Appendix 2

Ornetsmüller, C., J.-C. Castella, and P. H. Verburg. 2018. A multiscale gaming approach to understand farmer's decision making in the boom of maize cultivation in Laos. *Ecology and Society*

Full article available at https://www.ecologyandsociety.org

Appendix 2 – Local games

Figure A.2.1. Description MAPRI Board Game developed in Houaykai

Basic game information

Name: MAPRI: Maize allocation and PRIce game

Research objective: to explore spatial maize allocation patterns and reactions to changes of selling prices of maize and rice in a spatially explicit board game

Player objective: allocate your land use relative to roads and river and manage your farm and household according to your wishes

Target audience: local smallholder farmers

Number of players: 12 participants play 6 households (2 participants per household): 3 farm household types are each represented twice (different household composition, wealth status, land uses)

Resources

(1) Board of 10x10 cells, 1 cell represents 1 ha plot, one road (red), two streams (blue)

(2) Household (HH) cards specifying labour capacity and minimum consumption needs

(3) Numbers to identify land use cards of each HH

(4) Land use (LU) cards: upland rice, young fallow, old fallow, maize. Fixed land uses: protected forest (hatched, no usufruct)

(5) Posters: (i) input/output for each land use, (ii) table to record results per HH per round

(6) Game money in MLAK (million Lao kip)

Mechanics

Rules. keep within HH labour capacity with land use choices, protected forest is not for agriculture. If minimum consumption needs not met, must give up farming.

Rounds (n=3). Players first chose what and where to grow upland rice and maize in the next year. Second, all choices are recorded and money collected for activities with inputs. Third, revenues of farming minus family needs are paid to the players. Three rounds were played with different maize price announced before players chose land use: first medium, second high and third low maize prices while rice price remains constant.

Paper strips used in explanation round and board after final round

Figure A.2.2. Description MIALU Board Game developed in Homephan, Phoun-neua and Laeng

Basic game information

Name: MIALU - Maize Investments, Alternatives and related Land Use changes

Research objective: to explore what the profits from maize are invested in through a board game

Player's objective: manage your farm and household according to your wishes

Target audience: local smallholder farmers

Number of players: 12 participants play 6 households (2 participants per household): 3 farm types are each represented twice (different household composition, wealth status, land uses)

Resources

(1) Board of 10x10 squared cells, 1 cell represents a plot of 1 hectare

(2) Household (HH) cards specifying labour capacity and minimum consumption needs.

(3) Numbers to identify land use cards of each HH

(4) LU cards: upland rice, young fallow, old fallow, paddy rice, maize on good soil, maize on poor soil, opening fish ponds (added in game). Fixed land uses: village centre, protected forest, community forest

(5) Posters : (i) input/output for each land use and off-farm income: weaving, shop (added during game), (ii) table to record results per HH per round (iii) market offering livestock, houses, motorbikes, tractor, threshing machine, education, excavation service for paddy

(6) Game money in MLAK

Mechanics

Rules. keep within HH labour capacity. If minimum consumption needs not met, must give up farming. Protected forest is not for agriculture. Community forest and fallow may be used for bamboo harvest. Maize yield is lower if same plots used successive years.

Rounds (n=3). First, players chose what and where to grow in the next year. Second, all choices are recorded and money collected for activities with inputs. Third, revenues of farming minus family needs are paid to the players. Fourth, players spend their money (HH consumption, agricultural investments, etc.) and make new land use choices for next year. In total, two full rounds with those four steps were played, with all rounds at fixed prices.

MIALU board and a player showing his household card

Figure A.2.3. Description MaRISK Card Game developed in Namen

Basic game information

Name: MaRISK: Maize and RISK behaviour (card game)

Research objective: to explore land use related risk behaviour in a crisis

Player objective: manage your farm and household according to your wishes

Target audience: local smallholder farmers

Number of players: 12 participants play 6 households (2 participants per household): 3 farm household types are each represented twice (different household composition, wealth status, land uses)

Resources

(1) Household (HH) cards specifying labour capacity, minimum consumption needs and the number of plots at the start

(2) LU cards: maize

(3) Posters: (i) parameters for maize inputs (labour needed per plot, costs for seeds, weeding, hired land and labour, buying land) and outputs (revenue per plot)

(4) Game money in MLAK

Mechanics

Rules: keep within HH labour capacity regarding number of maize plots. Loans can be taken at bank (played by facilitators). Options to buy (4 MLAK) or hire (1 MLAK) more plots (from either the facilitators or other HHs) and to hire labour (3 MLAK). If a new plot is opened, expenses are added for first land clearance (0.5 MLAK).

Rounds (n=3). The initial conditions allow each HH to survive in the first year (minimum costs of food and HH expenditures covered), but they can only afford the input costs for cultivating 1 out of their 3 plots with maize in the following year. First, players decide on how many plots they want to cultivate and in what way they finance their choices (own, hired plots, hired labour, loans for input). Second, they receive loan and/or pay for inputs or new plots. Third, the revenue is calculated and paid out to the players. In total, three full rounds were played with average yields in the first round, bad yields in the second and good yields in the third round.

