IWRA's XVII
WORLD WATER CONGRESS

제 17차 IWRA 세계물총회

29 November – 3 December 2021
EXCO, Daegu, Republic of Korea

IWRA | DAEGU METROPOLITAN CITY | KOREA WATER RESOURCES ASSOCIATION | K water Korea Water Resources Corporation | Ministry of Environment

Living in a watershed: the role of traditional and local practices

Ms Yingshan Lau
PhD candidate, Geography
National University of Singapore
lau_ying_shan@u.nus.edu

30 November 2021

1. Introduction

Integrated Watershed Management (IWM):

"deals not only with the protection of water resources but also with the capability and suitability of land and vegetative resources to be managed for the production of goods and services in a sustainable manner" (Brooks et al, 2013, p. 7)

Incorporating traditional knowledge (TK) and local knowledge (LK):

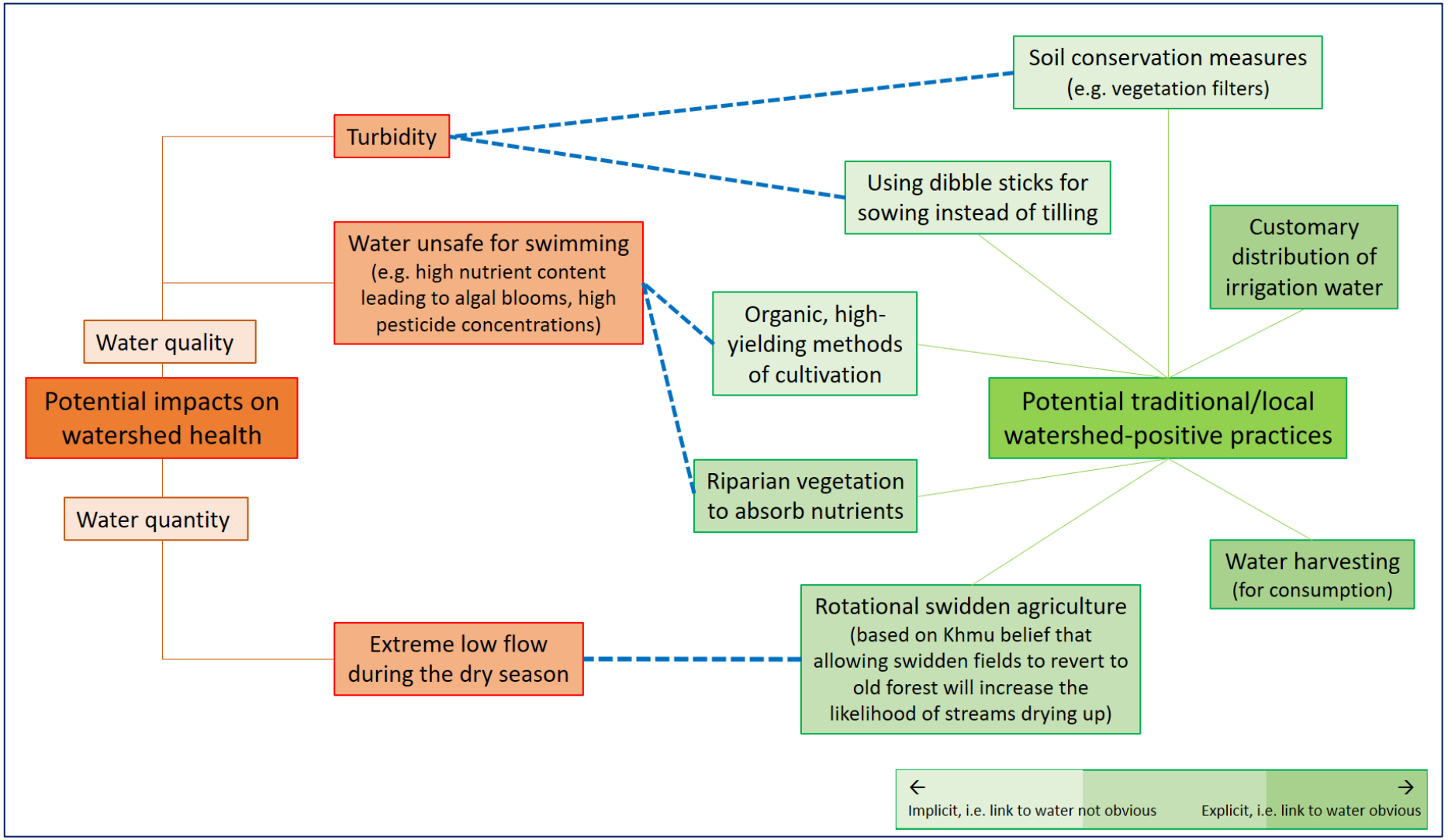
1. Efficacy reason:

