Ecosystem Restoration Reduces Community Vulnerability to Water-Induced Disasters: An Empirical Evidence from Churе, Nepal

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INTRODUCTION

- Churia region is situated between lower part of mid hills and upper part of genetic floodplain provides critical ecosystem services particularly surface water flows and recharging groundwater.
- Anthropogenic pressure made Churia region a highly vulnerable to various hazards such as floods, soil erosion and landslides.
- Ecosystem based disaster risk reduction (Eco-DRR) has been adopted in the Churia region to reduce disaster risk and vulnerability with the aim of achieving sustainable and resilient development.
- The vulnerability of households is a function of exposure, sensitivity, and adaptive capacity. The higher the exposure and sensitivity, the higher will be the vulnerability and higher adaptive capacity refers to less vulnerability.
- The objective of this research is to examined the influence of restoration projects in reducing vulnerability using data collected from questionnaire survey, remote sensing and field visits.

KEY WORDS

FLOW CHART

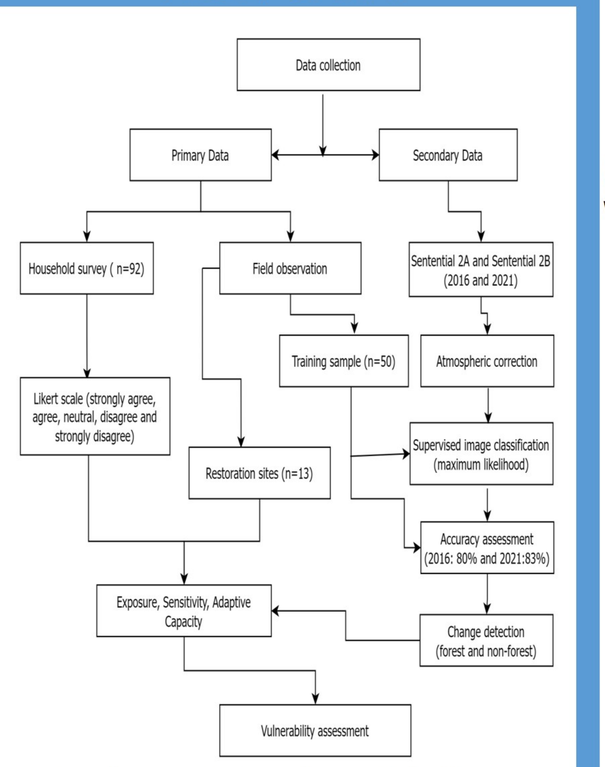

Fig 1: Flow chart representing the overall process of vulnerability assessment

RESULTS

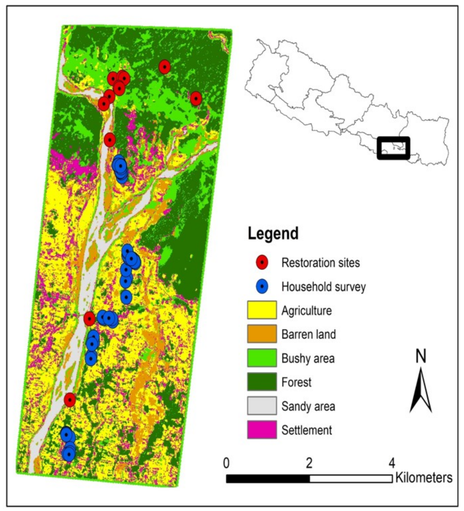

Fig 2: A land-use and land cover map of Jalad river basin, Dhanusha, Nepal with location of household survey and restoration sties

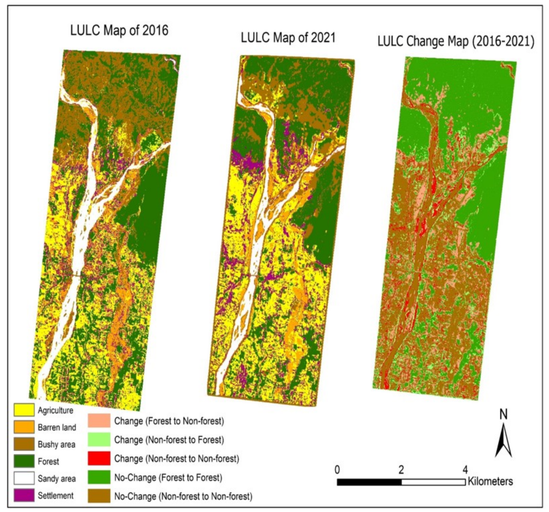

Fig 3: Pattern of land cover and land use change of Jalad river basin in year 2016 and 2021

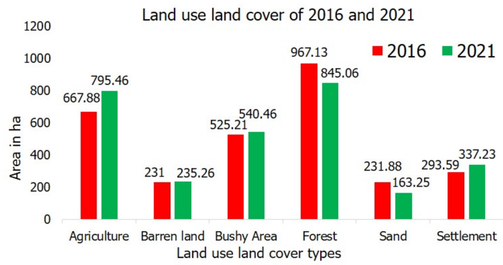

Fig 4: Land use land cover change of Jalad river basin in year 2021 and 2016

Table 1: A comparison of forest-non-forest change between 2016 and 2021

SN	LULC Change Class	Area (%)
1	No-change (forest to forest)	39.47
2	No-Change (non-forest to non-forest)	33.69
3	Change (forest to non-forest)	11.73
4	Change (non-forest to forest)	8.11
5	Change (non-forest to non-forest)	6.97

