FairFrontiers Field Methods Guide

Modules 2 and 3: Ecosystem Services and Well-being Bundles

Research Institute for Humanity and Nature,
Kyoto Japan

2022

Contents

List of Figures

List of Tables

Acknowledgment

This guide is written and compiled by Ahmad Dhiaulhaq and Catherine Hepp in 2022, and with updates by Alimata Sidibe and Grace Wong.

The sections on Focus Group Discussion 1 and Household Survey are adapted from methodologies developed by Grace Wong, Maria Brockhaus, Moira Moeliono and Indah Waty Bong as part of the CIFOR project, ASEAN-Swiss Partnership on Social Forestry and Climate Change (2012-2020).

This work is funded by Research Institute for Humanity and Nature (FairFrontiers, project no. 14200149).

To cite this guide:

FairFrontiers (2024) FairFrontiers Field Methods Guide: Modules 2 & 3, Ecosystem Services and Wellbeing Bundles, Research Institute for Humanity & Nature, Kyoto, Japan. http://www.fairfrontiers-methods-guide

Section 1

Analytical Framework

1.1 Introduction of FairFrontiers Project

Forest-agriculture frontiers are rapidly being converted in many parts of the tropics in recent decades, with smallholder and customary practices transformed to industrial land uses and commodity agriculture systems. This has led to dramatic changes in multifunctional landscapes and livelihoods. Frontiers of smallholder agriculture, fallow and forest mosaics have tended to provide multiple ecosystem services and support diverse social, cultural and livelihood needs. These are also areas where indigenous people and local communities have traditional rights to land and resources. Loss of these complex systems to increasingly homogenous landscapes is a global environmental problem – and a social-ecological crisis.

This is not a simple trajectory of change. Land use intensification in frontiers – often pursued under the guise of 'sustainable development' – have not led to expected win-win social and ecological outcomes (Rasmussen et al., 2018), and its benefits are often reaped by more powerful and capital-rich actors (and the State) who are remote from these changing landscapes (Kelly and Peluso 2015; Pemunta, 2014; Schoenberger et al., 2017). We argue that these outcomes are mainly a result of contextual institutional factors and underlying politics and power structures across different levels of governance and society (Brockhaus et al. 2021; Cons and Eilenberg 2019; Windey and Van Hecken 2021). They reflect the many ways in how local people are able (or not) to navigate access to forests and land, and exercise agency to pursue their own development aspirations (Hall et al., 2015). These different outcomes may also reflect policy preferences, when policy decisions prioritize particular ecosystem services (and associated human well-being outcomes) over others, creating trade-offs and conflicts.

FairFrontiers [1] is a research project that applies inter- and transdisciplinary approaches to examine the histories, policies and politics of forest and land governance. The field research

[1] Short for "Fair for whom? Politics, Power and Precarity in Transformations of Tropical Forest-agriculture Frontiers" research project, see `http://www.fairfrontiers.sakura.ne.jp/home/`

aims to examine well-being and ecosystem services interlinkages in transformations of forest-agriculture frontiers in the tropics, and the dynamics underlying these outcomes. The analytical framework is built on theories of power and everyday politics, equity and adaptive governance, integrated with the ecosystem services and well-being bundles approach. The project applies a comparative research approach to identify the enabling and hindering conditions for more equitable and sustainable development pathways in different contexts.

Research Objectives and Methodological Framework

The overall objective of this research is to generate grounded contextual understandings of the political, social and ecological dynamics of transformations in forest-agriculture frontiers in Central Africa (Cameroon, Democratic Republic of the Congo) and Southeast Asia (Malaysia (Sabah, Sarawak), Laos and Indonesia). We ask the following questions:

whose interests drive transformations of forest-agriculture frontiers, who benefits and who is made precarious? What are possible policy options that can deliver ecologically sustainable and socially equitable outcomes?