- Increases the relevance and adoption of the watershed development programmes (Rushemuka et al, 2014).
- Allows for innovations that are adapted to challenging terrains (Shivakoti, 2021).
- Better informs studies and policies about the watershed (Aswani et al, 2017; Stenekes et al, 2020; Merten et al, 2020).

2. Normative reason

- There is uncertainty in determining watershed boundaries, especially in remote mountainous areas
- The basis for 'enclosing' or 'recruiting' communities into a watershed is also uncertain or debatable: could be at the discretion of powerful actors (Hirsch, 2006; Grundy-Warr, 2017).
- Moral obligation to treat watershed 'residents' with responsibility – to respect their TK/LK, which is integral to cultural identity and self-dignity.

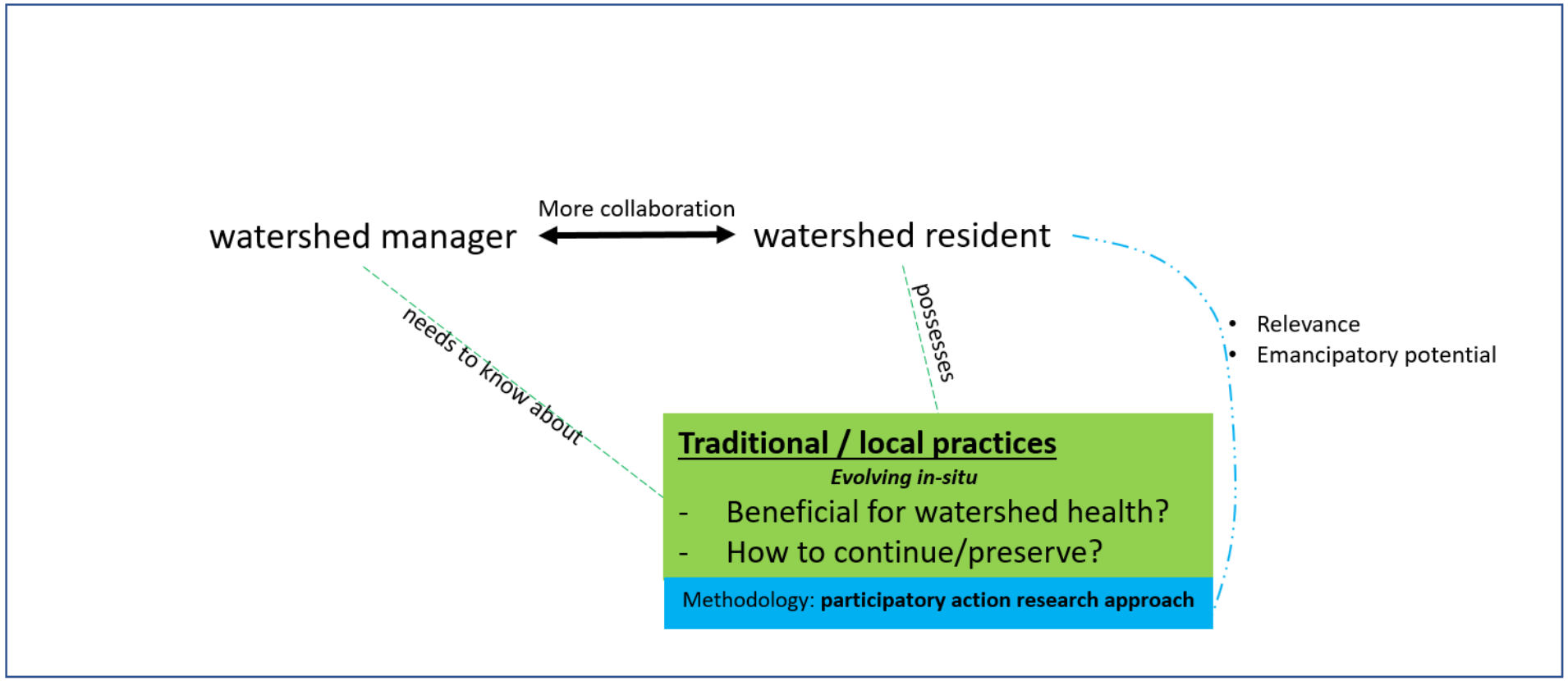
1. Introduction



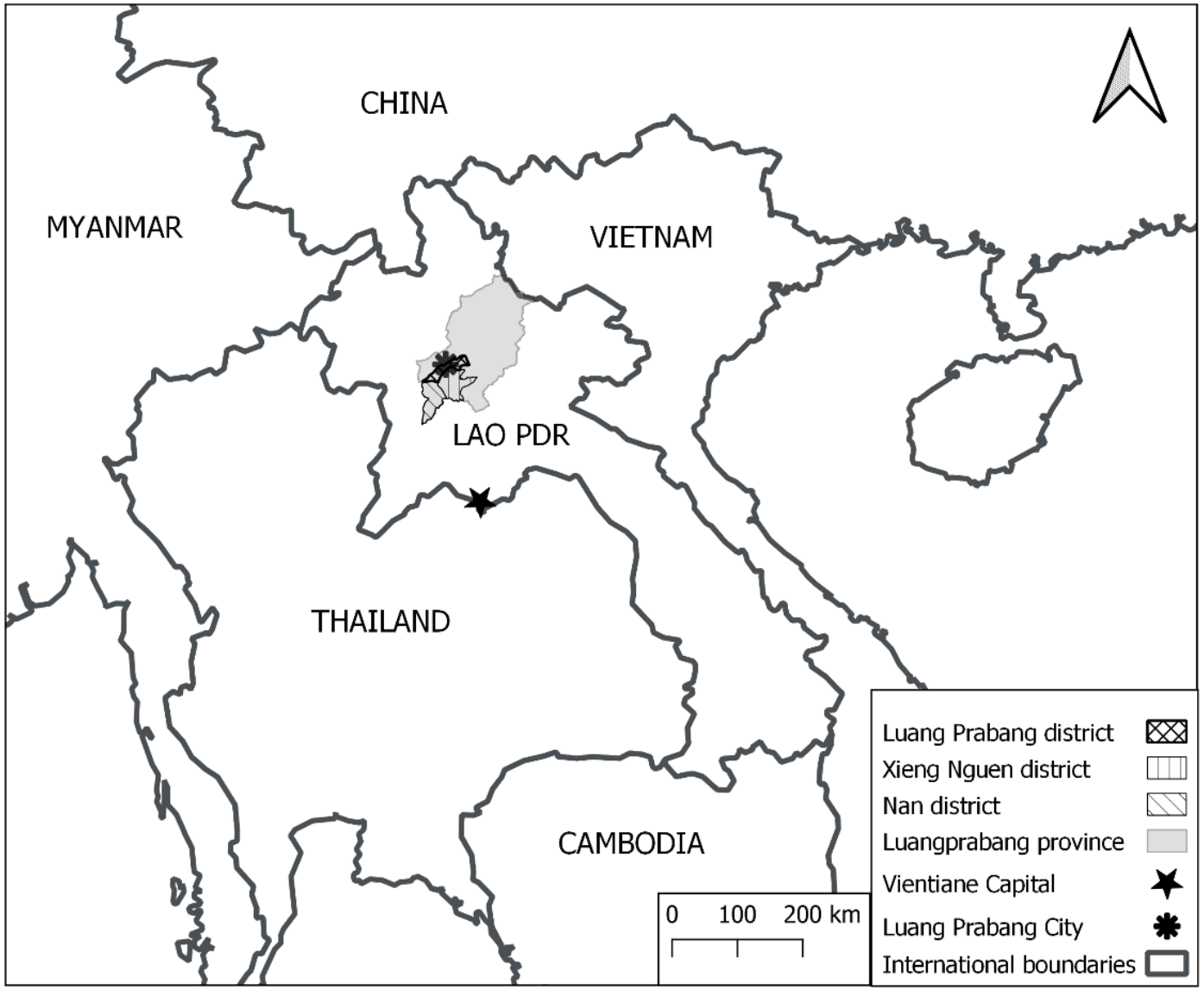
The link between traditional or local practices and watershed health in the context of rural mountainous Southeast Asia. (Source: Author, based on: NAFRI, 2006; Forsyth and Walker, 2008; Ziegler et al, 2011; SPERI, 2018).

