

Agricultural Intensification:

Determinants and Impacts in the Mae Ram Watershed of Northern Thailand

Introduction

Northern Thailand has undergone rapid agricultural transformation during the last few decades with agricultural intensification as one of the main results of this rural transformation. Farmers in this region adopt land, capital or labour intensive strategies to meet the growing needs for food and income. These intensification activities however have impacts ranging from socio-economic to environmental. Some researchers see intensification as having positive effects on the livelihood of farmers by contributing to higher yield and household income while others consider it for accelerating harmful negative effects on the environment.

This study was therefore undertaken with the aim of finding out the characteristics and driving factors of AI in Mae Ram watershed and examines its impact on socio-economic and environmental conditions as well as conflicts regarding the utilization of natural resources.

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Study area and Methods

The study was conducted in Mae Ram, a sub-watershed of Mae Rim watershed located in the province of Chiang Mai; District Mae Rim and Sub district Mae Ram. The watershed has an area of 54.2km² and is 5km from Mae Rim city. It is divided into three areas where the upper stream is mountainous with elevation range of 900-1500masl; the middle - mountainous to flat land with 600-900masl and the lower predominated by flat land ranging from 300-600masl. The different ethnic groups in the watershed include the Hmong people in the upper, the Karen in the middle and the Muang in the lower stream. Three villages, Ban Mae Khi, Ban Pang Eka and Ban Pang Haew were selected from the upper, middle and lower zone respectively for the study.

Data was mainly qualitative and was collected by carrying out 25 key informant interviews, 3 focus group discussions, 42 household surveys, soil and water sampling and use of Participatory Rural Appraisal methods.

Conclusions

➤The major findings from the study indicate that land, labour and capital intensification strategies are used by farmers to grow mainly vegetables for commercial purpose throughout the year. The main strategies include multiple cropping, short fallows; wide use agrochemicals, irrigation systems, soil conservation techniques such as terracing and intensive use of labour.

➤The proximate driver of agricultural intensification in the region is the promotion by the Royal Project which facilitates easy access to micro-credit, inputs and market. Restriction on land expansion by national park policy and increased household size are also key drivers.

➤The wealth status and living standard of households have generally improved after engaging in agricultural intensification but it was found to be associated with the increased frequency of erosion, flooding and siltation as well as increased soil concentration in pesticide residues in the watershed. Water availability and contamination resulting from intensification activities are the main conflict issues between the upper zone farmers and lower zone villagers in the watershed. The findings of the study suggest a need for more environmentally sustainable intensification strategies to avoid the negative impacts.

Intensification strategies

➤ Intensification mainly in the upper zone with commercial vegetable (cabbage, lettuce, spinach etc.) and flower production

Land Intensification

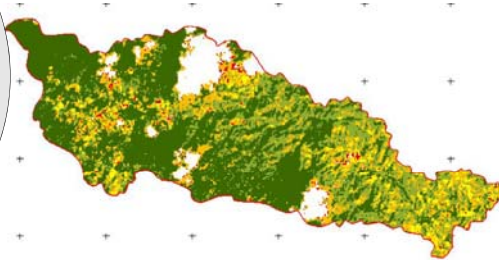
- Multiple cropping
- Short fallow period mostly less than six months
- Intercropping

Labour Intensification

- Intensive manual labour for planting, weeding and harvesting
- Use of family, shared and hired labour (mainly from Burma and Laos)

Capital Intensification

- Wide use of fertilizer, manure and pesticides
- Irrigation, tractor and terracing



Vegetation map of Mae Ram Watershed, 2008

Impacts of agricultural intensification

Soil quality indicators	Findings
Soil Organic Matter (SOM)	Moderate to High (M&L) Very high (U)
Bulk Density (BD)	Higher (U&M) and = ideal value (L)
pH	Acidic (U) to strongly acidic (M&L)
NO ₃	NO ₃ : Moderate to high (U) & Low (M&L)
P	P: Very high (U) to moderately low and very low (M&L)
K	K: Moderate to high (U) and low to very low (M&L)
Pesticide residue	Organophosphates and carbamates (0 to +4)

✓Erosion occurs in the watershed in the rainy season

✓Frequent problem of flooding and siltation in the lower zone

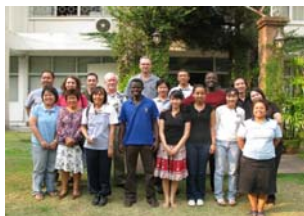
Water quality indicators	Findings
Dissolved oxygen (DO)	Normal
pH	Normal
Electric Conductivity (EC)	Normal but low (M & L)
Extractable Nitrogen (N), Phosphorous (P)	Normal but higher concentrations at some sites
Pesticides residues	No trace

✓No pollution

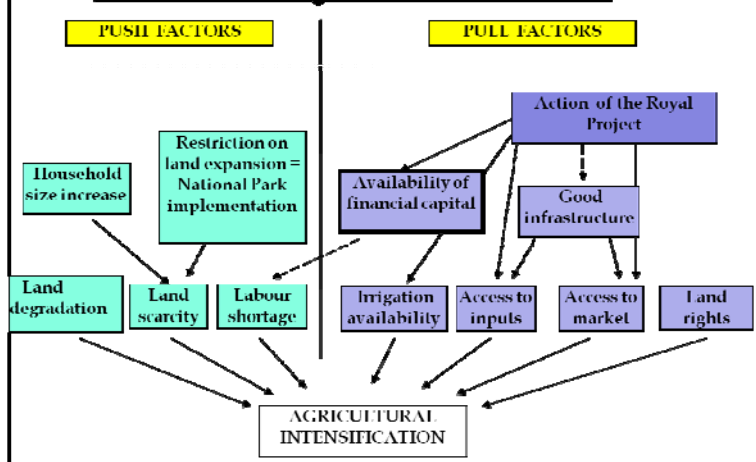
but

✓shortage of water in dry season

➤Improved acquisition of assets and standard of living : good education, health, clothing, housing and potable water



Drivers of agricultural intensification



References

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