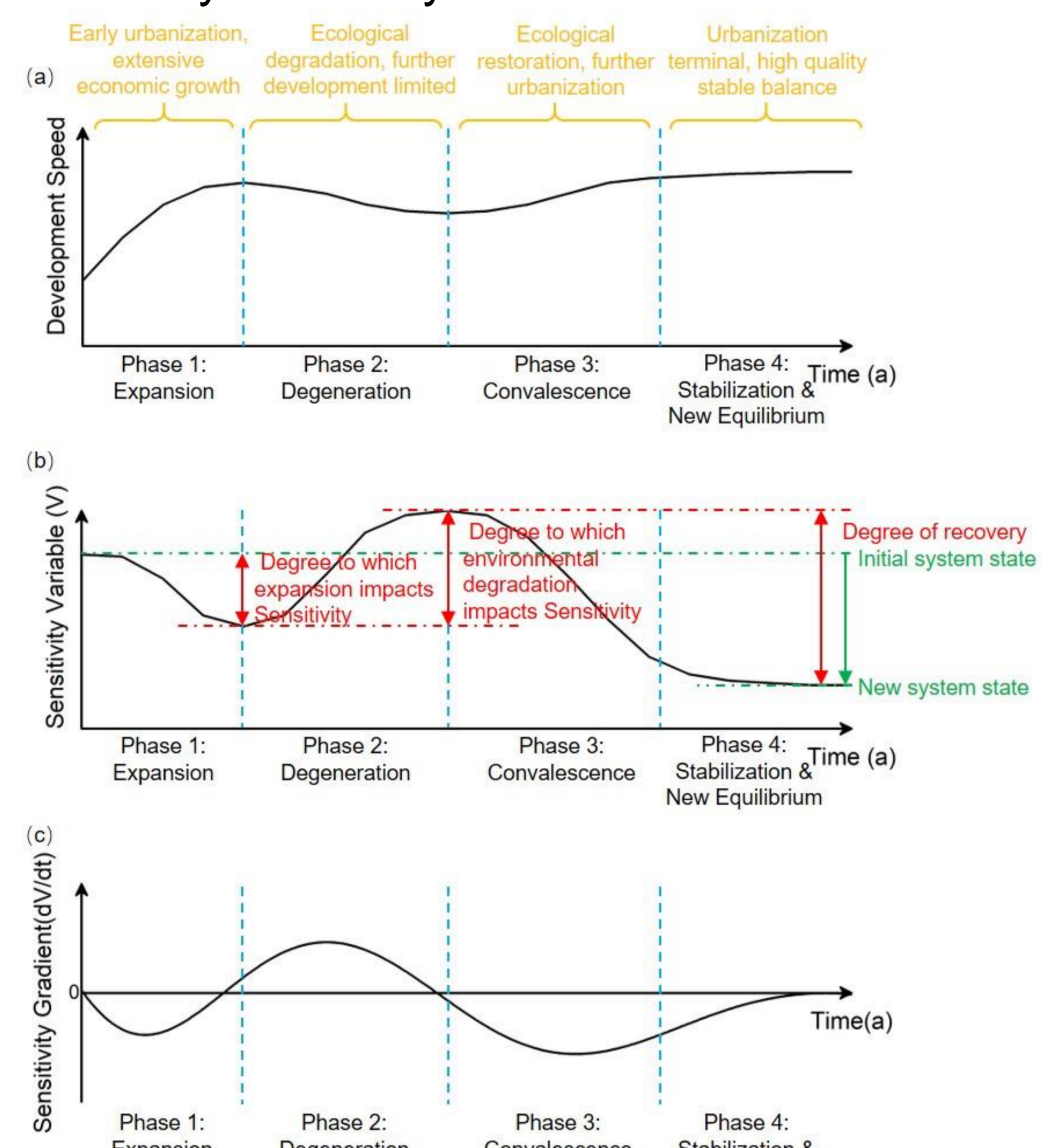


Fig.2 Coevolution process