1. Introduction

Integrated **watershed management**

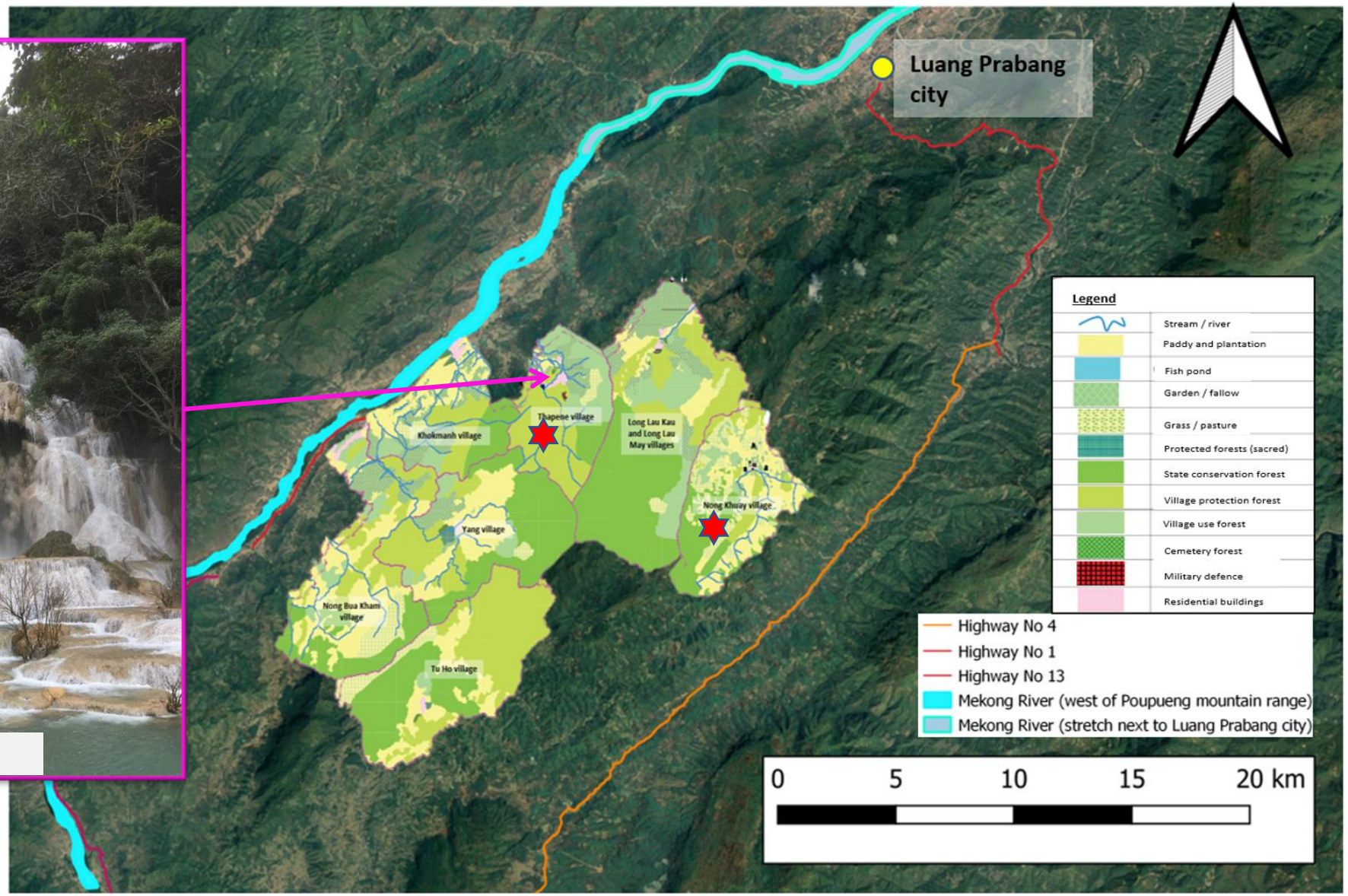


2. Study area


CHINA
MYANMAR
VIETNAM
LAO PDR
THAILAND
CAMBODIA
0 100 200 km
Luang Prabang district
Xieng Nguen district
Nan district
Luangprabang province
Vientiane Capital
Luang Prabang City
International boundaries

