

Review Comments

Title of Manuscript: Spatial patterns of global land management intensity are influenced by socioeconomic, biophysical and behavioural factors

Manuscript ID: essd-2026-482

General Observations

The manuscript presents novel research investigating the influence of socioeconomic, biophysical, and behavioural characteristics on the spatial distribution of land management intensity. The authors have developed a global dataset of land management intensity for 2020 at a spatial resolution of 0.01° , comprising four management classes: unmanaged, very extensive, extensive, and intensive. These classes are mapped globally across cropland, pasture, and forest systems.

The study concludes that income, market access, population density, and aridity influence cropland management intensity, whereas pasture and forest systems exhibit more complex relationships. The results are further compared with global land decision-making types, demonstrating a spatial consistency of 68%. Based on this comparison, the authors conclude that land management intensity is also influenced by land-user behaviour.

The study addresses an important research gap in land system science regarding land management intensity. It also provides a foundational global dataset of land management intensities and their spatial distribution, thereby creating opportunities for further research into the socioeconomic, biophysical, and behavioural factors influencing land-use and land-change decisions. The topic is timely and highly relevant, and the resulting dataset could become an important resource for global land-system modelling and land-management policy analysis.

The study is promising, original, and likely to be of interest to a broad range of researchers, particularly because it links the socioeconomic, biophysical, and behavioural characteristics of decision-makers with land management intensity and, more broadly, with land-use change. In my opinion, the following minor revisions should be considered before the manuscript is accepted for publication in ESSD.

Comments and Suggestions

1. The study has considerable innovative potential, particularly in linking global land management intensity with socioeconomic and behavioural decision-making variables. This perspective is highly relevant to current research frontiers in land system science. However, highlighting the work's originality and explaining how the resulting global dataset and research findings would contribute to future research in land system science will strengthen the manuscript.
2. The following sentence in the first paragraph of the abstract should be revised for clarity and grammatical accuracy: "However, there are limitations in data and in the systematic understanding of management intensity and how it is shaped by socioeconomic and biophysical factors and human behaviour."

3. The authors should briefly explain how the newly developed global land management intensity dataset addresses the limitations or gaps in existing datasets. This discussion may be included in either the Introduction or the Discussion section.
4. The influence of the biophysical and behavioural characteristics of decision-makers on land management intensity may be discussed more explicitly in the Results and Discussion sections.
5. Several input datasets with different spatial resolutions were used to produce the harmonised global land management intensity dataset. The Discussion section should therefore include a brief statement of the potential uncertainties associated with the harmonisation process.
6. The systematic sensitivity analysis undertaken to assess uncertainties in the spatial distribution of land management intensity resulting from the thresholds used to define the management classes is appreciated. A brief discussion of the remaining uncertainties associated with the selected thresholds would further strengthen the manuscript.
7. Remove the dash in line 305 on page 12.
8. The Limitations section should be concise and focused on the most important limitations of the study.
9. The citation style should be consistent throughout the manuscript. For example, multiple references should be listed consistently in either ascending or descending chronological order, in accordance with the journal's guidelines.
10. The manuscript contains a very few grammatical errors and unclear sentences. Minor language editing is required to improve its overall readability and clarity.

Recommendation

The study addresses an important research gap in land system science by examining how land management intensity is influenced by decision-makers' socioeconomic, biophysical, and behavioural characteristics. It also provides a potentially valuable global dataset that may support further research in land-system modelling, land-use change, and land-management policy analysis.

The manuscript currently requires only minor improvements, mainly related to language and grammatical editing, clearer presentation of the originality of the work, and a stronger explanation of how the present findings and dataset may support future research. These issues can be adequately addressed in a revised manuscript.

Therefore, I recommend a Minor Revision before the manuscript is considered for publication.