To address these research questions, the project carries out five interlinked strands of research (see Figure1.1). The first research module delves into the historical (and colonial) constructs of policies for forest and land and their contemporary pathways, and carry out critical discursive analyses of how policies frame and problematize development in forest-agriculture frontiers. The second and third modules examine how ecosystem services and well-being bundles are changing in frontiers, using a set of mixed methods and participatory approaches. The fourth module applies transdisciplinary approaches in the co-production of knowledge on and inclusion of diverse and local narratives of sustainable futures. The fifth module carries out integrative and comparative analyses across modules, scales and countries through structured qualitative and quantitative analyses. All research is carried out collaboratively with country partners and involve academic researchers, civil society activists, conservation practitioners, villagers and students.

The case study regions in Central Africa and Southeast Asia are unique contexts along different ecological, social and institutional gradients such as forest cover, ecosystem diversity, dimensions of inequality and human well-being, institutional/political control, democracy and civil society engagement in policy processes. Together, the project aims to advance theory and apply novel methods for assessing equity, ecosystem services and well-being; and the comparative approach will help to identify both enabling and hindering conditions for more equitable and sustainable development pathways for the millions of people who still live and thrive in these diverse landscapes.

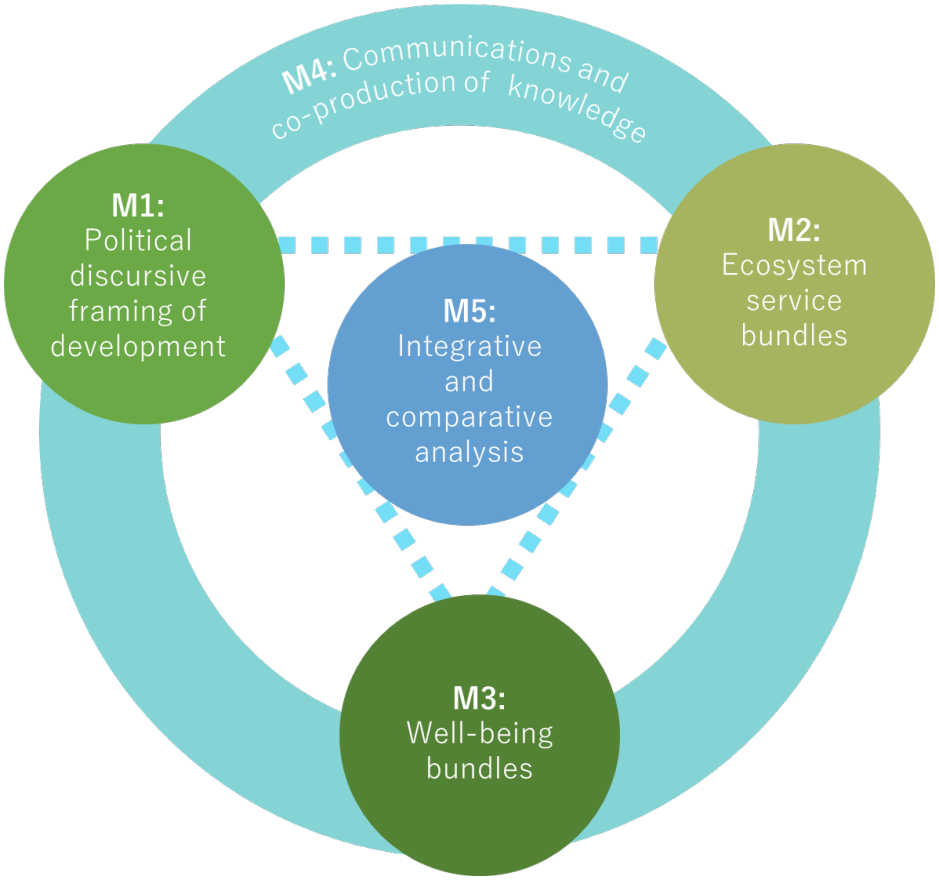


Figure 1.1: FairFrontiers project structure

1.2 Overview of Modules 2 and 3: Ecosystem Services and Well-being Bundles

This field methods guide focuses on Modules 2 and 3 - Ecosystem services and Well-being bundles. This section provides a theoretical overview, and presents the objectives of both modules. The field methods adopt a more expansive and integrated human well-being and ecosystem services approach to understanding socio-ecological changes in frontiers (Masterson et al., 2019; Berbés-Blázquez et al. 2016), and builds on the IPBES[2] conceptual frame on diverse values and valuation of nature (IPBES 2022).

