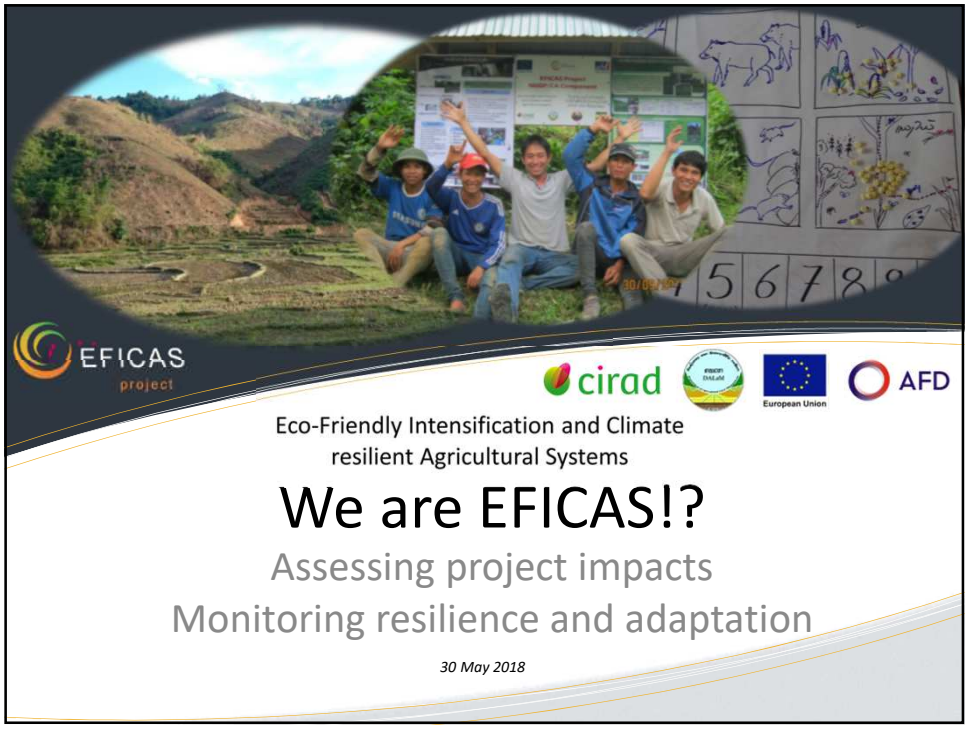

EFICAS project

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European Union

AFD

Eco-Friendly Intensification and Climate resilient Agricultural Systems

We are EFICAS!?

Assessing project impacts
Monitoring resilience and adaptation

30 May 2018

Questions

- In the context of Lao PDR, what is:
  - resilience to climate change?
  - eco-friendly (eco-system-based) adaptation?
- How can we transform agricultural systems towards
  - ecological intensification?
  - increase resilience?
- How can we measure changes in (i.e. project impacts)
  - agricultural systems - landscapes?
  - village resilience?

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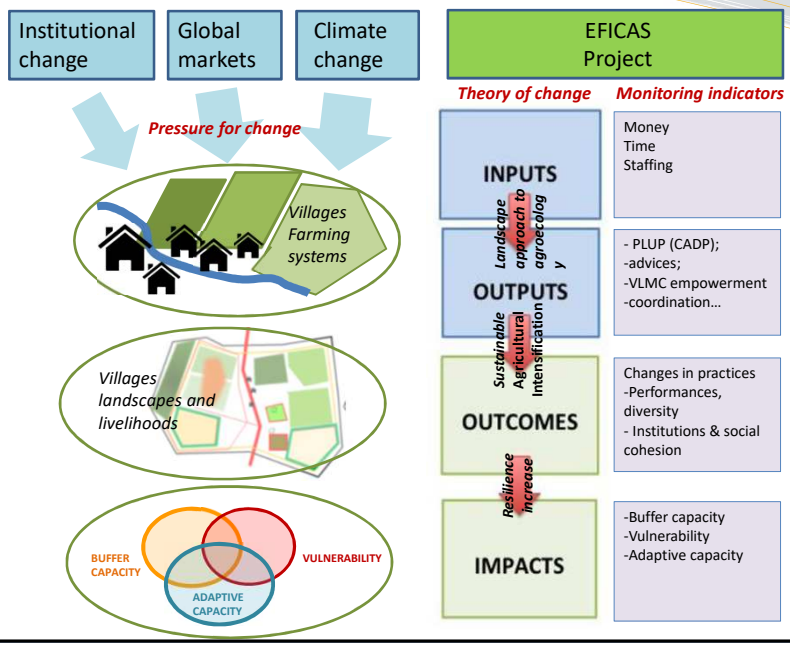
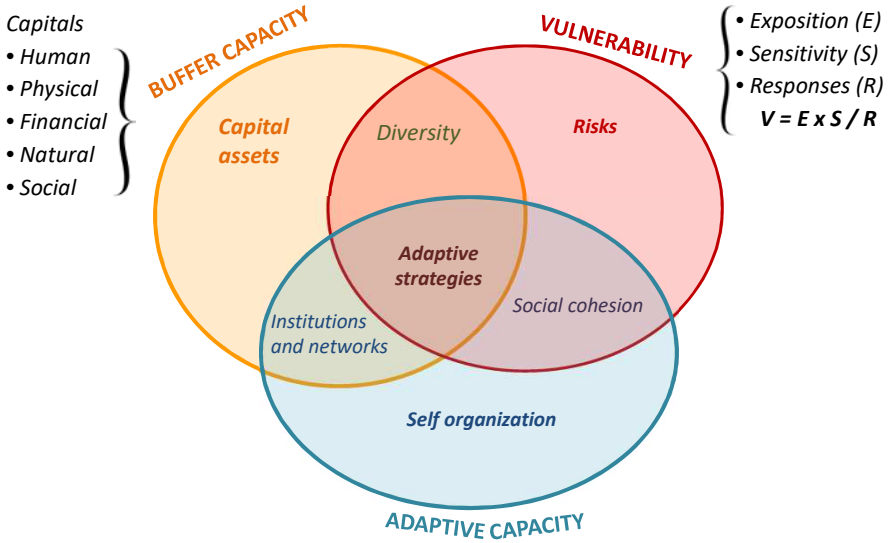
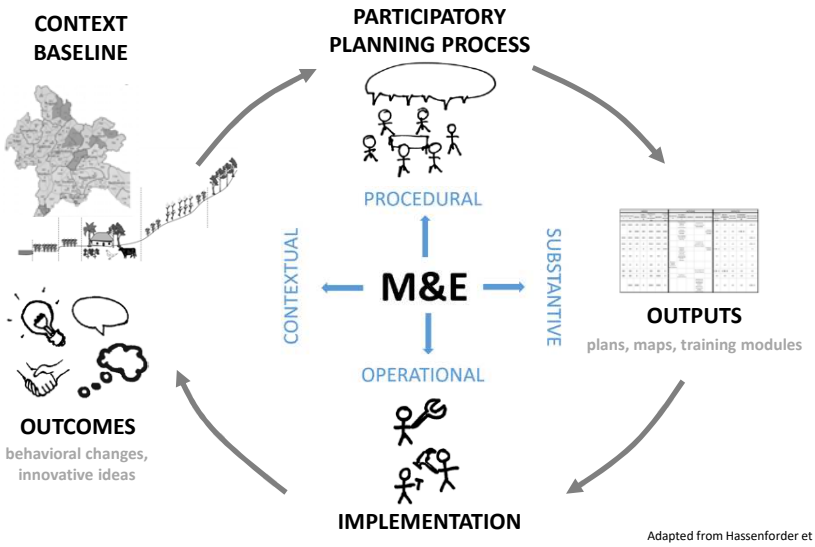
Changes in landscapes and livelihoods



