Differences in Livelihood Resilience Between Diversified and Intensified Smallholder Farms in Java, Indonesia

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1. Introduction

- Smallholders in Central Java, Indonesia are under pressure from dynamic market forces and climate variability (Setiyanto and Pasaribu 2021; Tanguay and Bernard, 2020).
- Exploratory evidence suggested that adjacent communities with similar socio-ecological dimensions use either intensified horticulture or diversified agroforestry systems (Fig. 1).
- Research question: How do the different adaptation pathways impact livelihood resilience?

Figure 1: Cropping Systems: Penanggungan (left), Leksana (right) (Photos: Rebernig)

2. Analytical framework and methods

Table 1: Resilience Indicator Dimensions, based on Jacobi et al. (2018) and Quandt (2018).

Resilience Capacities		
Buffer	**Self-Organisation**	**Learning and Adaptation**
Natural Capital	Institutions	Shared vision
Financial Capital	Cooperation and Networks	Reflective and Shared Learning
Physical Capital	Self-Sufficiency of Farming	Openness to Change
Human Capital	Opportunity for Self-Organisation	Functioning Feedback Mechanisms
Social Capital		Existence and Use of Local Traditional Knowledge
Farm Diversity		Knowledge of Threats and Opportunities

- Random sample of 78 households from both villages and application of priorly tested survey (Bahasa) - Jul.-Oct. 2018.
- Chi-squared Automatic Interaction Detection (CHAID) Decision Tree model (SPSS v.26) to identify prevailing strategies.
- Additive multidimensional resilience index (Table 1).
- Quantile regression (median) and T-test (STATA v.16) to map differences between sub-dimensions.

Jacobi, Johanna, Stellah Mukhovi, Aymara Llanque, Horacio Augstburger, Fabian Käser, Claudia Pozo, Mariah Ngutu Peter, et al. 2018. 'Operationalizing Food System Resilience: An Indicator-Based Assessment in Agroindustrial, Smallholder Farming, and Agroecological Contexts in Bolivia and Kenya'. *Land Use Policy* 79 (December): 433–46. https://doi.org/10.1016/j.landusepol.2018.08.044.

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Tanguay, Louis, and Stéphane Bernard. 2020. 'Ecoagricultural Landscapes in the Dieng Mountains of Central Java; A Study of Their Evolution and Dynamics'. *Journal of Rural Studies* 77 (July): 169–84. https://doi.org/10.1016/j.jrurstud.2020.05.001.

3. Results

- The share of area under *Agroforestry* management predicted with high accuracy whether a household followed an intensification ("Conventional") or diversification pathway ("Agroforestry") at the 15% threshold.

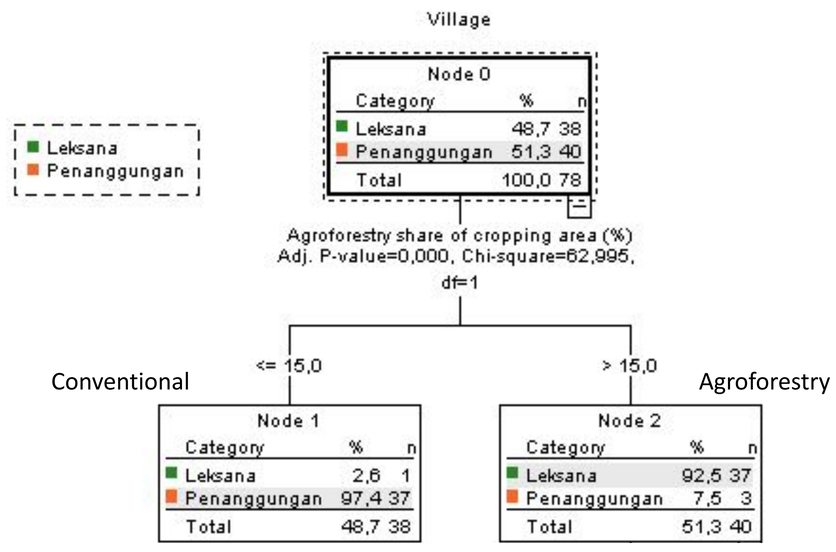

Figure 2: Differentiating Adaptation Pathways: Conventional and Agroforestry

- Agroforestry households had significantly more crop diversity, income from perennial crops, off-farm activities, farmer groups, extension services, and soil and water conservation techniques.
- Agroforestry households scored significantly higher across all resilience dimensions (Fig. 3).

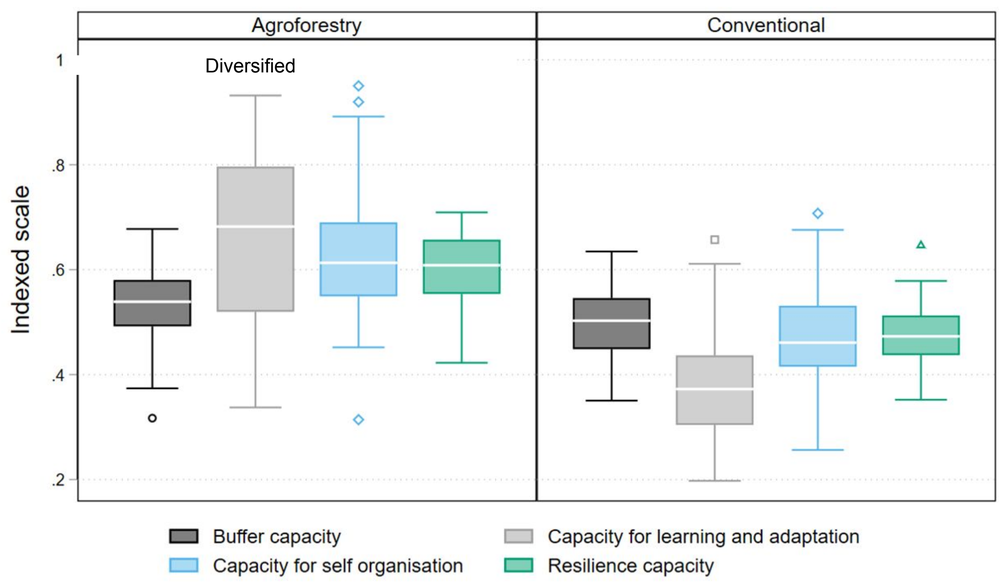

Figure 3: Distribution of Resilience Indicators and Sub-Dimensions

Highlights

- Diversified farm households applying agroforestry scored significantly higher across all resilience dimensions than households in the high-input conventional system.
- No significant differences in per-capita income between the groups.
- Diversified agroecological approaches offer a viable alternative to intensified horticultural systems for livelihood resilience in upland Central Java.

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