

Earth Syst. Dynam. Discuss., author comment AC2
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Reply on RC2

Bojie Fu et al.

Author comment on "Coupling human and natural systems for sustainability: experience from China's Loess Plateau" by Bojie Fu et al., Earth Syst. Dynam. Discuss.,
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Thank you for your valuable suggestions and comments. We will revise our manuscript following all your suggestions. The detailed responses are as follows.

Sincerely,

Bojie Fu (on behalf of the author team)

Reviewer #2 (General comments):

Through a thorough review of current research on coupled human and natural system (CHANS), the manuscript proposes a conceptual cascade framework of "Pattern-Process-Service Sustainability" and systematically demonstrates its applications in China's Loess Plateau (LP) in terms of coupling landscape patterns and ecological processes, linking ecological processes to services, and promoting social-ecological sustainability. By identifying the current research limitations, it points out the need for "the integrated research on multiple processes, the cascades of ecosystem structure, function, services, and human-wellbeing, the feedback mechanisms of human and natural systems, and the data and models for sustainability", especially implementing basin-wide management to consider not only the local ecohydrological effects caused by vegetation restoration, but also its effects on distant regions through telecoupling processes. The manuscript is well-written and innovative. It provides a much needed CHANS framework to address the bottleneck challenges facing both research and policy communities. The manuscript is of interest not only to the readers of the journal but also the wider ecological, socioeconomic, humanity, and management communities. I only have the following minor suggestions for the authors to consider:

[Response] We thank you for your positive comment.

[Reviewer #2 Comment 1] 1a shows the human system and natural system affects sustainability in one singular direction, while Fig.3 depicts sustainability impacts the interactions of both human and natural systems. Thus, Fig.1a should be modified to be consistent with Fig.3.

[Response] Thank you for your suggestion. We will add an arrow from "Sustainability" to

“Human and natural systems” in Fig. 1 and ensure that Fig.1 and Fig. 3 are consistent.

[Reviewer #2 Comment 2] 3 depicts both trade-offs and synergy but appears emphasizes trade-offs and synergy only occurs between ecosystem services. Would defining, implementing/achieving sustainability by human activity also lead to synergy between enhancing the capacity of natural system and the well-being of human being across multiple scales as well?

[Response] Thank you for your comment. Indeed, this study emphasizes the trade-offs and synergies between ecosystem services. We argue that implementing sustainability activities such as land use optimization is an effective way to mitigate trade-offs and enhance synergies, which finally can achieve win-win gains between people and nature (i.e., the synergy between natural systems and human well-being). This is reflected by the two inverted arrows from “Sustainability” to “Human systems (Activities)” then to “Natural system” in Figure 3. In addition, we will add a sentence in Section 2 “The Pattern-Process-Service-Sustainability framework”: “Targeted sustainability activities such as land use optimization provide feasible and effective ways to manage landscape patterns and ecosystem processes and to mitigate trade-offs and enhance synergies among ESs, which finally bring win-win gains between human and nature and improve the sustainability of CHANSs.”

[Reviewer #2 Comment 3] Based on the research experiences in the LP, the manuscript suggests future scientists and policy-makers “apply a basin-wide and telecoupling perspective to formulate land use policies, and carry out ecological restoration more effectively in the future.” This key and also challenging recommendation applies not only to China’s LP but also to the rest of the world. I wonder if the authors can elaborate a little further on how to implement this suggestion from an institutional perspective.

[Response] Following your suggestion, we will add more elaboration in Section 4.3: “The establishment of a basin-wide ecosystem and land use management regime is needed to support sustainable water use and sediment regulation (Zhou et al., 2015; Wang et al., 2016; Wang et al., 2017). The interconnected sub-hydrological units of the Yellow River Basin span various human-defined boundaries and are managed by different agents, resulting in institutional fragmentation. Considering the holistic nature of the basin, policy-makers and managers of the LP should cooperate and coordinate with middle-stream and downstream stakeholders to integrate management of river water and sediment (Wang et al., 2019). Specifically, cross-border and cross-scale coordination exerted by a higher-level authority is an effective means to overcome institutional fragmentation. This is because a third party or a higher administrative agency with whole-basin responsibility can promote effective coordination on a basin level by establishing social ties indirectly linking actors across administrative levels (Wang et al., 2019).”

After these minor revisions, I recommend the manuscript be accepted for publication.

[Response] We thank you for your positive comments and the time that you have spent reviewing our manuscript.