The three dimensions of resilience

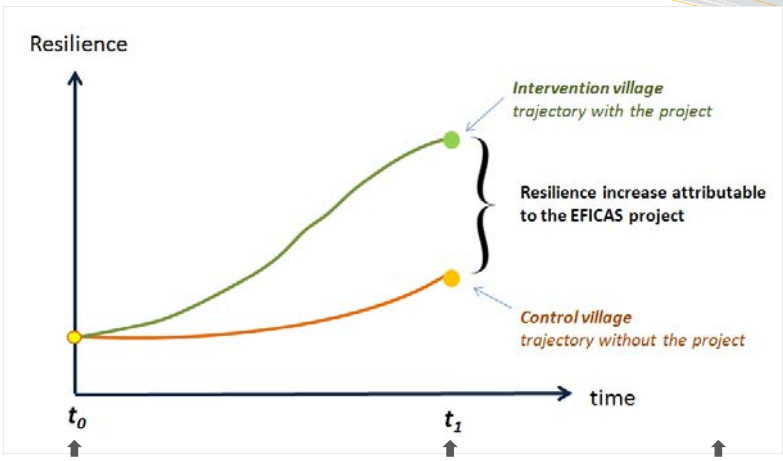


Impact monitoring and evaluation:
an integral part of a village transformative process



Adapted from Hassenforder et al. 2015

Impact monitoring-evaluation system



Baseline 2014 | Endline? 2016 | Endline? 2018

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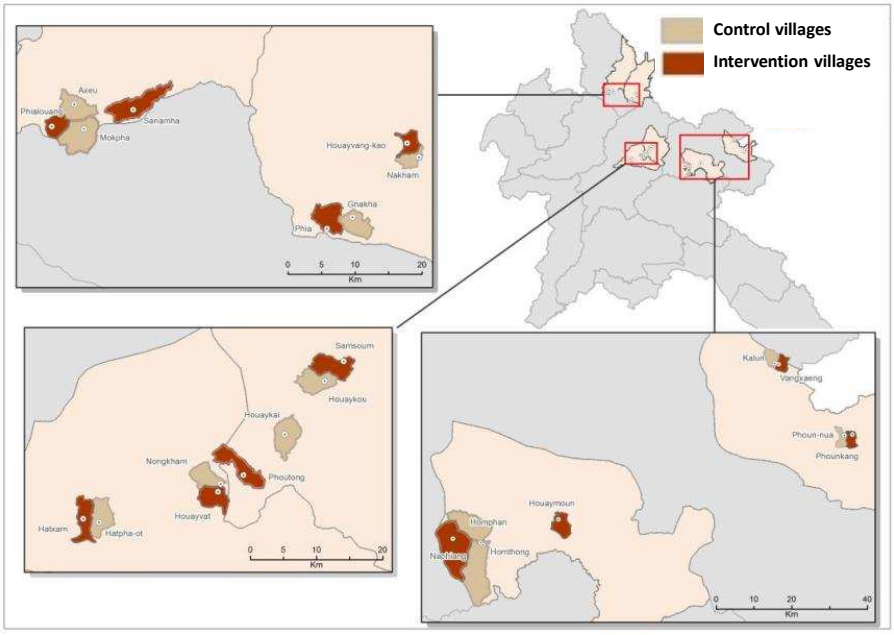
Impact monitoring-evaluation system



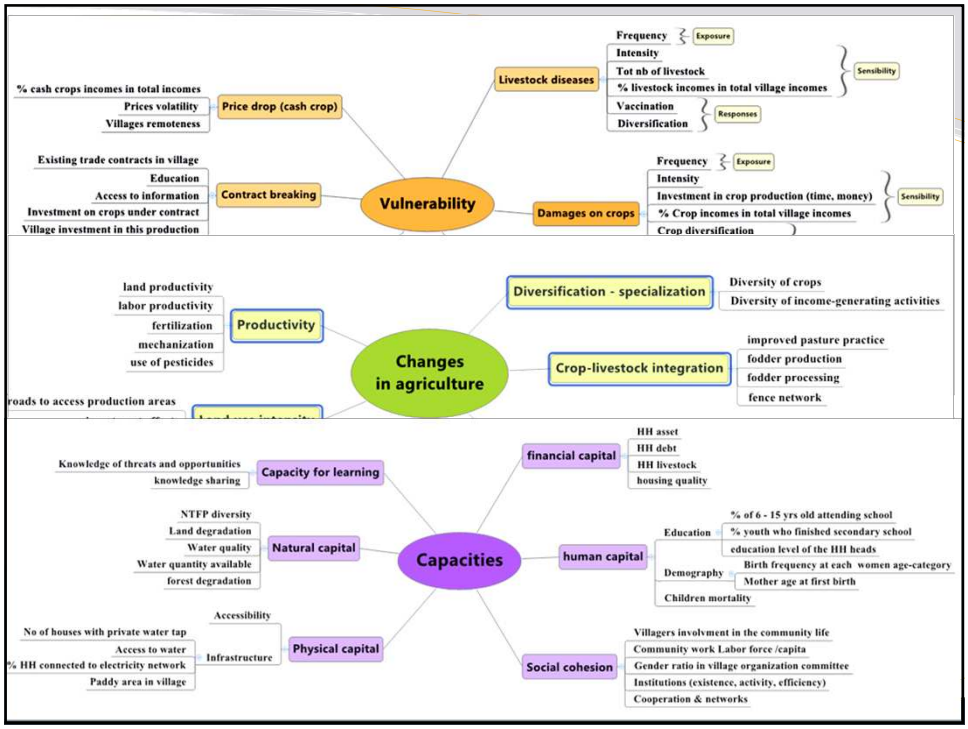
Measuring changes in livelihoods

LANDSCAPE SCALE
- land use patterns
- land use intensity

VILLAGE SCALE
- general village information
- problem census

HOUSEHOLD SCALE
- income
- agricultural practices

INDIVIDUAL SCALE
- family composition
- education

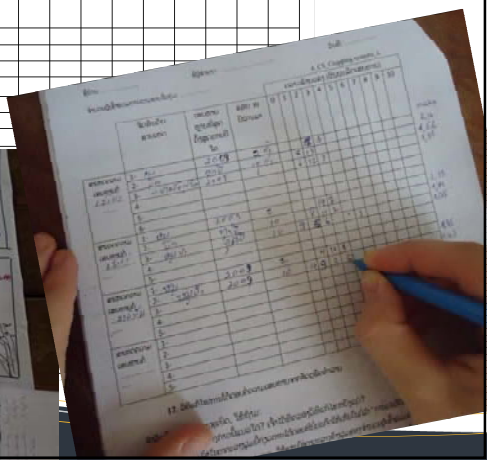


Designing a method to collect SMART data

Reflexive loops: exposure to crop damages

Village: ……. Interviewer: …… Date: ……
No participants to the focus group: ……

	Ranking of the causes	Year of the last big damage	Number of times over the last 10 yrs	INTENSITY (harvest loss) 0 %	10 %	20 %	30 %	40 %	50 %	60 %	70 %	80 %	90 %	100 %
Cropping system 1: ……	1-													
	2-													
	3-													
	4-													
	5-													
	6-													
Cropping system	1-													