Detailed guidelines of the methods are presented in Part II of this guide (from page 15 onwards). The methods for collecting data to carry out this research to enable analyses of interlinkages between well-being and ecosystem service bundles are: a) Community profile, b) Key informant interviews, c) Focus group discussions, d) Household survey, e) NTFP collection interviews and observation, f) Transect walk, g) Soil mapping, h) Quantitative measurements of specific ecosystems services (soil and/or water sampling and/or quality measurement in selected

[2]IPBES is the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, see `https://www.ipbes.net`

sites), i) In-depth interviews on well-being. We provide step-by-step guidelines of each of these methods, information on the materials required to carry out the data collection and highlight important notes where caution and care will be needed.

Module 2: Ecosystem Service Bundles in Changing Forest-Agriculture Frontiers

The Millennium Ecosystem Assessment (MA) (2005) defines ecosystem services as the **benefits** people obtain from ecosystems and includes: **provisioning services** (e.g. food, water, fuelwood), **regulating services** (e.g. water regulation/purification, pest regulation, climate regulation (carbon storage)), **supporting service**s (e.g. nutrient cycling, soil formation, photosynthesis), and **cultural services** (e.g. recreational and spiritual benefits).

A recent re-articulation of ecosystem services motivated by IPBES is the notion of **nature's contribution to people (NC**P) which differs from earlier definitions two in important ways: 1) NCP recognizes the central role that culture plays in defining links between people and nature; and 2) NCP emphasizes the role of indigenous and local knowledge (Diaz et al. 2019, Hill et al. 2021). As such, NCP emphasises the effects of nature as perceived and valued by individuals and social groups across different cultural, economic and social-ecological contexts, allowing for both generalising (i.e. scientific) as well as more context-specific (e.g. indigenous and local knowledge) perspectives.

Ecosystem services are not independent; the enhancement of one will lead to **trade-offs** (a negative relationship) or **synergie**s (a positive relationship); i.e. an increase in crop yields may lead to a decline in soil nutrients, if not managed correctly. **Trade-off**s or synergies occur when ecosystem services respond to the same drivers of change in the landscape or when the interaction between ecosystem services themselves causes a change in one ecosystem service which will alter the provisioning of another (Raudsepp-Hearne et al. 2010). Raudsepp-Hearne et al (2010) define an **ecosystem service bundle** as a set of ecosystem services that appear together across space or time; a concept that can help guide the management of complex mosaic landscapes and understand the effects as these landscapes transform.

Further, trade-offs and synergies between ecosystem service bundles are influenced by diverse values of nature and social preferences of the different stakeholders in different social-ecological contexts (Zafra-Calvo et al. 2020; Ellis et al. 2019; Martin-Lopez et al. 2012). It is also argued that transformation to just and sustainable futures will require leveraging on these multiple values of nature (Pascual et al. 2023). As such, it is not surprising that many of the studies on ecosystem service bundles highlight its close interlinkages with well-being (Meacham et al. 2022, Hamann et al. 2016). Thus, using the ecosystem service bundles and participatory approaches, Module 2 aims to further our understanding of **how changes in ecosystem services and the underlying ecological processes both affect and are impacted**

by values and changed land use practices in transforming forest-agriculture frontiers.

We elicit diverse local perspectives to understand:

- What ecosystem service bundles are provided by the different land uses within a given landscape? How do local people value these ecosystem services as the bundles change in response to land use change?
- How does land use change affect availability of, access to, and reliance on their surrounding ecosystem in terms of wild products, a provisioning ecosystem service?
- How do available ecosystem services influence land use decisions and practices?
- How do changes in available ecosystem services and their bundles influence livelihoods and well-being?
- Further, we collect soil and water samples to test how have landscape transformations affected regulatory ecosystem services such as soil and water quality?

