

1. Introduction

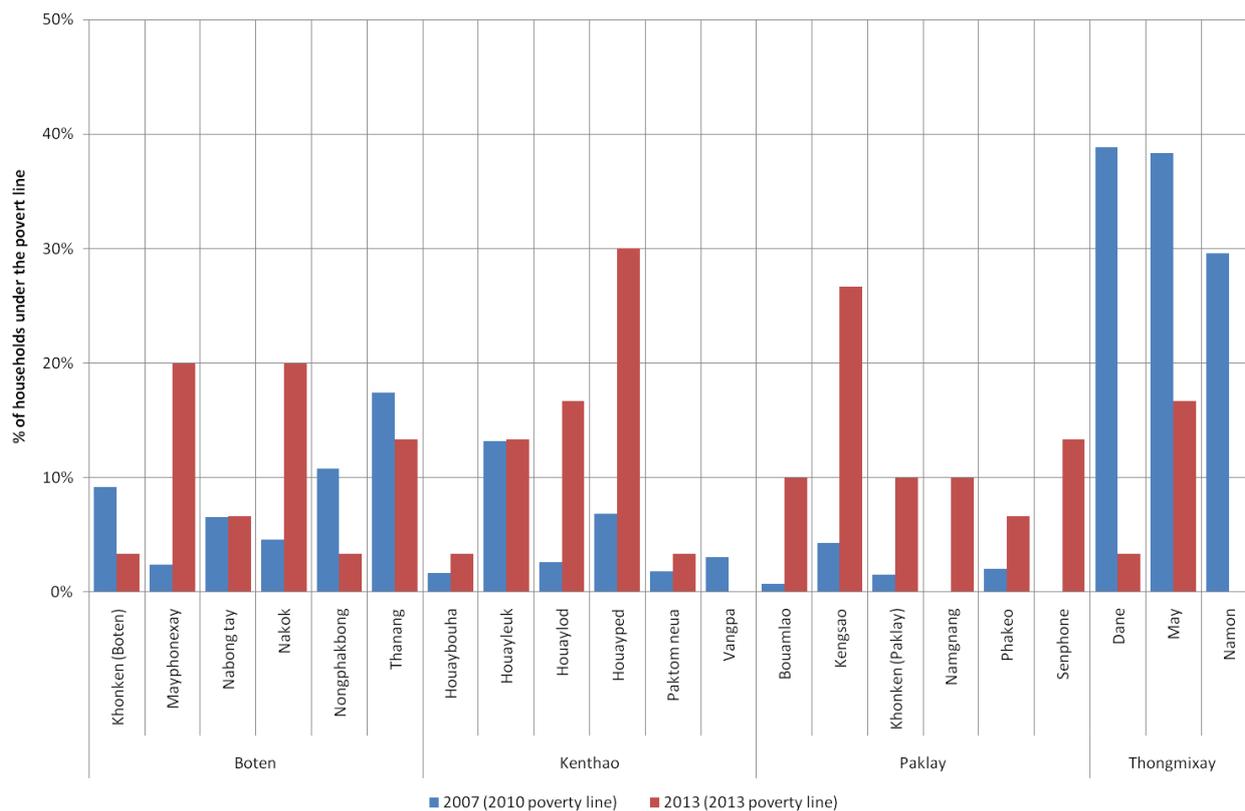
This report aims at providing up-to-date information and analysis on the recent socioeconomic and agricultural changes and the current status of Conservation Agriculture (CA) in villages of southern Sayaboury Province targeted by the PRONAE and PCADR-PASS projects between 2004 and 2009. In 2008, these projects had set up farmer groups in 44 villages, involving about 1 100 households and 1,500 ha of land cultivated with direct seeding mulch- and maize-based cropping systems. Questionnaire surveys had also been conducted annually in 21 villages of Boten, Kenthao, Paklay and Thongmixay districts in order to monitor agro-economic changes and the adoption of CA. Before the end of the PCADR-PASS project in 2009, a Conservation Agriculture Development Fund (CADF) was set up to continue supporting agricultural extension activities. Since then, the CADF has been supplied by a 10 LAK per kilogram tax on maize sales and exports collected in 10 districts of Sayaboury Province. Between 2010 and 2014, the Fund supported traders and farmers associations, through field demonstration activities, capacity building of farmers in the field of CA, and promotion of contract farming systems for agri-input supply. Between November 2014 and February 2015, a study was coordinated by the EFICAS-NUDP/CA project in order to take stock of these experiences of promotion of CA. Under the supervision of the CADF Secretariat and in collaboration with the Agricultural and Forestry Offices, the 21 villages monitored by PCADR-PASS between 2005 and 2008 were revisited with questionnaire surveys conducted among 630 sample households. The main results of this survey are summarized below.