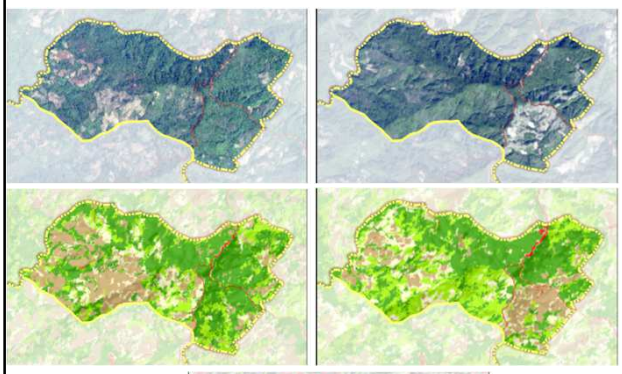
Bottom-up definition of SMART indicators

e.g. exposure to crop damages

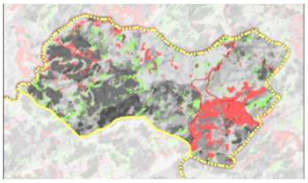
***S**pecific*
***M**easurable*
***A**ssignable*
***R**ealistic*
***T**ime-related*

Land use changes

- Time series of high resolution remote sensing data (SPOT6)



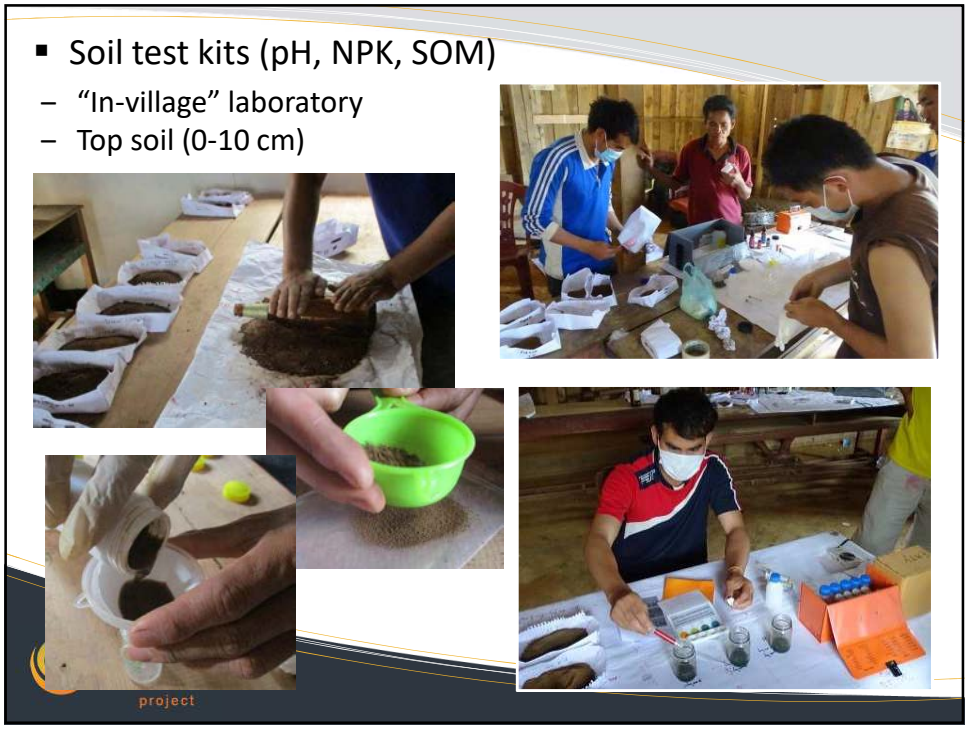
Unclassified
Paddy Field
Upland crop
Shrub
Fallow
Forest
Plantation
Water
Settlement
Cloud



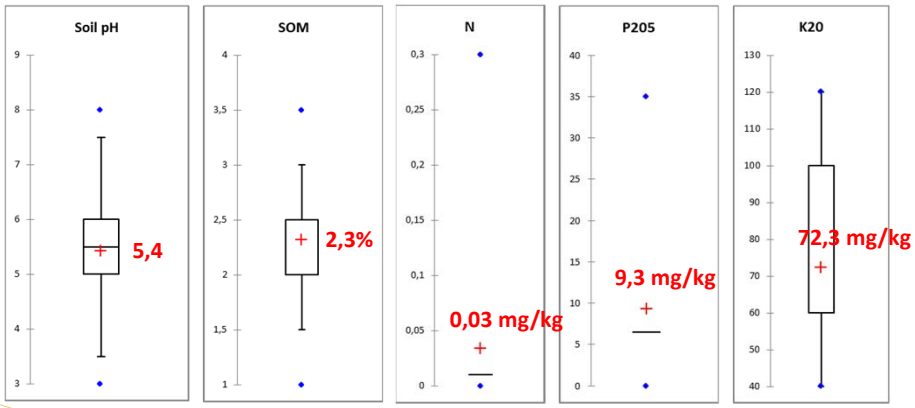
Decreasing forest
F-PF
F-UPL/Shb
F-OL
Increasing forest
UPL/Shb-F
OL-F

LULC class	Village	Samsoum	
	Year	2015 (ha)	2017 (ha)
1	Paddy field		
2	Upland crop	411.8	265.4
3	Shrub	205.3	283.0
4	Fallow	312.3	461.8
5	Forest	764.6	680.4
6	Plantation		
7	Water		
8	Settlement	5.1	8.5
9	Cloud		
	Total	1,699.0	1,699.0


Inputs
Outputs
Outcomes
Impacts
Measuring soil health
Soil erosion
Water run-off
Infiltration
Soil biological activity
Soil Quality Card for Lao Uplands
What is Soil Quality?
How to Improve Soil Quality?
Recommendations
A locally adapted tool designed with farmers for farmers
Developed by:
EFICAS project
Eco-Friendly Intensification and Climate resilient Agricultural Systems


Soil test kits (pH, NPK, SOM)
"In-village" laboratory
Top soil (0-10 cm)
project

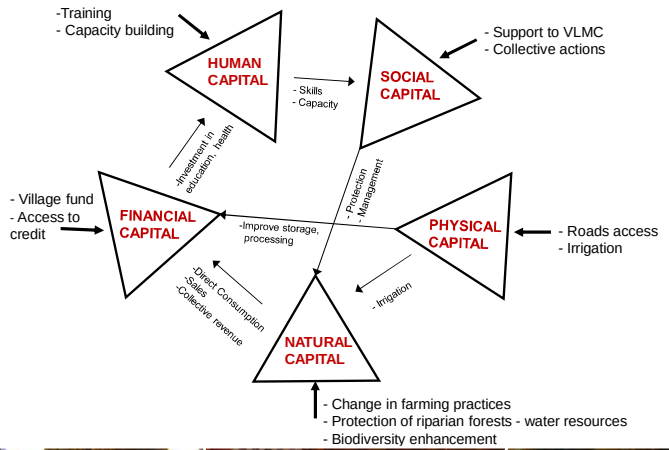
- Preliminary results (22 villages, n=720)
  - Variable description