Participants during introduction to MARISK in the village Namen

Figure A.2.4. Description of ranking workshop PALUM developed in Namen

Basic information

Name: PALUM - Preferred Alternative Land Uses to solve Maize problems (ranking)

Research objective: to explore preferences among proposed solutions to maize crisis

Player objective: rank different alternatives to current cropping techniques and land use

Target audience: local smallholder farmers

Number of players: 12 participants play 6 households (2 per household): 3 farm household types are each represented twice (different household composition, wealth status, land uses)

Resources

(1) Households are the same as in MaRISK, identification tokens with HH number

(2) LU cards (ranking options):
- maize intensification
    - Pink: cultivation improvement (fertilizer, seeding machines)
    - Red: dry season crop cultivation
- paddy
    - Orange: System of Rice Intensification (SRI)
    - Yellow: Annual paddy rice
- livestock and feed

    - Dark green: Improved pasture for whole village
    - Light green: Improved pasture as a group (3-4 households)
    - Blue: Personal improved pasture
    - Dark red: Techniques on raising small livestock

(3) Tokens for voting (3 per player, not household)

Mechanics

Rules. Household ranking: pick four favoured options per household and place the first ranked on top, least ranked on bottom. Collective ranking: place three tokens to favoured options (among eight) – all participants at the same time.

Workshop structure. First, three facilitators played extension agents who presented in total eight options/alternatives to continue in/after maize crisis. Second, the individual HH ranked the alternatives from most to least preferred. Third, all players collectively voted for their preferred options with individual tokens (regardless of household they belonged to).

Result of collective voting for options/alternatives after maize crisis

Figure A.2.5. Description MALAD Board Game developed in Mayphonexai

Basic game information

Name: MALAD - MAize and LAnd Degradation *(*non-spatial board game)

Research objective: to explore perception and response to maize-induced land degradation

Player objective: manage your farm and household according to your wishes

Target audience: local smallholder farmers

Number of players: 12 participants play 6 households (2 participants per household): 3 farm household types are each represented twice

Resources

(1*) Board*: the 8x8 cell board is only used to provide a frame rather than village representation, each HH plays on their own patch

(2) *Household (HH) cards* specifying labour capacity and minimum consumption needs.

(3) *LU cards:* paddy, maize, red bean, cassava, pasture-livestock, tree plantation, off-farm activity

(4) *Posters*:

   (i) parameters for each land use with input tokens (labour, financial, environmental) and
   output tokens (financial, environmental);
   (ii) market goods and prices;
   (iii) table to record results per HH

(5) Tokens: blue = labour force, white = fictive money, red = environmental value

Mechanics

Rules. Only land uses can be cultivated for which labour capacity and environmental quality sufficient, one HH after another announces decision and gets payment, facilitators make updates

Rounds (n=4). Player pairs are formed and HH cards drawn, initial land use setting explained and cash given to each HH according to what their initial setting produces. First, players chose what to grow in the next year based on their labour force, environmental quality of their plots (red tokens) and necessary financial inputs (white tokens). Second, we calculate their revenue/pay out financial tokens and update the environmental quality for maize plots, cassava, red bean, pasture/livestock and tree plantation (paddy is neutral)

Initial setting on the board and poster with parameters

Figure A.2.6. Description TAKIT Workshop developed in Namgnang

Basic information

Name: TAKIT - (Take it!) Factors for adopting alternatives to maize

Research objective: to explore the prime factors for adoption of an alternative

Player's objective: decide whether to try out a new opportunity or not

Target audience: local smallholder farmers

Number of players: 12 participants play 6 households (2 participants per household): 3 farm household types are each represented twice (different household composition, wealth status, land uses)

Resources

(1) *Household (HH) cards* specifying labour capacity and minimum consumption needs.

(2) *Land use cards:* maize, takit (fictive crop with attributes that are competitive to maize)

(3) *Posters*:

  i) parameters for maize and takit
  ii) collected questions organized in categories

(4) Maize grains for voting

(5) Energy drink and water for exemplary warm-up round

Mechanics

Workshop structure. Facilitators briefly offer two options (one old, one new) while describing only few details. HHs write down questions they have about options. Facilitators collect, categorize and write all questions on poster. HHs vote for most important question to them. Facilitators answer this question. HHs decide whether to take old or new option. Then they gather with those who decided like them for debriefing. Warm-up round with water (representing the known) and yellow fluid in a transparent bottle (i.e. an energy drink, representing the unknown). Actual maize alternative round with maize (representing the known) and takit (the new opportunity).

Rules. First note own questions, listen to answers by facilitators, then decide for own HH

Voting results on most important question (factor) for adoption of an alternative crop