2. Key socioeconomic and agricultural changes

- **Poverty**

Building on the National Poverty Line (set for rural areas at 180,000 LAK per person and per month in 2010 and 253,000 LAK in 2013) to estimate poverty headcounts, a very significant decrease of poverty can be observed in Thongmixay district (Figure 1). In average for the 3 villages of Thongmixay, the proportion of poor has decreased from 36% to less than 7%. In contrast, several villages of Boten, Kenthao and Paklay districts display alarming increases in poverty. In Houayped and Kengsao for instance, poverty has increased at an annual rate of 4% over the past 6 years, leading to proportions of 25-30% of poor households in 2013.

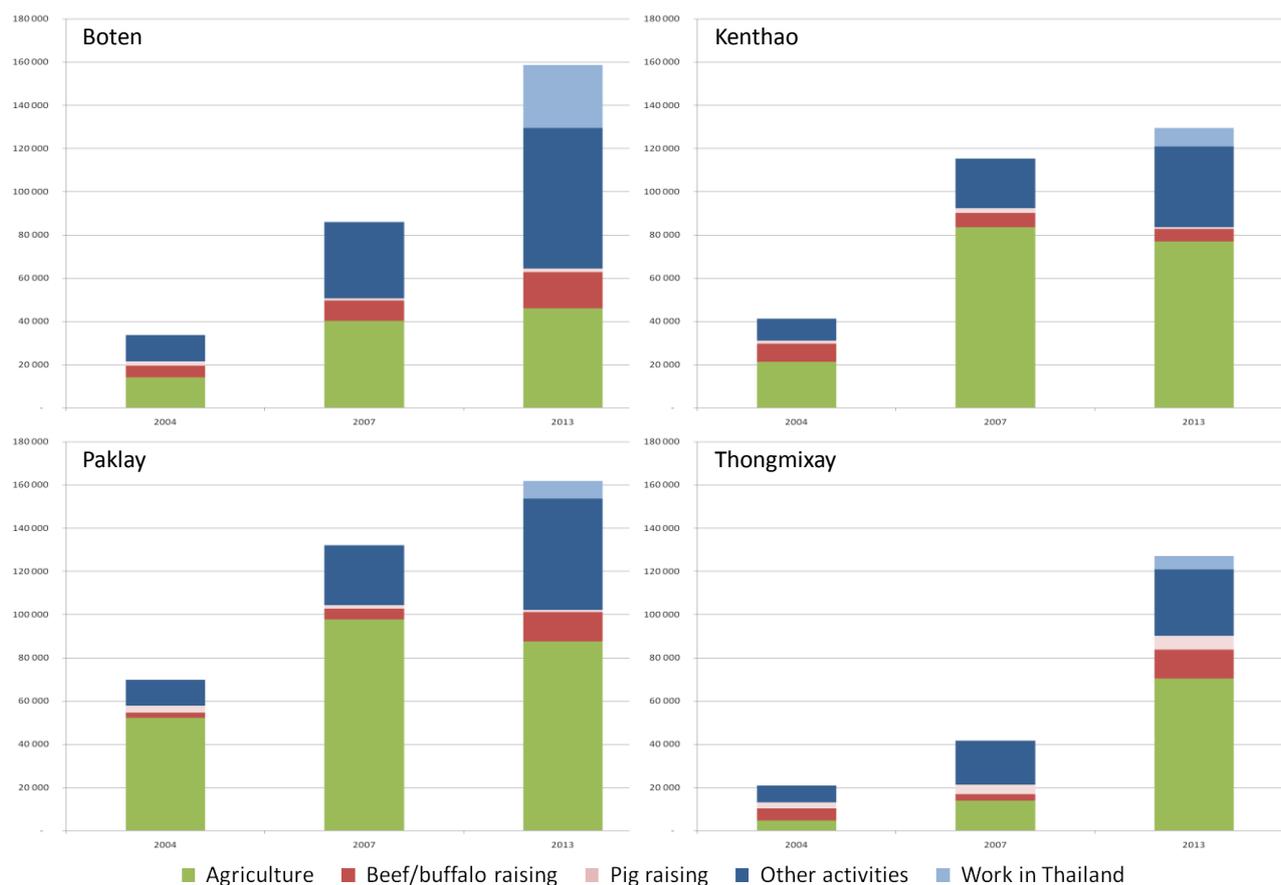
Figure 1. Evolution of poverty in the study villages (2007-2013)



