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REVIEWER'S REPORT

Manuscript No.: IJAR- 56168

Title: Evaluating the Consequences of Land Cover Change for Ecosystem Service Provisioning in the Fragile Landscape of the Ratuwa River, Nepal

Recommendation:
Accept as it is .....
Accept after minor revision.....
Accept after major revision
Do not accept (*Reasons below*)

Rating	Excel.	Good	Fair	Poor
Originality		✓		
Techn. Quality		✓		
Clarity			✓	
Significance			✓	

Reviewer Name: **ANAPANA GOPAL**

Reviewer's Comment for Publication.

General Comments

This manuscript presents an integrated assessment of land cover change (1995–2023) and its consequences for ecosystem service provisioning in the Ratuwa River Basin, Nepal. The study combines remote sensing, InVEST modeling, and socio-economic surveys, which is methodologically appropriate for watershed-scale ecosystem service research.

The topic is highly relevant, particularly for fragile mountain systems such as the Churia (Siwalik) region. The manuscript is conceptually strong and policy-relevant, especially in linking upstream land degradation with downstream socio-economic impacts. The integration of biophysical modeling with community perceptions is a significant strength.

However, while the structure is comprehensive and the narrative is coherent, the manuscript requires moderate in terms of methodological clarity, statistical robustness, result presentation, and language refinement before publication.

Content and Originality

Strengths

- Focuses on the understudied Churia region, addressing a clear geographic research gap.
- Basin-scale ecosystem service modeling is valuable and policy-relevant.
- Integration of:
  - LULCC analysis
  - InVEST ecosystem service modeling
  - Household perception surveys enhances originality and interdisciplinarity.
- Clear articulation of trade-offs between provisioning (agriculture) and regulating services (erosion control, carbon storage).

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Limitations

- Similar studies using InVEST for Himalayan watersheds already exist (e.g., Phewa Lake, Gandaki Basin).
- The novelty lies primarily in the study area, rather than methodological innovation.
- The fourth research question (future scenarios) is mentioned in the introduction but not fully implemented in the results.
- Trade-off analysis remains descriptive rather than quantitatively optimized (no scenario modeling or multi-criteria analysis).

Recommendation

Clarify explicitly what differentiates this study from previous Nepal-based InVEST applications. If possible, incorporate a simple future scenario simulation to strengthen originality.

Technical Quality

This section needs strengthening.

1. Land Cover Classification

- Accuracy levels (85–90%) are acceptable.
- However:
  - Kappa statistics are not reported.
  - No confusion matrix shown.
  - No explanation of how spectral similarity between dense forest and shrubland was handled.
- Sentinel vs Landsat resolution consistency needs clarification.

2. InVEST Modeling

- Input parameter tables (biophysical coefficients, C, P, K factors) are not provided.
- No sensitivity analysis conducted.
- Climate variability is not explicitly separated from land-use effects.
- Calibration/validation of water yield and sediment outputs using observed discharge or sediment data is missing.

3. Statistical Analysis

- Increase percentages are presented, but:
  - No statistical significance testing.
  - No regression linking forest loss to sediment increase.
- Survey analysis remains descriptive; inferential statistics could strengthen results.

4. Data Consistency

- Some numbers in Table 1 appear misformatted (e.g., "112.5145.6").
- Carbon loss (22%) should include uncertainty bounds.

Overall Technical Assessment:

Technically sound in design but lacking validation, uncertainty analysis, and deeper statistical rigor.

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Language and Presentation
The manuscript is generally well-written but requires careful editing.
Issues:
- Repetition of statements (land cover change described twice in similar wording).
- Occasional formatting errors:
  - Missing spaces ("criticaland potentially").
  - Merged text (e.g., "conversion patterndense forest").
- Overuse of emphatic language:
  - "severe and continuous"
  - "dramatic shift"
  - "profound transformation"
- Some paragraphs are overly long and dense.

Recommendation:
- Reduce rhetorical emphasis.
- Tighten discussion paragraphs.
- Correct formatting inconsistencies.
- Ensure uniform citation style.

Structure and Organization
Strengths
- Clear logical flow:
  - Introduction → Literature → Methodology → Results → Conclusion.
- Research questions are clearly defined.
- Integration of qualitative and quantitative findings is strong.

Weaknesses
- Literature review is lengthy and could be condensed.
- Results and Discussion are partially repetitive.
- No explicit Limitations section.
- The future trajectory research question is not fully addressed.
- Figures/maps are referenced but not described in sufficient analytical detail.

Recommendation
- Add a subsection: Limitations and Uncertainty.
- Clearly separate Results and Discussion sections.
- Reduce redundancy in the land cover description.
- Ensure all research questions are answered explicitly in conclusion.

References and Citations
Strengths
- Extensive and relevant citation base.
- Good mix of:
  - Global LULCC literature
  - Himalayan regional studies
  - Ecosystem services framework
  - Modeling references
- Proper use of foundational works (MEA 2005, Foley et al. 2005, Rodríguez et al. 2006).

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Weaknesses

- Few citations post-2021.
- Some grey literature (theses) included without clear justification.
- Reference formatting inconsistencies (italics, punctuation).
- Missing citation for some numerical claims in introduction.

Recommendation

- Add recent (2022–2024) ecosystem service modeling literature.
- Standardize reference formatting.
- Ensure all datasets cited in methodology appear in reference list.

Overall Recommendation

The manuscript is scientifically relevant, policy-oriented, and structurally solid. The integrated modeling and perception-based validation are commendable strengths. However, to meet publication standards, the following revisions are necessary:

1. Strengthen methodological transparency (biophysical tables, model parameters).
2. Add uncertainty analysis and model validation discussion.
3. Address the "future scenario" research question or remove it.
4. Improve statistical rigor.
5. Refine language and remove repetition.
6. Add a limitations section.

Final Decision:

Minor to moderate Revision Required

The study has strong publication potential, but significant methodological clarification and analytical strengthening are needed before acceptance.