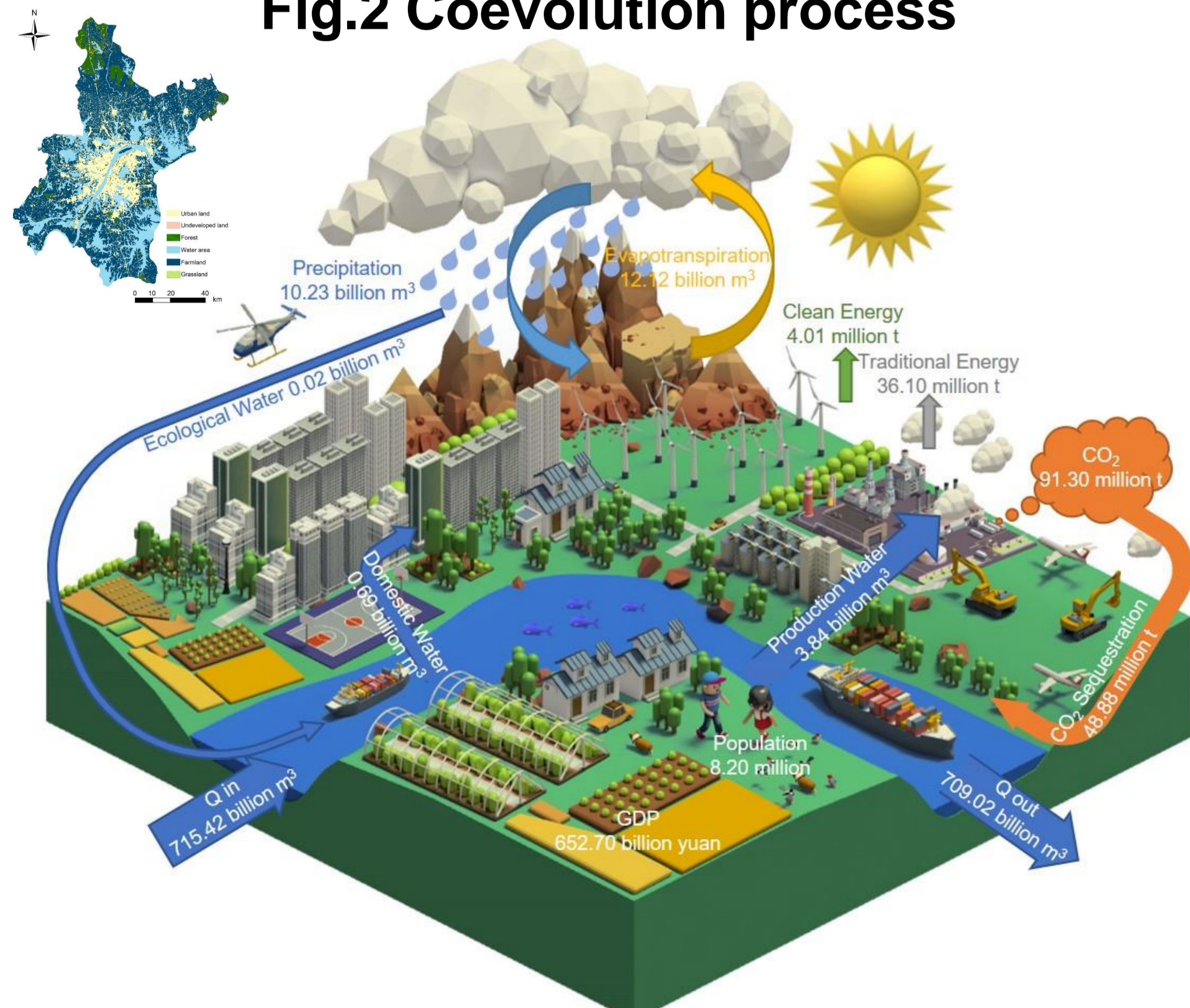


Fig.3 The 2.5D map of Wuhan.