• **Incomes and sources**

Since 2004, the average incomes have increased in a majority of study villages (Figure 2). Between 2007 and 2013, the villagers of Thongmixay district have rapidly caught up with the income levels observed in other districts, explaining the significant poverty reduction highlighted above. A very strong increase in agricultural incomes (+70% over the past 6 years) has played a key role in this process. In the other districts however, agricultural incomes have often stagnated, or even decreased, and the observed increases in the total incomes are primarily linked to a development of off-farm and non-farm activities (including seasonal migration to Thailand). Increased incomes are accompanied by growing inter-household inequalities in the four districts.

Figure 2. Average household incomes and sources (THB per year, 2004-2013)



Note: “Work in Thailand” was added as a distinct category in the 2014 questionnaire survey, whereas it was previously included in “Other activities”.

• Paddy cultivation

Villagers’ access to paddy land has generally remained similar to what it was in 2008, at the exception of most study villages in Kenthao district where it has increased quite significantly (Table 1). Similarly, the average paddy land cultivated per household has gradually and significantly increased in Boten district. These two trends suggest continued investments from Boten and Kenthao villagers into paddy land development. Surprisingly, the surfaces of paddy land cultivated have decreased significantly in Thongmixay, a trend which may result from a displacement of farm labour from paddy cultivation towards upland cash crops like Job’s Tear (see below). Yet, despite this small areal decrease and similar to all other target districts, households’ self-sufficiency in rice has significantly increased since 2008.

Table 1. Access to paddy land (% of households and average surface per household, 2005-2014)

	2005		2008		2014	
	Households (%)	Avg surface (ha)	Households (%)	Avg surface (ha)	Households (%)	Avg surface (ha)
Boten	90%	0,71	88%	0,74	89%	0,85
Kenthao	71%	0,53	74%	0,51	82%	0,56
Paklay	70%	0,58	73%	0,58	74%	0,61
Thongmixay	90%	0,77	88%	0,73	90%	0,65

• Upland agriculture

Building village-level estimates from data collected among our household samples in 2014, it appears

that upland crops covered over 15,500 ha in the 21 study villages, including around 10,780 ha of maize and 1,060 ha of Job's Tear (Table 2).

Table 2. Estimated total surface areas of upland crops in the study villages (hectares, 2014)

Boten district	Khonken	Mayphonexay	Nabong tay	Nakok	Nongphakbong	Thanang
Maize	277	372	4	112	26	45
Job's Tear	5	-	-	-	-	1
Rainfed rice	10	27	1	-	4	-
Peanut	-	1	-	3	15	10
Sesame	10	3	31	-	69	23
Vigna	5	5	2	-	52	28
Cassava	-	150	-	4	92	52
Teak	-	2	1	10	-	-
Rubber	-	24	-	-	8	-
Pasture	15	61	8	30	216	38
Total	321	644	46	158	481	198

Kenthao district	Houaybouha	Houayleuk	Houaylod	Houayped	Paktom	Vangpa
Maize	1134	677	414	371	869	1152
Job's Tear	-	-	84	41	-	-
Rainfed rice	14	55	-	10	66	27
Peanut	60	19	-	-	39	36
Sesame	-	-	5	-	-	-
Vigna	16	1	-	-	51	-
Cassava	28	-	119	29	218	4
Teak	7	25	30	-	-	11
Rubber	-	-	-	-	-	-
Pasture	81	25	96	22	122	61
Total	1341	803	748	473	1364	1290

Paklay district	Bouamiao	Kengsao	Khonken	Namngang	Phakeo	Senphone
Maize	1004	366	972	1201	1377	369
Job's Tear	23	-	1	4	22	1
Rainfed rice	32	3	18	53	24	5
Peanut	117	-	30	33	109	24
Sesame	-	-	-	-	-	-
Vigna	21	-	3	3	-	3
Cassava	8	37	34	13	23	44
Teak	8	37	8	14	53	7
Rubber	100	-	1	1	-	-
Pasture	46	72	96	143	85	20
Total	1358	515	1166	1465	1693	473

