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Comment on esd-2022-1

Anonymous Referee #3

Referee comment on "Coupling human and natural systems for sustainability: experience from China's Loess Plateau" by Bojie Fu et al., Earth Syst. Dynam. Discuss.,
<https://doi.org/10.5194/esd-2022-1-RC3>, 2022

The manuscript entitled "Coupling Human and Natural Systems for Sustainability: Experiences from China's Loess Plateau" proposed a conceptual cascade framework of "Pattern-Process-Service Sustainability" to observe, analyze and predict the dynamics of coupling human and natural system (CHANSs). The manuscript introduced the components of the framework in length and illustrated a review of CHANS research in terms of coupling landscape patterns and ecological processes, linking ecological processes to services, and promoting social-ecological sustainability.

It is well known that Loess Plateau (LP) in China suffered severe soil erosion historically and achieved successful vegetation restoration in recent decades, and extensive studies have been conducted on the CHANS of the LP, so it is an ideal region for summarizing research experiences of CHANS.

Overall, this is a well written manuscript without any apparent flaws. The article tackles a relevant topic, certainly of interest to the readership of the journal. However, some details and aspects are not clearly expressed. A list of the main issues is provided below in a constructive spirit. I also include a (non-exhaustive) list of style suggestions and grammar issues. I recommend minor revision.

Some revisions to manuscript are needed:

Abstract

- This manuscript focused on the conceptual cascade framework of "Pattern-Process-

Service-Sustainability” to understand the dynamics of CHANS, but the meaning of this framework is missing.

- I thought the novelty of this manuscript is the proposed framework, but in LL.70-71, it described that “Over the last 20 years, researchers have conducted extensive studies on the CHANS of the LP using the ‘Pattern-Process-Service-Sustainability’ framework”, then what is the originality of this manuscript? It should be clearly stated.

Introduction:

- The argument of proposed framework is well established, but the knowledge gap of

current understanding towards CHANS is missing.

- The explicit aim of this research is also missing.

China’s Loess Plateau

- The success of the GTGP is shown in Figure 2 with NDVI index, but in the context, there

is no description of NDVI, neither an explanation of the Figure 2 indicates.

Application of the framework in the LP

- The farmland in land-use changes is a type of also human activities, why it is divided into natural system?
- The human system and the linkage between natural system and ESs did not well depict in the context.
- The introduction of social-ecological sustainability mainly focusses on the enhancement of targeted policies and management instead of the explanation and the coupling relationship of each component, it should be well-structured like 4.1 and 4.2.

Future directions of the Pattern-Process-Service-Sustainability paradigm

- The first aspect that future research should focus on (integrated research on multiple

processes) is repetitive with the "future investigation" in 4.1 (LL.208-212)

Conclusions

- 393-396 is repetitive with the abstract, it's better to rephrase.
- The implication of "Pattern-Process-Service-Sustainability" paradigm should be well introduced.

Minor points:

- 9: "Addressing the sustainability challenges facing humanity" is a bit strange, "Addressing the sustainability challenges that humanity is facing" sounds better?
- 15-20 are the evaluation result of the proposed framework, but the linkage of these results is missing.
- 14-15 is repetitive with LL. 68-69, at least one sentence should be deleted.
- 84 the "wellbeing" should be changed as "well-being"

LL.86-87 "the same single ES" should delete "single"

- 130 "soil-and water- conservation" should be "soil and water conservation"

L.140 "the extensive research here conducted" should be "the extensive researches conducted here"

L.148 "As human disturbance to .." lack of the subjective in this sentence.

L.195 "described in (Wang et al., 2016)" should delete "described in"

- 236 "Using the universal soil loss equation", I guess it's USLE ($A = R \times K \times L \times S \times C \times P$), it's better to show

L.249 "The assessment of ESs further provide" should be "provides"

- 277-278 "...the changes of demand and wellbeing of in the LP following ecological restoration" is not clear
- 286 "introduced exotic plant species" is better changed as "introduction of exotic plant species"

LL.292-293 "are needed in the ensuing ..." should be changed as "are needed for.."

- 302 "than terrace and slope croplands have" should be "than terrace and slope croplands do"
- 303 "check dams are at risk of collapse during rainstorms, due to the lack of management" please add references.
- 320 "had also positive" should be "also had"

L.365 "human-wellbeing" should be "human well-being"

- 380 "field monitoring, control experiments... to understand ecological processes" should add reference

Figure 1: The green color for describing "pattern" is improper in (b), or the transparency of background color is needed.

The "sustainability" in the framework also can be shown in diagram (b).

Figure 2: The label of "Yellow River" is barely seen, the color of the label should be changed.

What does the white color (the western LP) indicate regrading NDVI index?

Figure 3: The descriptions of vegetation type is barely seen in the Figure, maybe change another color?

The soil erosion, NEP change and the sediment decline are all process changes, so the subtitle of the "process change" is inappropriate