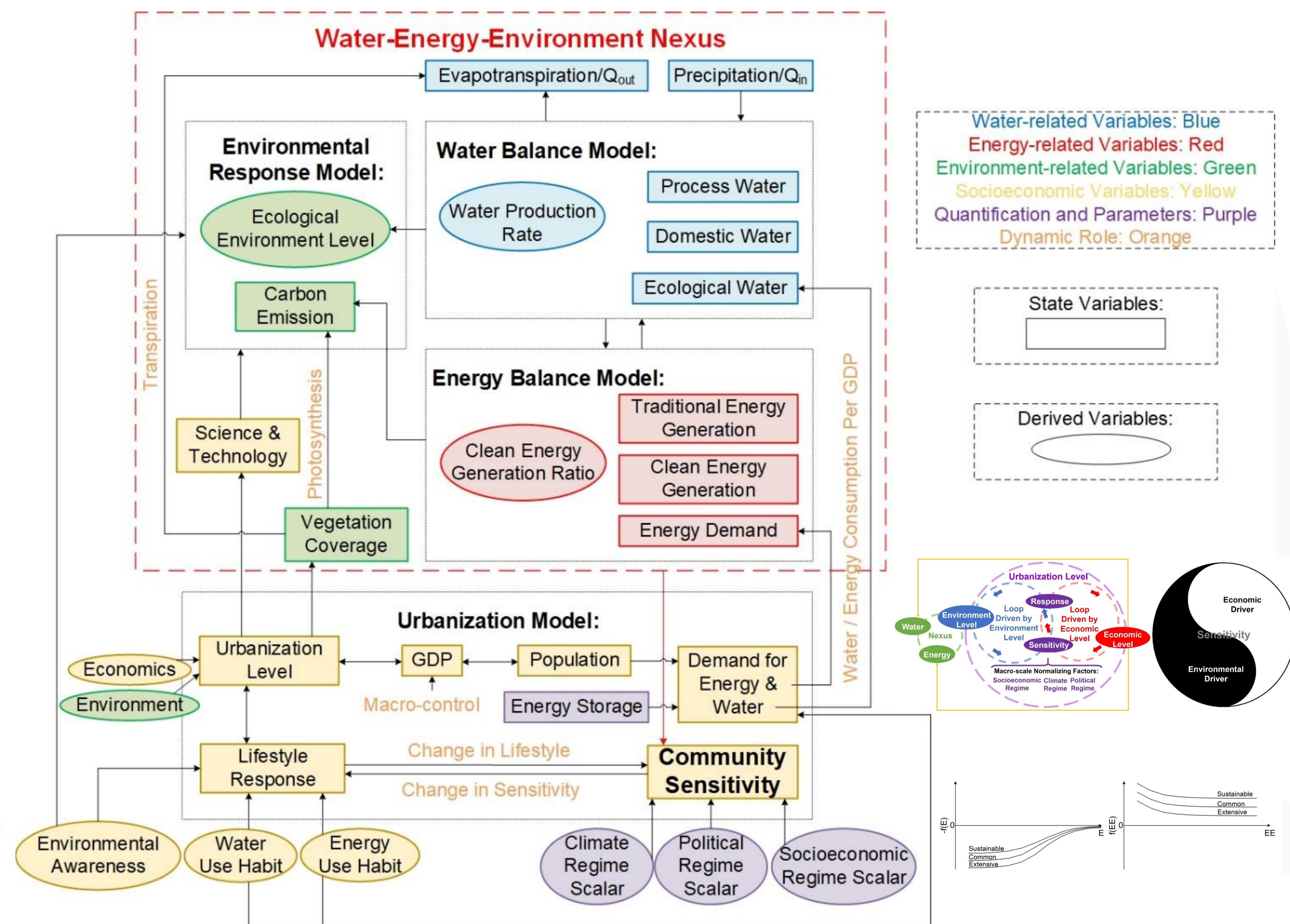


Fig.1 Sketch of complex interconnections of W-E-E nexus.

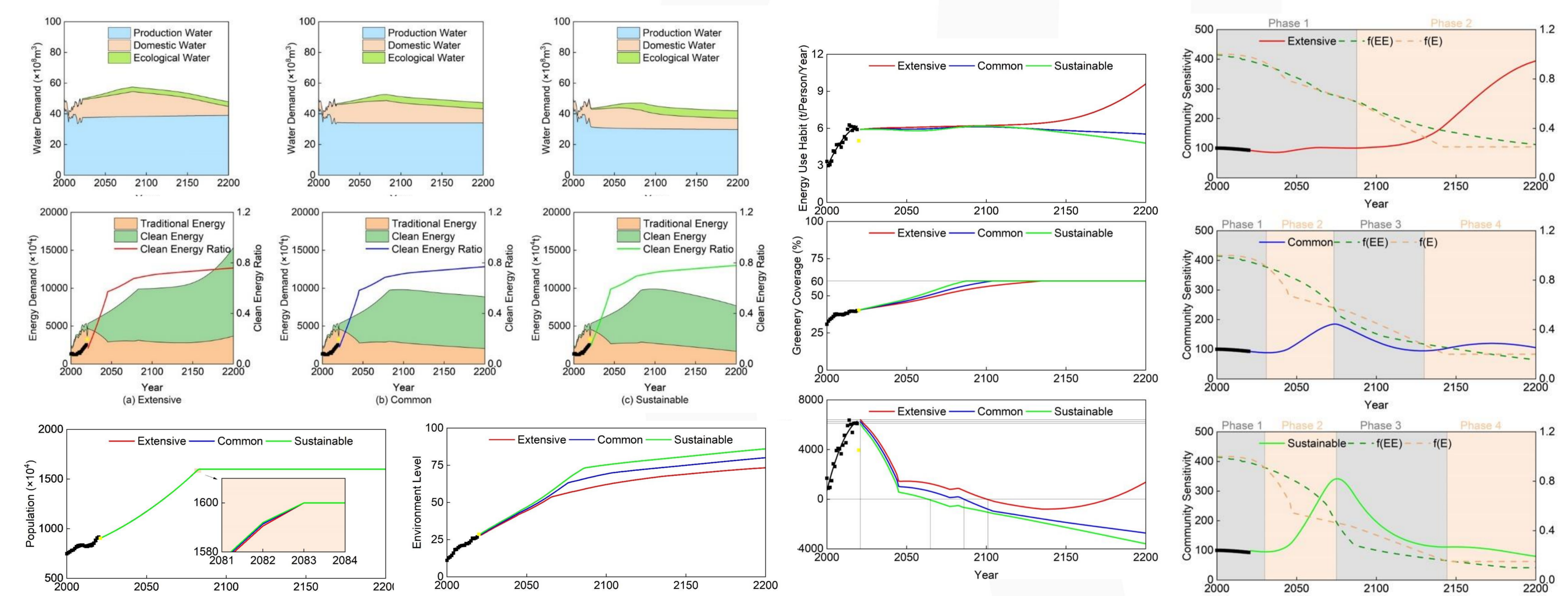


Fig.4 Simulated results

Results

- The coevolution process is divided into four cyclic stages.
- Development patterns exert a salient effect on community sensitivity.
- Only under sustainable development, can Wuhan anticipate achieving the goal of carbon neutrality by the 2060s.

Conclusions

- The proposed framework is competent in modeling the W-E-E nexus.
- The peaks of different variables occur at different times.
- Possible signals from the system should be anticipated and given high priority.