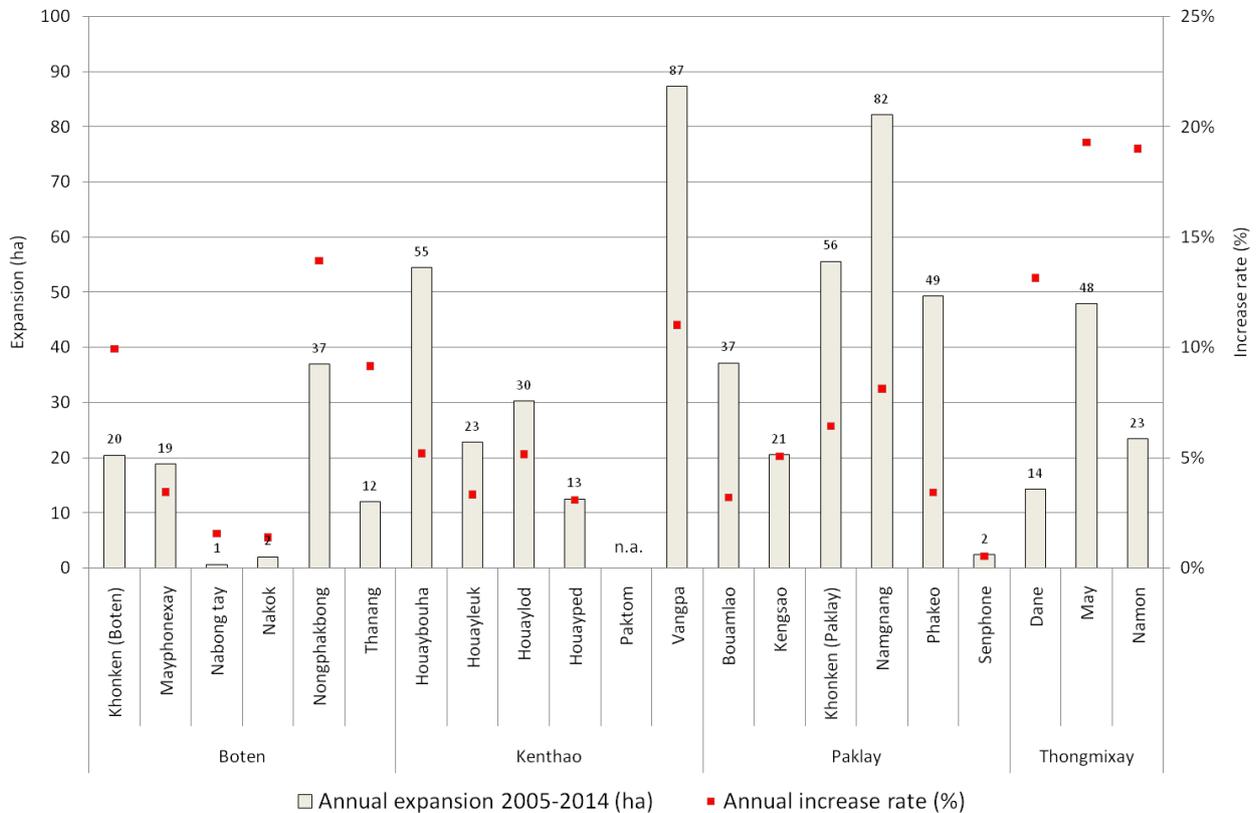
Thongmixay district	Dane	May	Namon
Maize	-	11	25
Job's Tear	168	468	239
Rainfed rice	-	-	3
Peanut	-	-	-
Sesame	-	-	-
Vigna	-	-	-
Cassava	-	-	-
Teak	-	29	-
Rubber	-	-	-
Pasture	24	34	-
Total	192	542	266

Note: Village-level estimates were calculated using the values reported by the household samples proportioned to the actual population of the villages

Over the past ten years, upland agriculture has expanded very significantly in most target villages. In villages like Vangpa (Kenthao) and Namngang (Paklay) for instance, agricultural expansion has