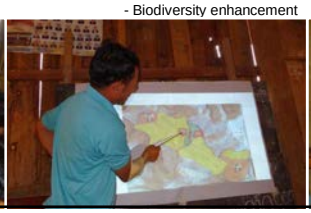


Acidic soils, with low nutrients and SOM content

EFICAS project

Measuring changes in livelihoods



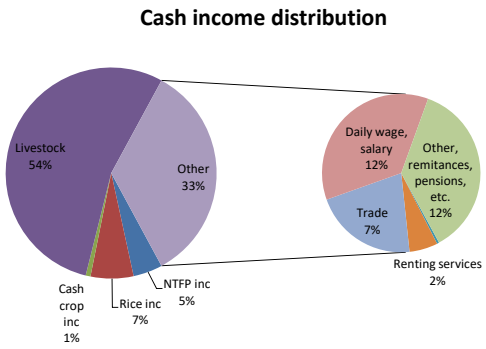




Village baseline data

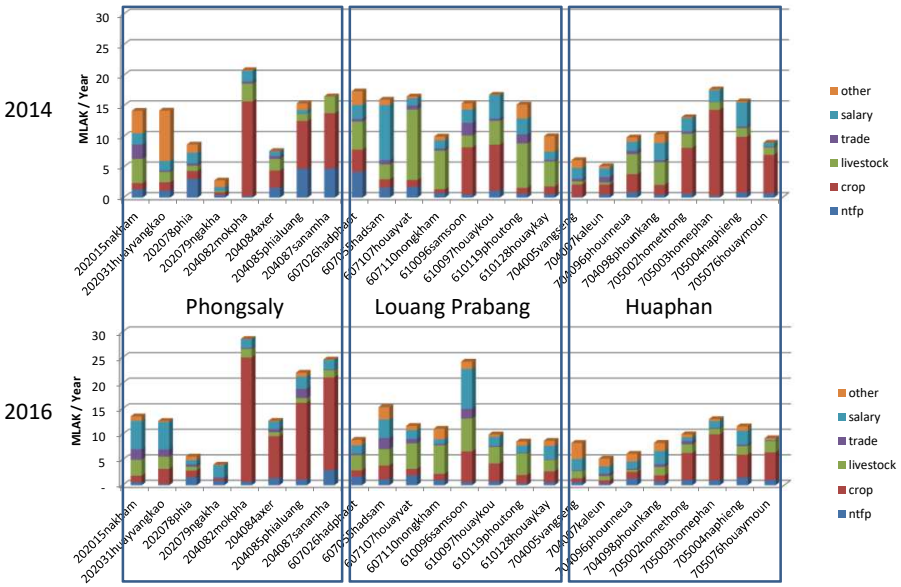
Topics	Variable	Houaphan		Louang Prabang	
		Houamuang	Viengxay	Viengkham	Pakseng
		Houaymoun	**Phounkang**	**Phoutong**	**Houayvat**
Population	Households (no)	69	36	71	43
	HH members (no)	405	186	429	240
	Women (no)	191	93	195	118
	Labor force (no)	171	81	162	84
	% active population	42%	44%	38%	35%
	Dependency ratio (chidren/adult population)	46%	41%	53%	58%
	% children 6-15 going to school	87%	97%	97%	95%
Agriculture	Upland rice prod (t)	106	18	189	65
	Upland rice production (kg/capita)	234	97	441	272
	Lowland rice production (t)	11	48	0	0
	Lowland rice production (kg/capita)	28	258	0	0
	Rice production (kg/capita)	262	354	441	272
	% upland rice on total rice production	89%	27%	100%	100%
	Maize production (t)	517	65	90	7
	No Buffalo	0	28	188	59
	No Cattle	191	68	28	2
	No Goat	42	0	202	144
	No Pig	130	62	351	141
	No Fish pond	5	31	5	2

Village baseline data

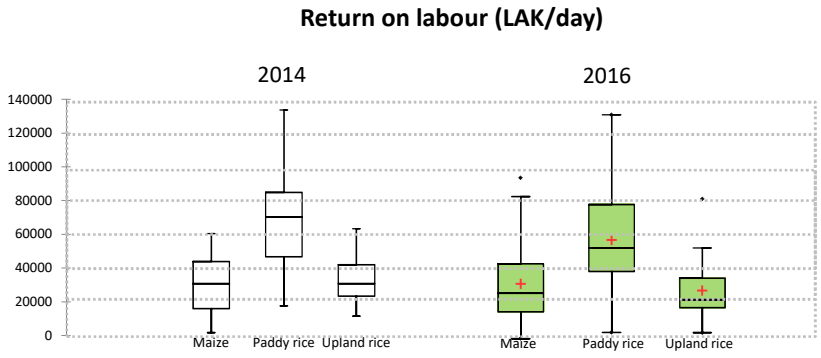
Topics	Variable	Houaphan		Louang Prabang	
		Houamuang	Viengxay	Viengkham	Pakseng
		Houaymoun	**Phounkang**	**Phoutong**	**Houayvat**
	% swidden	87%	67%	92%	95%
Household economics	% paddy				
	% livestock				
	% trade				
	% salary/employment				
	Village NTFP income (r				
	% NTFP income				
	Village rice income (m				
	Village cash crop incor				
	Village livestock incom				
	Village non-farm incor				
	% non-farm income				
	Village annual cash inc				
	Avg HH cash income (r				
	Avg farm income (mill				
	Avg non-farm income				
	Gini index on cash inc				



Change in income distribution

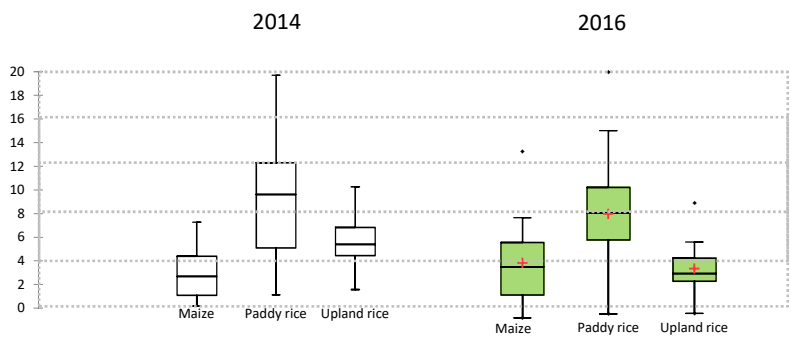


Cropping system performances

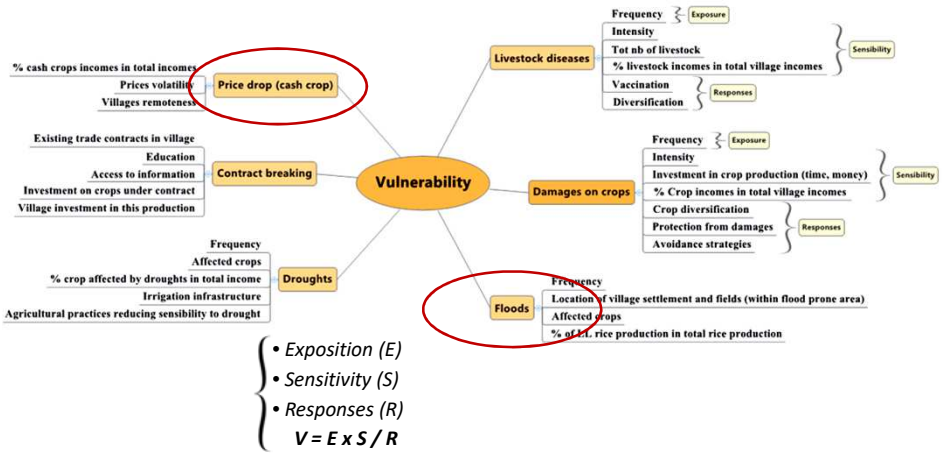


Cropping system performances

Return on land (MLAK/ha)



Vulnerability indicators



- *Exposition (E)*
- *Sensitivity (S)*
- *Responses (R)*

V = E x S / R

Vulnerability variables

Hazard	Questions	Variables	Variable name
Flood - storm	Exposure_Flood or extreme rain episode frequency	No floods or extreme rains over last 10 years	v_fs_flood_frequency
Flood - storm	Exposure_% of village territory with slope>25°	% village surface with slope >25° in 'Data about villages_GIS.xlsx File'	% of village territory with slope>25
Flood - storm	Exposure_Village location on the slope	0/1 : 0=unexposed: village in uplands, no pady surfaces. 1= exposed, village in lowlands.	Village location on the slope
Flood - storm	Sensitivity_% of LL rice production in total rice production	Avg on all HH [rds_paddy_rice_prod / (rds_paddy_rice_prod + rds_upland_rice_prod)]	Avg HH % paddy rice
Flood - storm	Adaptive Response_Reactions to floods - land slides	Avg [fl_reaction_n (production area + village settlement + road + lowland area + village) * weight (see note [4] below] for n from a to f	v_fs_reactions