1.2.1 Module 3: Well-being Bundles in Forest-Agriculture Frontiers

Well-being is a broad and **multidimensional** concept, encompassing a number of factors that contribute towards a person's or group's condition and sense of well-being, ranging from subjective dimensions of individuals' happiness to fulfilment of material needs. Amartya Sen's capability approach links development, quality of life and freedom, and people's agency to choose a life they have reason to value depends on their capabilities functionings, social arrangements and environment (Sen 1999). As such, well-being is also related to the freedom of agency. To have a holistic understanding and to disentangle the complexity inherent in the relationship between ecosystem services and human well-being, scholars (Hamann et al. 2016) suggested that it is best to look at well-being as a **'bundle'** instead of focusing on an analysis of individual indicators. The Millennium Ecosystem Assessment (2005) groups well-being indicators into five dimensions:

- **Basic material for a good life** (e.g. food, income, shelter)
- **Physical and mental health**
- **Good social relations**
- **Security**
- **Freedom of choice and action**

As ecosystems play a critical role in the achievement and maintenance of human well-being, new configurations of well-being bundles are expected to emerge during transformation of forest and agriculture frontiers. This feedback is mediated by some key factors such as **institutions and power relations** (norms, rules, regulations – both formal and informal), diversity of **values** of nature and people's ability to mobilise **agency and resources** (Berbés-Blázquez et al. 2016; Masterson 2019; Pascual et al. 2023). However, studies found that improvement in one aspect of well-being does not always lead to positive outcomes in other aspects (Rasmussen et al. 2018). For example, increases in income and assets might come with higher inequity, precarity, more conflict, reduced access to land and environmental effects, particularly if they are driven by commodity plantations or capitalist change (Hall, Hirsch and Li 2011; Rigg et al. 2016; Tsing 2005).

This raises concerns regarding **fairness** of development policies and interventions. To understand this issue, we use the equity (environmental justice) lens that includes an analysis of four dimensions of distributive, recognition, procedural, and contextual equity (e.g. Pascual et al. 2014; McDermott et al. 2012). **Distributive equity** refers to the distribution of costs and benefits from transformations in the forest-agriculture frontier, and questions who gains and who loses. **Procedural equity** refers to access and participation in decision making processes, examining who are included and who are excluded. **Recognition equity** refers to accounting for stakeholders' knowledge, capabilities, norms and values, asking whose worldviews are recognized in the development process. **Contextual equity** refers to deep rooted social conditions, such as gender and power relations, social structure, discrimination and colonial legacies, which help to explain not only how and why certain inequalities are perpetuated and reproduced over time but also how notions of equity are formed.

Furthermore, in facing forest and agricultural change, different groups in society might respond to this change differently. So far, there is limited knowledge on what motivates local people in their various responses, adaptations and resistances when negotiating their interests and aspirations (Cole et al. 2019; DeVos and Delabre 2018; Hall et al. 2015) as well as the outcomes of these responses. Analysis of people's values, choices and decisions can give a clue on how local actors prioritize their desired well-being bundle, and hence, understand their agency to pursue particular development pathways.

We will engage with diverse local groups to understand their differentiated perspectives, contexts, constraints, creativity and agency of local people in their livelihood decisions. We draw on the theorizing of everyday politics (Kerkvliet 2009, Scott 1986) to understand how local values and resistance are manifested, either overtly or subtly expressed, in ways of adjusting and contesting norms and rules regarding authority over, production of, access to, and allocation of resources.

Overall, Module 3 aims to advance our understanding of **the effects of transformations in the forest-agriculture frontier on different dimensions of well-being**. Specifically, we ask:

- How do bundles of well-being evolve when the forest-agriculture frontier is transformed? What bundles of well-being do different groups experience and prioritize?
- How do local people exercise agency in engaging, negotiating and/or resisting development interventions and changes in forest and land governance? Who has capability and agency, and who are marginalized?
- How do contextual histories, institutional factors and the underlying power structures across different scales affect ecosystem services and well-being?
- Do these changes create differentiated social and gendered vulnerability and precarity? How do local groups express or perceive of equity?