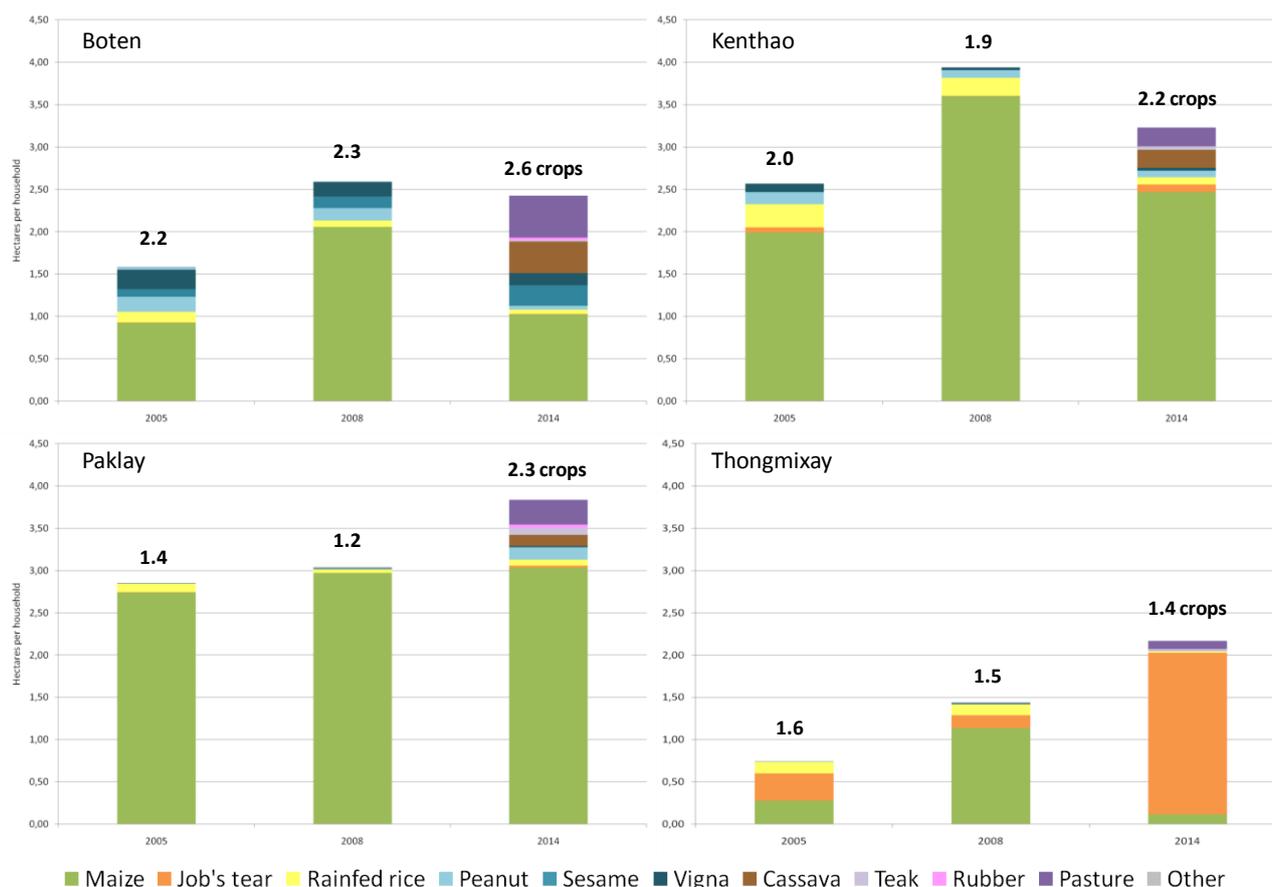
translated in more than 80 additional hectares being developed every year since 2005 (Figure 3). Similarly, in nine years, villages like May and Namon (Thongmixay) have seen their upland cultivated areas increasing by a factor of 5.

Figure 3. Estimated agricultural expansion in the uplands (hectares and increase rates per year, 2005-2014)



Looking at the most recent years however, different trends can be observed. Overall, the mean cultivated area per household has increased quite sharply since 2008 in Paklay and Thongmixay while it has decreased slightly in Boten and more significantly in Kenthao (Figure 4). Significant crop diversification is also observed in the uplands of Boten, Kenthao and Paklay districts, with the development of cassava, peanut and sesame cultivation and the establishment of pastureland. Crop diversification leads to a replacement of maize in Boten and Kenthao, while it occurs alongside maize cultivation in Paklay. Finally, Thongmixay district is characterized by a clear trend of specialization into Job's Tear production, in replacement of maize.

Figure 4. Average surface areas and number of upland crops (hectares and crops per household, 2005-2014)



After a rapid expansion during the 2000s, herbicide use appears to have decreased over the past six years. This is especially true in Paklay district where a 10-point decrease in the percentage of households applying herbicides on their land can actually be observed (Table 3). Statistical analysis for all 21 study villages confirms the significance of this trend which could be related to the abovementioned shift towards off-farm and non-farm activities. Simultaneously however, service provision activities for herbicide application have not developed at a broader scale than in 2008, although they could have contributed to better control of pesticide utilization. Quite the contrary, the increased health hazard linked to the rapid spread of motorpumps and anticipated in earlier reports has become a reality with an overwhelming majority of households (99% in average) of the four target districts using motorpumps for applying herbicide on their land.