Vulnerability variables

Hazard	Questions	Variables	Variable name
Market instability	Sensitivity to price fluctuations_Price volatility weighted by importance of farm products	Avg (price_volatility_ntfp (cf. [5] below) * rds_income_ntfp + price_volatility_rice * rds_income_rice + price_volatility_cash * rds_income_cash + price_volatility_livestock * rds_income_livestock) / (rds_income_ntfp + rds_income_rice + rds_income_cash_crop + rds_income_livestock + rds_income_handicraft + rds_renting_services + rds_trade + rds_salary + rds_other_income)	v_mi_price_volatility
Market instability	Exposure to concessions_% of village agricultural land given away to concession	con_surface_company_area / village agricultural area	v_mi_agriculture_land
Market instability	Exposure_% informal contracts	cb_contracts_documents=t + cb_signatory_a=t * 1 + cb_signatory_b * 0,8 + cb_signatory_c * 0,5 + cb_signatory_d * 0,2	v_mi_informal_contracts_perc
Market instability	Adaptive Response_No of cash crops in the village / total no of crops	No crops in s_selling_name / No of cp_crop_name	v_mi_cash_crops_perc
Market instability	Adaptive Response_Indebtedness	Avg all HH [rds_pending_debts] / cash income	v_mi_%_debts
Market instability	Adaptive Response_Diversity of income sources	IDSR (diversity of income sources + levels of reliance on the different sources) GINI Index	Diversity of income sources
Market instability	Adaptive Response_Education	Average education level of HH-heads	v_mi_education_level_hhh

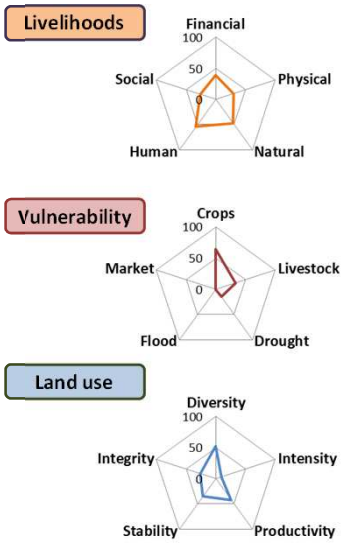
Indicators 2014 – 2016 -> 2018

Themes	Indicators	Variable	Data	Entries
3	**15**	**115**	**325**	**15600**

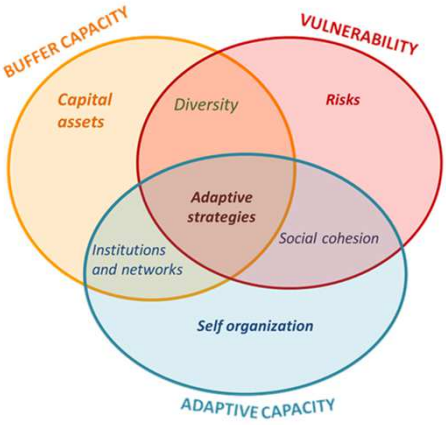
Resilience	Assets	axer	hadphaot	hadsam	homephan	homethong	houaykay	houaykou
Livelihood	Financial	30,54	39,11	34,15	34,99	33,14	30,81	30,07
	Physical	36,93	22,14	22,98	35,13	27,30	14,62	21,90
	Natural	46,55	55,64	48,93	55,45	46,00	48,61	49,62
	Human	31,14	48,77	49,68	33,88	36,36	35,27	47,88
	Social	24,09	56,25	24,14	40,17	27,46	16,67	11,91
Vulnerability	Crop damages	36,01	32,80	24,60	15,68	15,87	44,00	38,26
	Livestock diseases	1,30	2,06	0,87	1,85	4,41	53,79	5,42
	Drought	19,99	9,27	8,06	43,44	95,97	11,53	19,61
	Flood - storm	0,00	0,00	2,53	7,54	3,72	0,00	0,00
	Market instability	7,51	74,83	12,26	4,67	0,00	0,00	15,22
Landuse	Diversity	40,93	55,06	54,44	37,10	34,15	48,95	48,92
	Intensity	35,95	8,23	10,72	28,25	22,48	27,29	24,47
	Productivity	12,27	45,64	29,69	51,56	51,39	19,98	34,92
	Stability	34,22	43,44	44,15	34,13	62,24	39,69	35,94
	Integrity	26,67	65,68	39,78	24,00	23,33	31,11	25,78

Resilience indicators

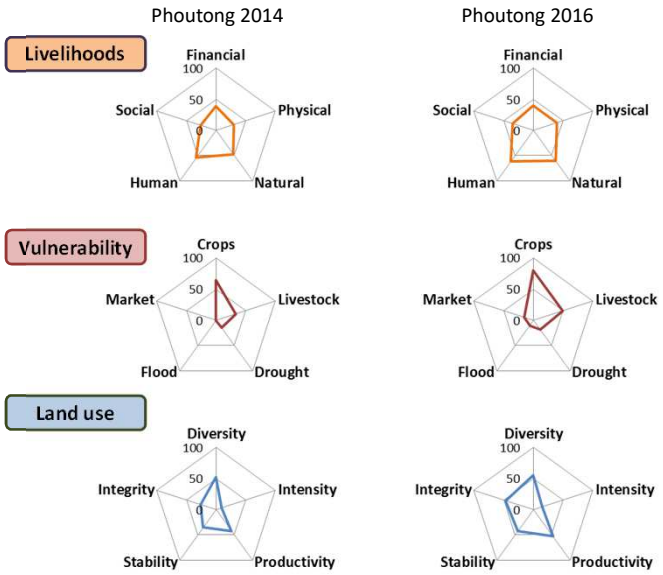
Phoutong 2014



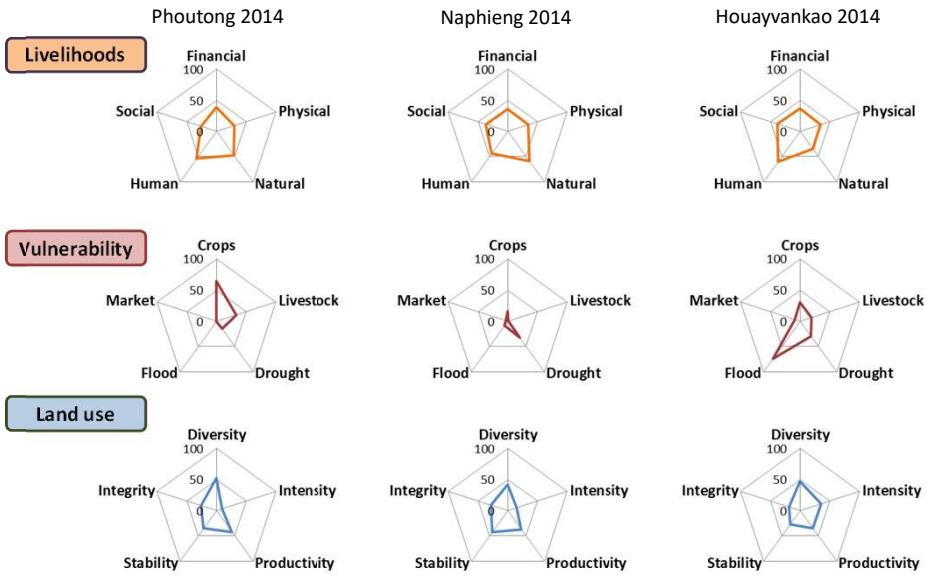
Resilience framework



Village comparisons 2014-2016

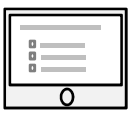


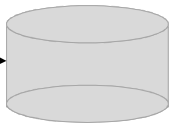
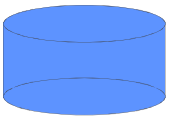
Village comparisons 2014