2. Study area

Kuang Si Waterfall



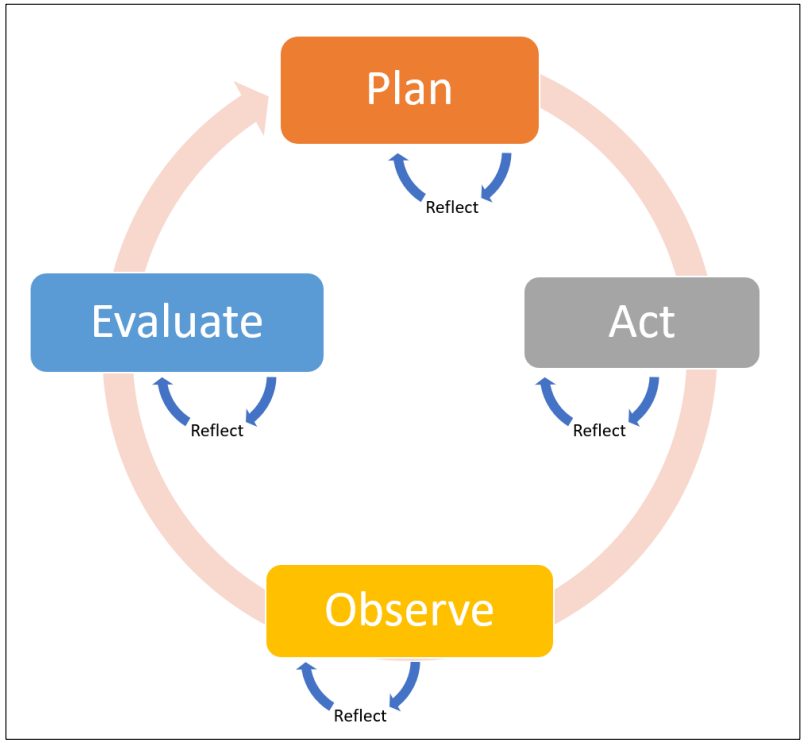
2. Study area

Thapene Village		Nong Khuay Village
~400m AMSL	*Elevation*	~800mASL
~1800 hectares	*Area*	~2750 hectares
112 households; 628 people	*Population*	53 households; 391 people
Khmu and Lao	*Dominant ethnic groups*	Khmu and Hmong
Supporting tourism-related services	*Economy*	Semi-subsistence agriculture

3. Methodology and methods

Participatory Action Research (PAR)

- Researchers and participants work together to examine an issue to change it for the better (Chevalier and Buckles, 2013).
- Cycles of plan-act-observe-evaluate & continuous, iterative reflection at the various stages within each cycle (Kindon et al, 2007; Whitman et al, 2015).
- At the end of each cycle, the participants reflect on what further action is needed
- Through multiple cycles, the emancipatory and empowering potential of PAR is most realised.



One cycle of plan-act-observe-evaluate in the PAR approach. (Adapted from: Berg (2004))

Fieldwork

- May 2019 – May 2020; one PAR cycle

3. Methodology and methods

Participatory co-research project @ Thapene Village

Hypothesis: “Tourism-related activities/service has led to more waste being produced in Thapene Village.”

Scoping discussion

Collecting and weighing rubbish to compare between tourism-related zone and residential zone

Interviews to understand villagers’ alternatives to single-use plastic

3. Methodology and methods

Participatory co-research project @ Nong Khuay Village

Hypothesis: “Having ground-cover and the no-tilling of soil help to: (a) conserve soil moisture, (b) reduce erosion and (c) improve soil fertility.”