Table 3. Herbicide use (% of households, 2005-2014)

	2005	2008	2104
Boten	20%	62%	56%
Kenthao	23%	82%	77%
Paklay	70%	94%	84%
Thongmixay	0%	67%	66%
Total	37%	80%	71%

- **Livestock farming**

Cattle and buffalo farming is widely practiced in the study area (Table 4), with a general trend of increase of the average farm size. This increase plays a part in the income diversification process described above and can be associated with the significant expansion of pastureland observed in the

upland areas of Boten, Kenthao and Paklay districts. At the same time however, a significant decrease in the proportion of villagers engaged in cattle/buffalo farming can be observed in Kenthao district. According to key informants, this decrease may actually reflect a broader change in the production system with cattle being increasingly raised by traders or other non-local investors on land bought to villagers who, in turn, are gradually shifting to off and non-farm activities. In contrast, while it had strongly decreased during the 2005-2008 period, the involvement of villagers in pig farming has remained relatively steady after 2008, except in Boten district where the activity has developed significantly (Table 4).

Table 4. Villagers engaged in cattle/buffalo and pig farming (% of households, 2005-2014)

	Cattle/buffalo farmers			Pig farmers		
	2005	2008	2104	2005	2008	2104
Boten	72%	59%	59%	61%	27%	39%
Kenthao	69%	50%	30%	42%	25%	20%
Paklay	43%	45%	47%	63%	39%	34%
Thongmixay	56%	62%	62%	94%	63%	67%
Total	59%	52%	48%	59%	34%	36%

Main hypotheses on the drivers for socioeconomic and agricultural change

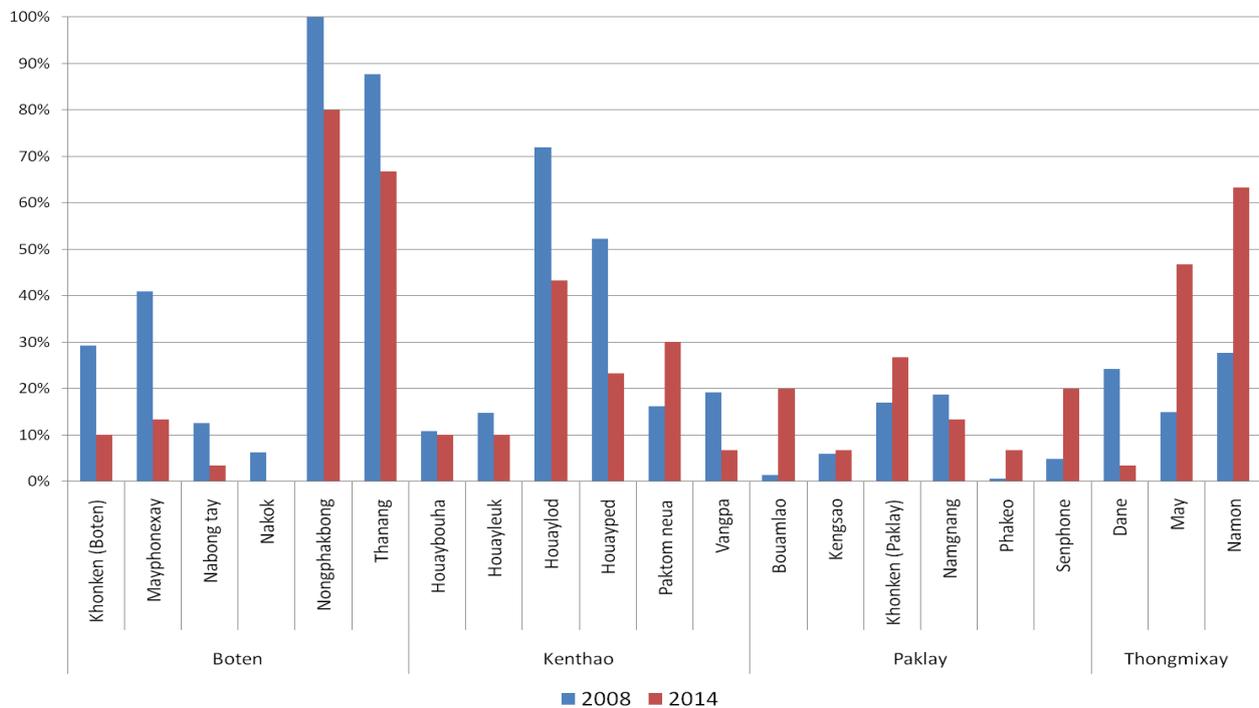
- The Job's Tears boom in Thongmixay is likely to have played a major role in increasing household incomes and driving significant poverty reduction after 2008
- People's interest for maize cultivation is decreasing in Boten and Kenthao districts as reflected in reduced surface areas, agricultural diversification and a shift to off/non-farm activities. Various drivers (possibly combined) could explain this trend: land degradation, decreased labor availability and increased labor costs. Market price variations and recurrent issues linked to maize exportation probably also foster economic diversification
- Crop diversification observed in Paklay would be more related to emerging market opportunities (establishment of a cassava factory, new border checkpoint with Uttaradit Province, better marketing channels for peanut, sesame, etc.)
- Villagers of Boten district have made continued investments into paddy land development, whereas in Thongmixay, decreased surfaces of paddy land per household might reflect a minor displacement of farm labor from paddy cultivation towards upland cash crops like Job's Tear
- A significant decrease in herbicide use by households can be observed throughout the study area, a trend that appears correlated to the broader shift towards off/non-farm activities