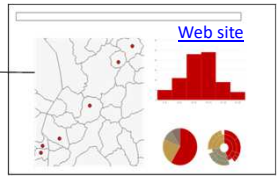
Data Management




Mobile application

Design/selection of indicators



http://data.eficas-laos.net/

Data Management

http://data.eficas-laos.net/

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project

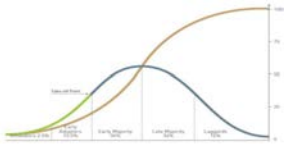
Main lessons

Rethinking innovation processes and impact pathways

The technology adoption pathway (s-curve): evaluation of

- adequacy of the "solution", number of "beneficiaries",
- impacts on livelihood or wellbeing of the new technology.

speed of adoption of an innovation

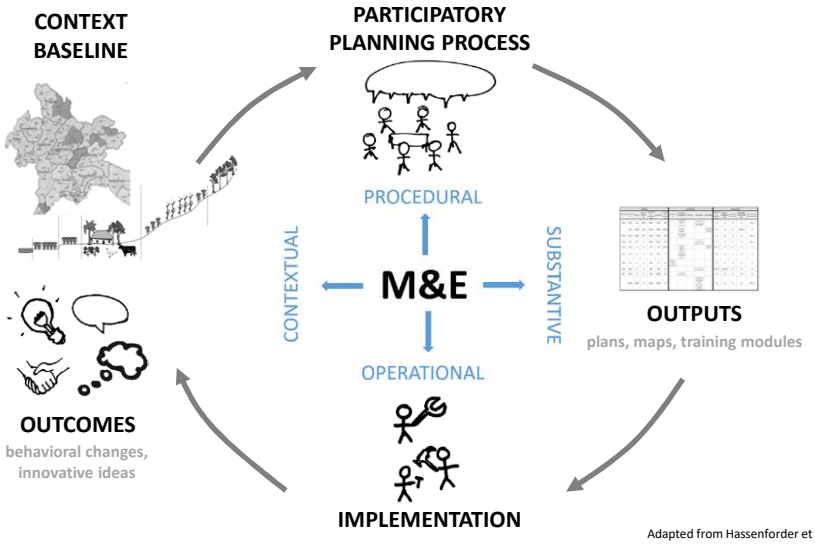


The empowerment pathway in complex, adaptive systems:

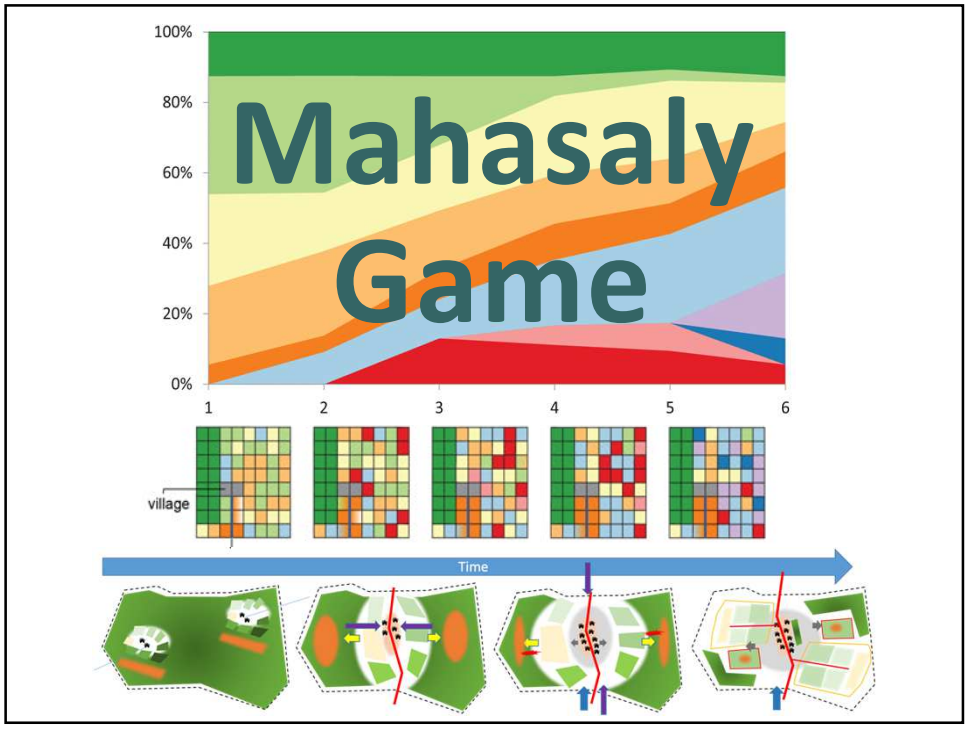
- capacity of the rural innovation system to innovate,
- development of platforms, networks, skills.

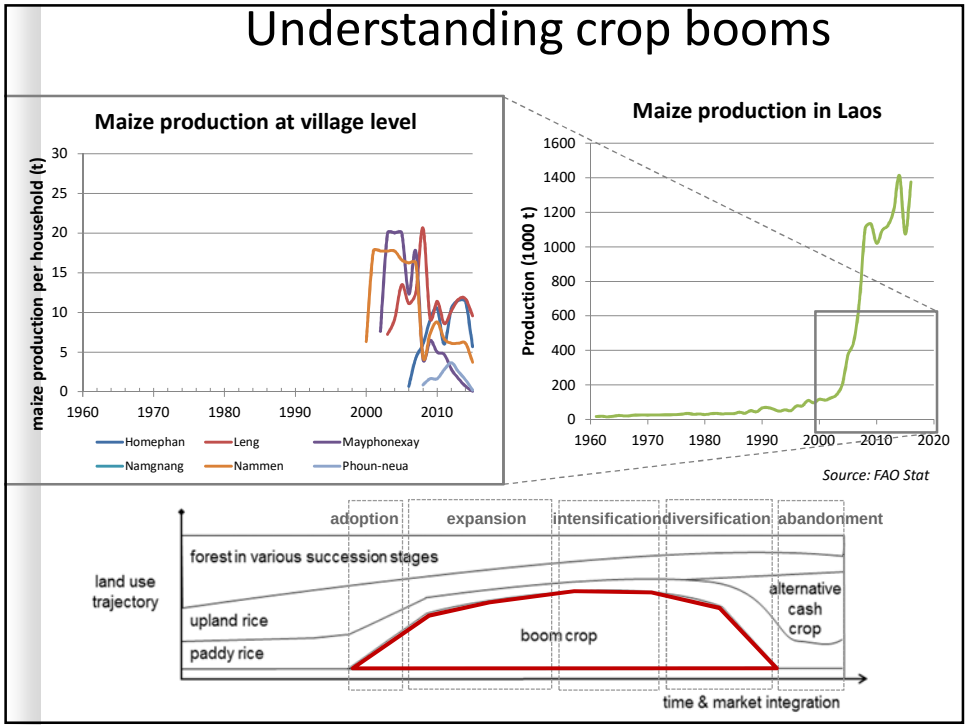
Impact monitoring and evaluation:

an integral part of a village transformative process



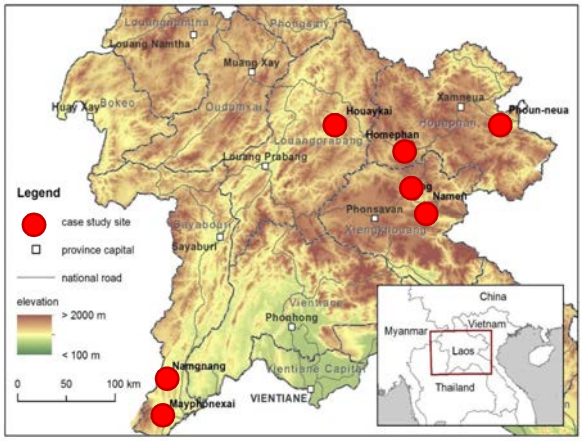
Adapted from Hassenforder et al. 2015

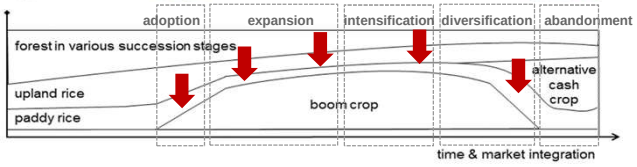

Mahasaly
Game
100%
80%
60%
40%
20%
0%
1
2
3
4
5
6
village
Time


Understanding crop booms
Maize production at village level
maize production per household (t)
30
25
20
15
10
5
0
1960
1970
1980
1990
2000
2010
Homephan
Leng
Mayphonexay
Namgnang
Nammen
Phoun-neua
Maize production in Laos
Production (1000 t)
1600
1400
1200
1000
800
600
400
200
0
1960
1970
1980
1990
2000
2010
2020
Source: FAO Stat
adoption
expansion
intensification
diversification
abandonment
land use trajectory
forest in various succession stages
upland rice
paddy rice
boom crop
alternative cash crop
time & market integration

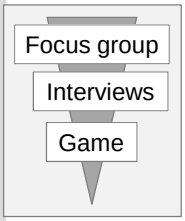
Understanding farmers' decision making
in the boom of maize

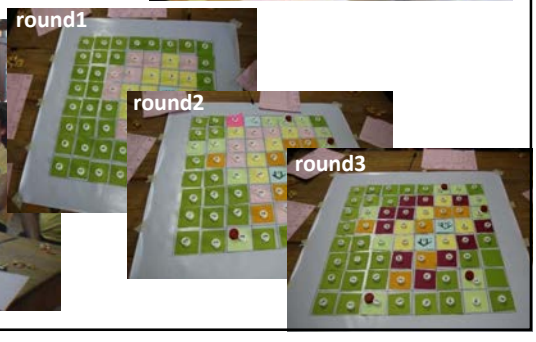
- Village sampling
  - Market access
  - Stage in the boom





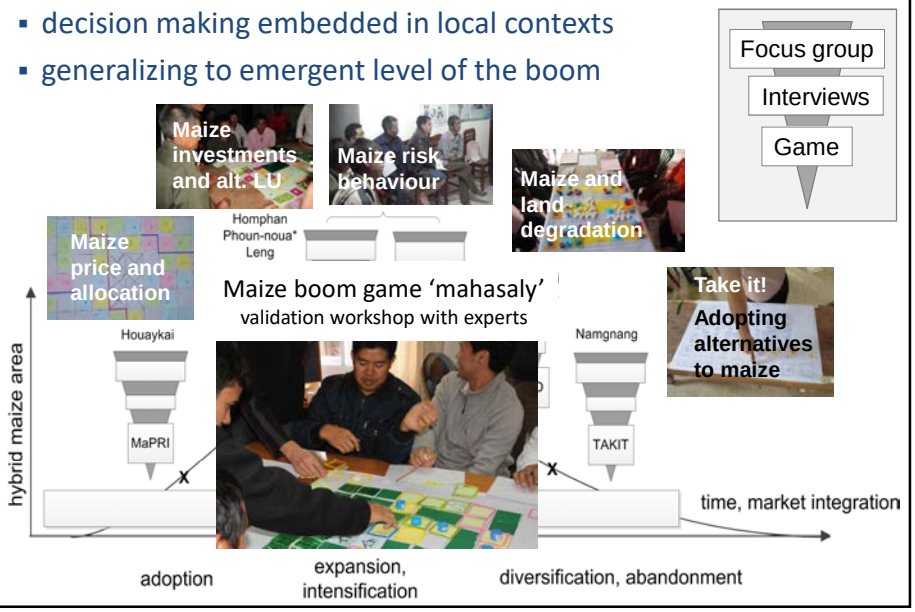
Understanding farmers' decision making
exploring local trajectories of agricultural change





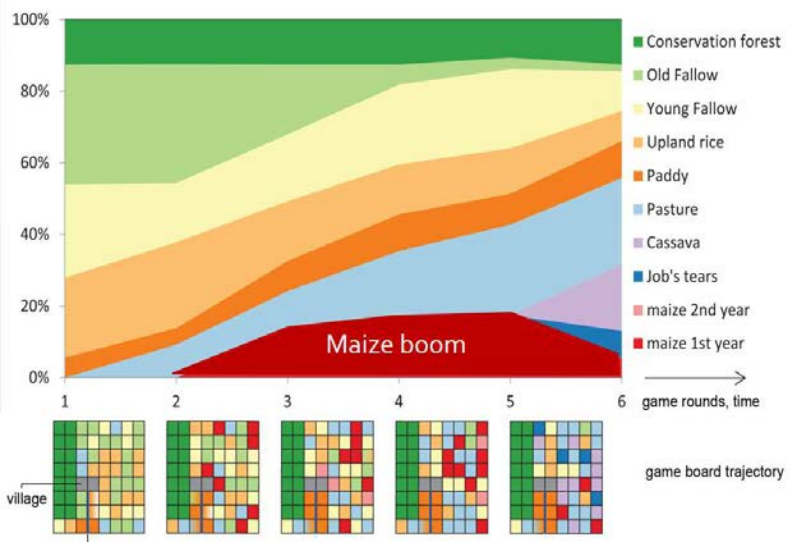
Multi-scale gaming approach to the boom

- decision making embedded in local contexts
- generalizing to emergent level of the boom



Maize boom game 'mahasaly'

How the boom comes up from individual decision making

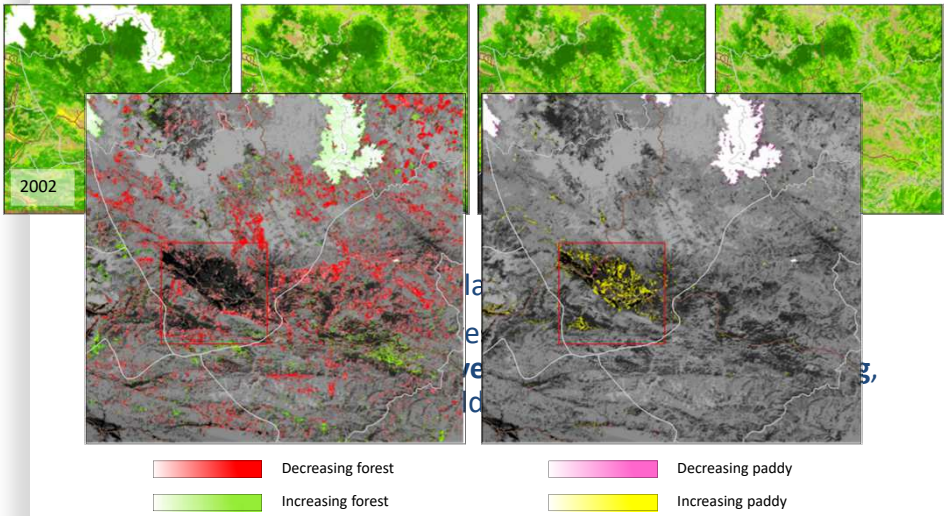


Ornetsmüller C, Castella JC , Verburg PH. (2018) A multi-scale gaming approach to farmer's decision-making in the maize boom of Laos. *Ecology and Society*