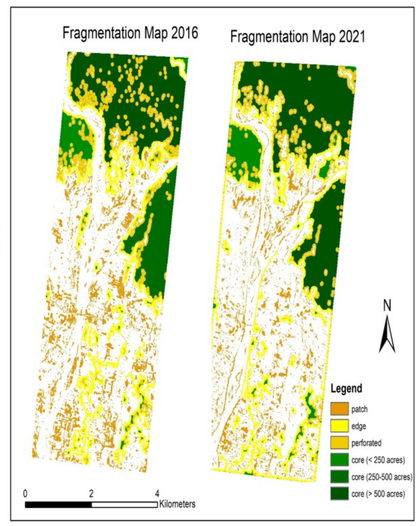

Fig 5: Landscape fragmentation map of Jalad river basin in year 2016 and 2021

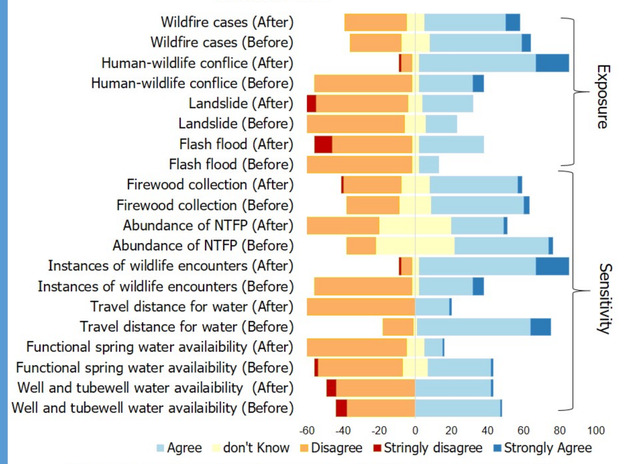

Fig 6: Comparison of people responses of different ecosystem services indicators before and after the restoration practices.

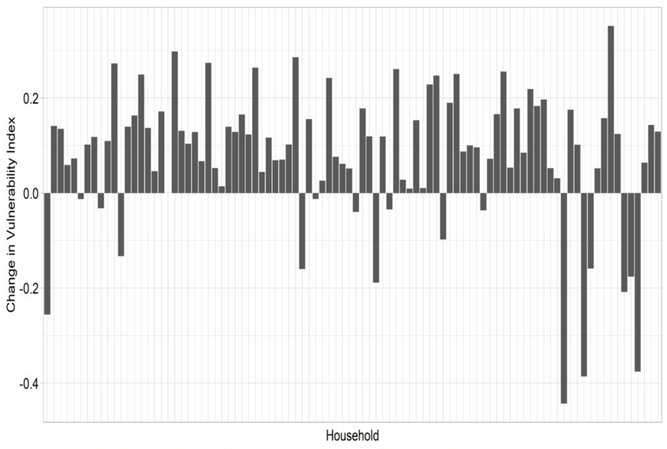

Fig 7: A bar plot depicting change in vulnerability index of 92 households after restoration project

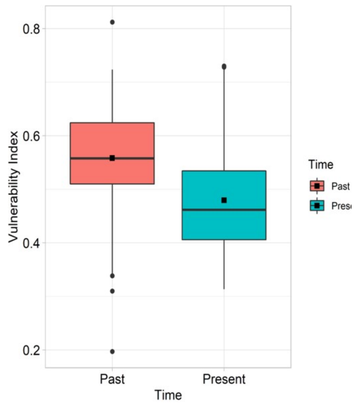

Fig 8: Box plot showing the vulnerability index of 92 households in the past (before restoration project) and now.

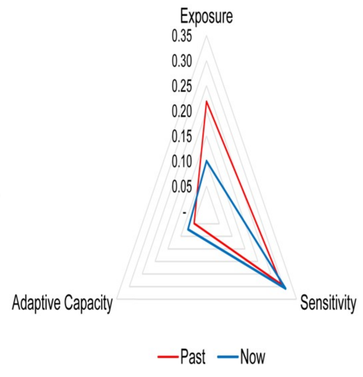

Fig 9: Diagram showing the contributing factors of the households' vulnerability in the past and after restoration activities in Jalad River, Dhanusha.

Photo 1: Questionnaire survey in Madhubasha village of Jalad river basin

Photo 2: Observing restoration sites of Jalad river basin

CONCLUSION

- Result shows that overall vulnerability decreased and 70% household benefit from the restoration practices.
- After the restoration projects there were an increase in bushy and grassland area along river bank and in northern part of study area but, the forest areas were decreased at a rate of 2.52% per year from 2016 to 2021.
- Implementation of restoration projects decrease landscape fragmentation in flood prone areas i.e. increase in core forest from 2016 (43%) to 2021 (48%) in restoration sites.
- The average vulnerability index of households reduced from 0.56 (maximum 0.81 and minimum 0.20) in the past to 0.48 (maximum 0.73 and minimum 0.31) now.
- Overall evaluation presents that a restoration project well-aligned with ecosystem-based adaption at landscape approach would have direct benefits in both mitigating disaster risk reduction and restoring degraded ecosystem services in the long run.
- Highly fragile geology and sensitivity to environmental disturbance in Chure region of Nepal, both policy makers and disaster risk reduction professionals need to acknowledge and incorporate ecosystem-based approach including indigenous Knowledge and community perspectives in future restoration projects.

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