3. Dissemination and current status of Conservation Agriculture

Different trends in the use of CA techniques can be observed over the past six years. In average, the proportion of farmers applying CA techniques (mainly direct seeding mulch-based maize cropping systems) has decreased from 46% to 30% in Boten and from 31% to 21% in Kenthao since 2008 (Figure 5). In some villages, this proportion has become equal or close to 0% (e.g. Nabongtay and

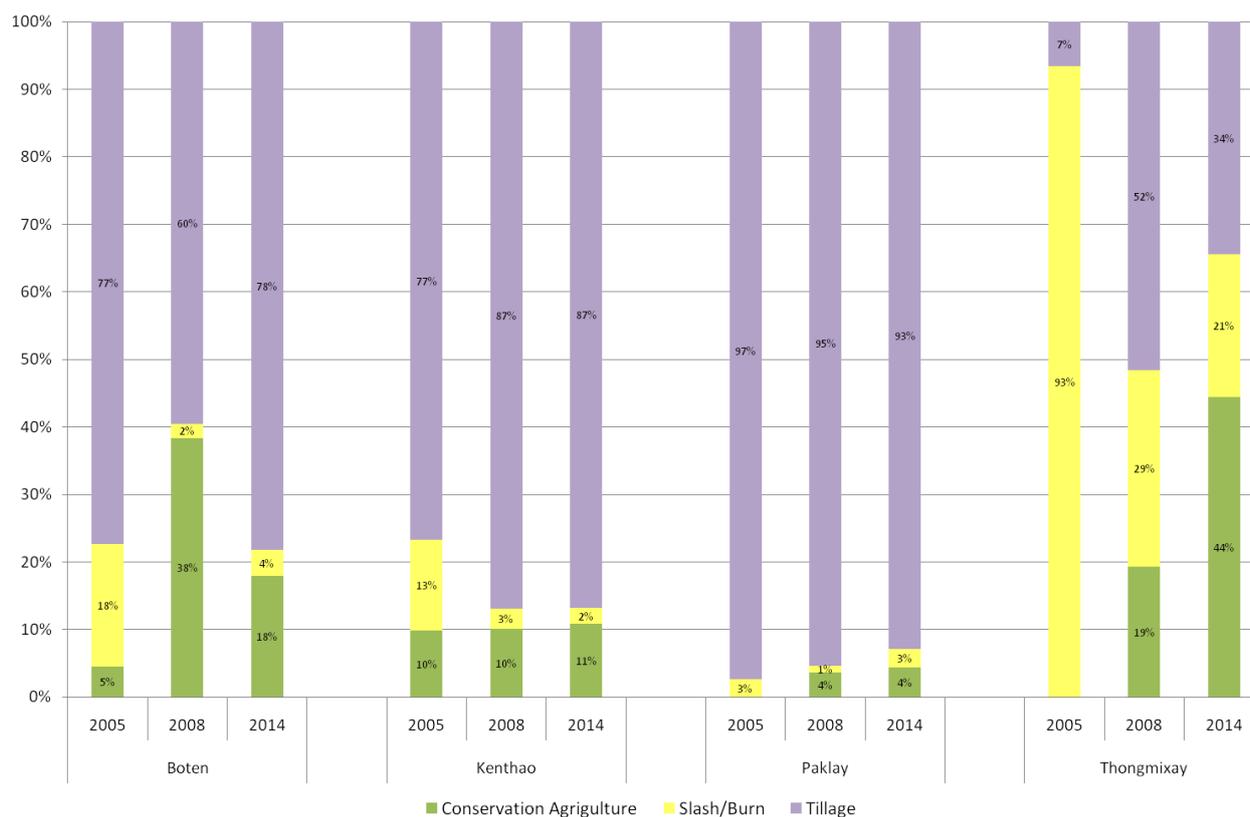
Nakok) while, in other villages, CA remains very popular (e.g. Nongphakbong and Thanang). In contrast, the average number of CA practitioners has doubled in the two other target districts, reaching 16% of farmers in Paklay and 38% in Thongmixay. Again, some differentiation can be also observed at the village level, with decreases in the number of practitioners in Namngang (Paklay) and Dane (Thongmixay) and increases in all the other study villages.