Compare:

Test soil up to 1m-deep

More directly related to watershed management

Related to agricultural productivity

Soil properties – soil infiltration rate, soil moisture, soil pH, soil nitrate, soil texture

Rainy season → Dry season

Over time – from early-October, end-November, mid-January and early-March

Rice harvest

Between various land cover/land management practices – vegetable garden, palao, ไร่, นา (dry) and forest

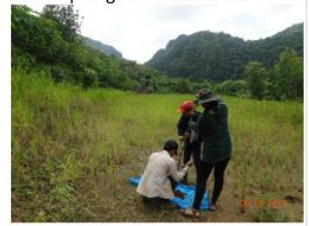
Started soil collection from forest only in end-Nov

Site 1: vegetable garden (ສວນຜັກ) - Machine-ploughed to about 20cm-deep

Site 2: regenerating bush fallow (ປ່າເຄີ່ງ) – about 2 years old

Site 3: swidden rice field (ไร่) – previously fallow for 4-5 years

Site 4: dry paddy rice field (นา) - Machine-ploughed to about 50cm-dee



Site 5: forest (ป่า) – protected forest since around 1980

‘Gentle-on-soil’ swidden cultivation

Soil auguring

Soil infiltration experiment

Soil moisture analysis

Soil texture analysis

4. Findings and recommendations

Participatory co-research project @ Thapene Village

- Thapene Village produces **about 600-1000 kg** of rubbish per day.
  - 15-35% from households (more organic waste);
  - 65% - 85% from tourism-related activities (more single-use plastics
- **Within the Kuang Si Waterfall Par**k, each visitor generates **~0.14kg of rubbish**
  - Almost equivalent to every 2 visitors leaving behind a full 300ml bottle of water for it to be cleared from the Park

Rubbish from the tourism-related services/activities (left) and rubbish from the houses (right)

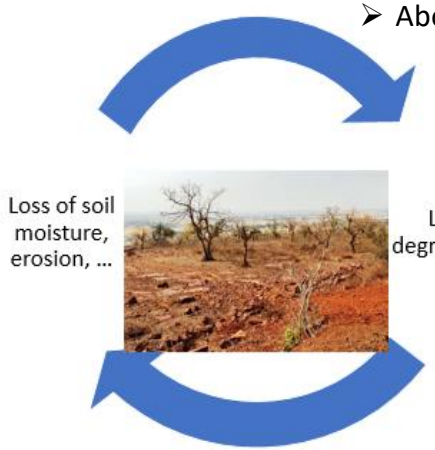
- **Villagers' LK** of re-using plastic bottles, etc. is good
- There is potential to **reinvigorate the TK** of using biodegradable materials for storage and packaging
  - Aligns with eco-tourism
  - Villagers still have the skills

Plastic water bottles being reused for pickling sour bamboo

Bamboo container and cutlery which can be used for take-away food

4. Findings and recommendations

Participatory co-research project @ Nong Khuay Village



- Not simply about 'tilling versus no-tilling' or 'ground-cover versus no-ground-cover'

- About **taking care of soils**
  - Rainfed agriculture is vulnerable to climate change
    - ❑ Conserving soil moisture
    - ❑ Preventing erosion
    - ❑ 'Feeding' the soil
    - ❑ Think about how to recreate forest-soil conditions for farmlands, within a shorter timespan

- Farmers should consider inherent conditions (e.g. **soil pH** (alkaline))

- **Need for localised innovation**
  - For agricultural productivity *and* watershed sustainability
  - Agricultural extension programmes can facilitate

5. Closing the PAR cycle?

Thapene Village

Nong Khuay Village

6. Implications for IWM

- **PAR** obliges researchers to go into the field with an open mind, in which **the research question is not pre-defined** (Lane, 2014).

- Like **'adventure[s] in relevance'** (Klenk and Meehan, 2017) and '**geographical expedition[s]'** (Lane, 2017).

- Highlights which of the numerous factors affecting watershed health, or 'matters of fact', are connected to the "experiential values of social life in which human values are inextricably embedded" and hence are '**matters of concern**' (Lucas and Davison, 2018, p. 132)

- This kind of **community-engaged research** (Bell, 2021) can also **inform the design of watershed development programmes** so that finite resources are more strategically used.

During the mini-exhibition at Thapene Village on 12 March 2020, villagers took part in a game to learn about the biodegradability of various materials.