Lessons from the 'mahasaly' game

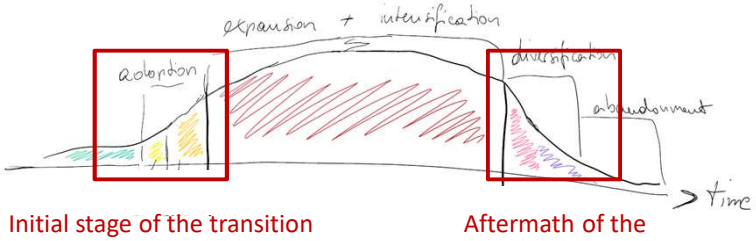
Short term benefits vs long term investments

Land use change in Kham district, Xiengkhuang province, 2002-2015



Lessons from the 'mahasaly' game

- Windows of opportunity
  - **No technical intervention** possible during the expansion-intensification phase of the boom,
  - Two opportunity windows for intervention

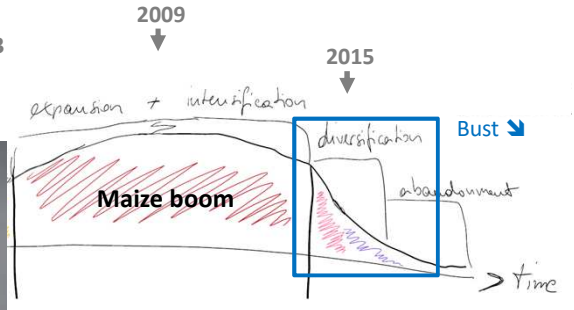


Initial stage of the transition from subsistence to commercial farming

Aftermath of the boom: advanced land degradation

Supporting community analysis of opportunities and constraints

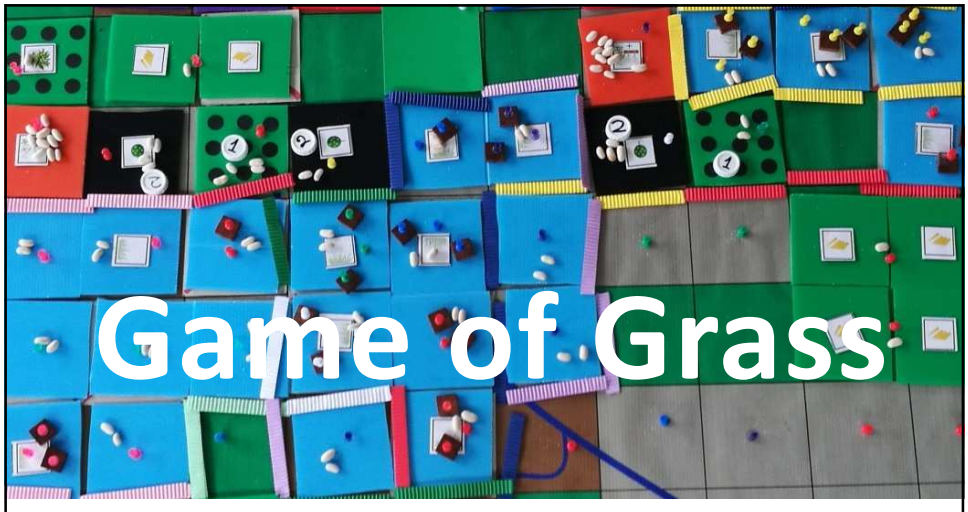
Better timing for intervention



Aftermath of the boom: advanced land degradation, distress diversification:

farmers are looking for alternatives!

Gaming to explore priorities for innovation with local communities



Exploring farmers' priorities for innovation

The EFICAS game

- to explore alternatives pathways to intensive, land degrading, maize systems.
- to prioritize options available to individual and communities, prior to piloting an innovation
- to engage farmers into implementing PLUP, and learning about developing their households' economy

Exploring priorities for innovation with local communities

The EFICAS game

- 8 participants (4 men, 4 women) from poor-medium-rich households.
- Timing: 5-6 hrs, play 5 rounds, to explore about 10 years changes.
- Color cards represent different land uses and activities (traditional + innvative) implemented by players.

Exploring priorities for innovation

The EFICAS game

- Each player select land use based on expected income and available labor force.
- At the end of each round players receives money that cover family needs and surpluses can be reinvested in farming or off-farm activities.
- Risk of land degradation, damages on crops, livestock diseases, weather events played with dices ->

Exploring priorities for innovation

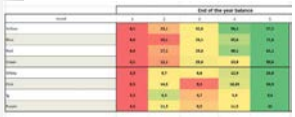
The EFICAS game

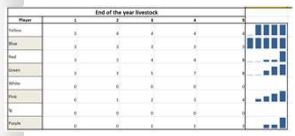
- Land degradation or crop failures in the game trigger discussions – search alternative practices, e.g. introduction of legume crops,
- Test individual or collective innovations, diversification of activities, e.g. improved pastures and livestock, paddy terracing,
- Collective debriefing: analyze trade-offs between short term decisions and long term strategies, etc.

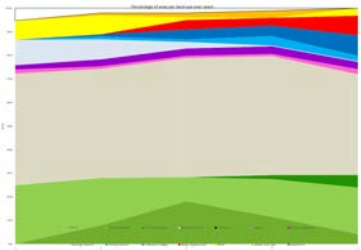
Improving household economics

After the EFICAS game

- Post-game surveys to relate behaviors in game and reality
- Data analysis
  - Collective development pathways
  - Individual decision making
- Reporting (text, graphs, pictures, video)







LAO UPLANDS INITIATIVE
landscape of opportunities

Towards a common vision and a roadmap for sustainable development in the Lao Uplands

laouplands.org
/laouplandsinitiative

Knowledge capitalization

Objectives

- Taking stock of knowledge about development in the Lao Uplands
- Developing a common vision for the future to feed development policies
- Provide guidance to strategic planning of the Ministry of Agriculture and Forestry and other relevant ministries

Institutional set-up and process

- Initiative chaired by Minister of MAF
- Hosted by the Sector Working Group of Agriculture and Rural Development – Communication platform between Govt agencies and Development Partners
- Workshop series – multi-stakeholder arena – use of SLIDO App. on smartphones for participants to anonymously send questions and comments.

Timeline of the knowledge capitalization process

Date	Workshop topic	Organizers
Nov 23, 2017	Soil carbon is what we need!	DALaM, CIRAD, EFICAS
Dec 9, 2017	We are what we eat	MAF, GRET, CIRAD, ACTAE
Feb 9, 2018	Bringing agroecology to market	ALiSEA, NUoL, GRET, CIRAD
Feb 23, 2018	Vulnerabilities and adaptation to changes in the Lao Uplands	DALaM, NAFRI, CIRAD, CDE, CARE, CCL, SAEDA
Feb 27-Mar1, 2018	Green extension practitioner's workshop	DAEC, LURAS, FAO
Mar 12-14, 2018	Lao Uplands Conference: landscape of opportunities	DALaM, NAFRI, CIRAD, CDE, TABI, LURAS
May 2, 2018	Alternative Futures in the Lao Uplands: a macro-level perspective	NAFRI, DALaM, CDE, TABI
June 18, 2018	Sector Working Group of Agriculture and Rural Development	Govt agencies and Development Partners

Learning briefs with EFICAS inputs

Adding values to agriculture: **a vision and roadmap** towards sustainable development in the Lao Uplands

CHANGING UPLANDS
challenges & opportunities

- **1. Alternative futures** in the Lao Uplands
- **2. Vulnerabilities and adaptation** to changes

ENGINEERING TRANSITION
towards agroecology

- **3. Landscape approaches**: co-designing development pathways
- **4. Green extension**: learning processes for sustainable agriculture

ENABLING ENVIRONMENTS
for uplands development

- **5.** Bringing **agroecology to market**
- **6. Youths in agriculture**

cirad

EUROPEAN UNION

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Thank you for your attention!