Figure 5. Use of Conservation Agriculture techniques (% of households, 2008-2014)



Similar trends are observed when looking at the extent of the different land preparation techniques (tillage, CA and slash-and-burn). Compared to 2008, there is now less land under CA in Boten and Kenthao districts (Figure 6). This contraction is accompanied by a relative increase in tillage practices. Nevertheless, in villages like Nongphakbong and Thanang (Boten), the areal extent of CA remains quite significant. Slight areal increases in land prepared with CA can also be observed in villages like Houaybouha, Houayleuk and Paktom in Kenthao district. In Paklay district, the relative extent of CA has increased but remains clearly below 10% of the cultivated uplands in all the study villages. Thongmixay district displays a more heterogeneous situation as the extent of CA has decreased in Dane but strongly increased in May and Namon to cover more than 50% of the cultivated uplands. Overall, deriving village-level estimates from data collected among our household samples in 2014 suggests that some 1,440 ha were under CA in the 21 study villages in 2014; 225 ha in Boten district, 575 ha in Kenthao, 235 ha in Paklay and 405 ha in Thongmixay.

Figure 6. Relative extent of the different land preparation techniques (% of cultivated land, 2005-2014)



4. Conclusions and perspectives for Conservation Agriculture

Key drivers for the maintenance of Conservation Agriculture

- *Land degradation and soil erosion issues* still constitute key factors pushing farmers to use CA techniques. This is notably the case on poorly fertile and soil erosion-prone sandstone areas like in Nongphakbong and Thanang (Boten district) where CA practitioners still constitute a large majority of the farmers
- As suggested by the simultaneous expansion of off- and non-farm activities, upland agriculture and CA techniques in Paklay and Thongmixay districts, the *economic efficiency of Conservation Agriculture* is probably a key factor for adoption in a context of income diversification, decreasing farm labor availability and increasing labor costs

Key constraints for the maintenance of Conservation Agriculture

- In the *absence of specific agronomic and technical research-and-development activities*, crop diversification towards cassava, peanut and perennial land uses like pasture and tree crops favors tillage-based agriculture. In Boten and Kenthao districts for instance, decreasing maize production area and its partial replacement by cassava and pasture are probably proximate drivers for the reduction of the spatial extent of CA
- Similarly, in the *absence of dedicated equipment for no-till cultivation* (e.g. no cutting disks for use of mechanical seeders on mulch), agricultural expansion processes such as those observed in Paklay district are likely to be primarily realized through tillage-based agriculture

Key recommendations

- In view of these major socioeconomic and agricultural changes (e.g. increasing land pressure, income diversification and changing labour, resources and capital availability), a renewal and diversification the CA-based technical options, primarily based on direct seeding mulch-based maize cropping systems, is required. In practice, new cropping systems should be designed that fit with the diverse trajectories of land use change currently at play in southern Sayaboury Province – e.g. expansion of Job’s Tear in Thongmixay district, annual crop diversification (e.g. cassava, groundnut and sesame) in Boten district, pasture and perennial crops (e.g. rubber) development in Kenthao district.
- Although this renewed setup would probably require external inputs and technical-organizational expertise for review and redefinition of the technical options promoted and their dissemination channels (e.g. demonstration sites, extension activities, traders and farmer groups) as well as for capacity-building of CA stakeholders, part of this work may initially be undertaken through a pilot site approach, selecting sites that are representative of diverse trajectories of land use change and adapting the technical propositions accordingly.