References

- Aswani, S., Lemahieu, A. and Sauer, W.H.H. (2018) *Global trends of local ecological knowledge and future implications.* PLoS ONE, 13(4): e0195440. https://doi.org/10.1371/journal.pone.0195440
- Bell, M. (2021) *Conceptualising institutional barriers to community-engaged scholarship.* Presentation for plenary on Sustainable Development Issues: Sustainable Development Goals; Extension, Communication and Community Empowerment, 4th International Interdisciplinary Conference on Green Development in Tropical Region (IICGDTR), 7-8 July 2021, University of Andalas, Indonesia.
- Berg (2004) *Qualitative research methods for the social sciences (5th edition).* Pearson, USA.
- Brooks, K.N., Folliott, P.F. and Magner, J.A. (2013) *Hydrology and the management of watersheds*. Wiley-Blackwell, USA.
- Chevalier, J.M. and Buckles, D.J. (2013) *Participatory Action Research: Theory and Methods for Engaged Inquiry.* Routledge, Abingdon, UK.
- Forsyth, T. and Walker, A. (2008) *Forest guardians, forest destroyers*. University of Washington Press, USA.
- Grundy-Warr, C. (2017) 'B/ordering nature and biophysical geopolitics: a response to Hirsch', *Political Geography*, 58, p131-135.
- Hirsch, P. (2006) 'Governing water as a common good in the Mekong River Basin: issues of scale', *Transforming Cultures eJournal*, 1(2), p104-113.
- Kindon, S., Pain, R. and Kesby, M. (Eds.) (2007) *Participatory action research approaches and methods: Connecting people, participation and place*. Routledge, UK.
- Lane, S.N. (2014) *Acting, predicting and intervening in a socio-hydrological world.* Hydrology and Earth System Sciences, 18: 927-952.
- Lane, S.N. (2017) *Slow science, the geographic expedition, and critical physical geography.* The Canadian Geographer, 61(1): 84-101.
- Lucas, C. and Davison, A. (2018) *Not `getting on the bandwagon': When climate-change is a matter of unconcern.* Environment and Planning E: Nature and Space, 2(1) 129-149.
- Merton, J., Stiegler, C., Hennings, N., Purnama, E.S., Roll, A., Agusta, H., Dippold, M.A., Fehrmann, L., Gunawan, D., Holscher, D., Knohl, A., Kuckes, J., Otten, F., Zemp, D.C. and Faust, H. (2020) *Flooding and land use change in Jambi Province, Sumatra: Integrating local knowledge and scientific enquiry*. Ecology and Society, 25(3): 14.
- NAFRI (2006) *Conference booklet for the international conference on sustainable sloping lands and watershed management: Linking research to strengthen upland policies and practices*. National Agriculture and Forestry Research Institute (NAFRI), Lao PDR.
- Rushemuka, N.P., Bizoza, R.A., Mowo, J.G., Bock, L. (2014) Farmers' soil knowledge for effective participatory integrated watershed management in Rwanda: Toward soil-specific fertility management and farmers' judgmental fertiliser use. Agriculture, Ecosystems and Environment, 183: 145-159.
- Shivakoti, G.P. (2021) *Governance challenges on the future of Asian irrigation and water resources.* Presentation for plenary on Governance Challenges on the Future of Asian Irrigation and Water Resources Management, 4th International Interdisciplinary Conference on Green Development in Tropical Region (IICGDTR), 7-8 July 2021, University of Andalas, Indonesia.
- SPERI (2018) *E-map of Long Lau May and Long Lau Kau territory in Laung Prabang, Laos.* Available at: https://www.google.com/maps/d/u/0/viewer?hl=en&mid=1VOVWklosMj97W3k5PCM4DyFW_ynFfqF7&ll=19.73670277663561%2C102.02853905000006&z=12 (accessed: 24 October 2018).
- Stenekes, S., Parlee, B. and Seixas, C. (2020) *Culturally driven monitoring: The importance of traditional ecological knowledge indicators in understanding aquatic ecosystem change in the Northwest Territories' Dehcho Region*. Sustainability, 12: 7923.
- Whitman, G.P., Pain, R. and Milledge, D.G. (2015) *Going with the flow? Using participatory action research in physical geography*. Progress in Physical Geography, 39(5): 622-639.
- Ziegler, A.D., Fox, J.M., Webb, E.L., Padoch, C., Leisz, S.J., Cramb, R.A., Mertz, O., Bruun, T.B. and Tran, T.D. (2011) *Recognising contemporary roles of swidden agriculture in transforming landscapes of Southeast Asia*. Conservation Biology, 25(4): 846-848.

Thank you