Table 1.1: Summary of research questions and methods of Module 2 and 3

Modules	Research questions	Methods
M2: Ecosystem service bundles	• What ecosystem service bundles are provided by the different land uses within a given landscape? How do local people value these ecosystem services, particularly as the bundles change in response to land use change? • How does land use change affect the availability of, access to, and reliance on the surrounding ecosystem in terms of wild products, a provisioning ecosystem service? • How do available ecosystem services influence land use decisions and practices? • How do changes in available ecosystem service bundles influence local livelihoods and well-being? • How have landscape transformations affected regulatory ecosystem services such as soil and water quality?	• Differentiated FGDs; • Household surveys; • Collection interviews of ecosystem service use; • Transect walk; • Soil mapping; • Measurements of soil and water quality
M3: Well-being bundles	• How do bundles of well-being evolve when the forest-agriculture frontier is transformed? What bundles of well-being do different groups experience and prioritize? • How do local people exercise agency in engaging, negotiating and/or resisting development interventions and changes in forest and land governance? Who has capability and agency, and who are marginalized? • How do contextual histories, institutional factors and the underlying power structures across different scales affect ecosystem services and well-being? • Do these changes create differentiated social and gendered vulnerability and precarity? How do local groups express or perceive of equity?	• Differentiated FGDs' • Household survey; • In-depth interviews on well-being; • Participant observations

References

Berbés-Blázquez M, González JA and Pascual U. (2016) Towards an ecosystem services approach that addresses social power relations. Current Opinion in Environmental Sustainability 19: 134–143. http://dx.doi.org/10.1016/j.cosust.2016.02.003

Brockhaus, M., Gregorio, M. di, Djoudi, H., Moeliono, M., Pham, T. T., and Wong, G. Y. (2021). The forest frontier in the Global South: Climate change policies and the promise of development and equity. Ambio, 50, 2238–2255. https://doi.org/10.1007/s13280

Cole R, Maria Brockhaus, Grace Y. Wong, Maarit H. Kallio, Moria Moeliono. (2019) Local Agency in Development, Market, and Forest Conservation Interventions in Lao PDR's Northern Uplands. Southeast Asian Studies 8(2); 173-202. https://doi.org/10.20495/seas.8.2_173

Cons, J., and Eilenberg, M. (2019). Frontier assemblages: The emergent politics of resource frontiers in Asia. Wiley.

Díaz, S., Pascual, U., Stenseke, M., Martín-López, B., Watson, R. T., Molnár, Z., ... and Shirayama, Y. (2018). Assessing nature's contributions to people. Science, 359(6373), 270-272. https://doi.org/10.1126/science.aap8826

Ellis, E. C., Pascual, U., and Mertz, O. (2019). Ecosystem services and nature's contribution to people: negotiating diverse values and trade-offs in land systems. Current Opinion in Environmental Sustainability, 38, 86-94. https://doi.org/10.1016/j.cosust.2019.05.001

Hall R, Marc Edelman, Saturnino M. Borras. Jr., Ian Scoones, Ben White and Wendy Wolford. (2015) Resistance, acquiescence or incorporation? An introduction to land grabbing and political reactions from below. Journal of Peasant Studies. http://dx.doi.org/10.1080/03066150.2015.1036746

Hall, D., Hirsch, P., and Li, T. M. (2011). Introduction to powers of exclusion: land dilemmas in Southeast Asia. National University of Singapore Press and University of Hawaii Press.

Hamann M., Reinette Biggs, Belinda Reyers. (2016) An Exploration of Human Well-Being Bundles as Identifiers of Ecosystem Service Use Patterns. PloS ONE 11(10):e0163476 . https://doi.org/10.1371/journal.pone.0163476

Hill, R., Díaz, S., Pascual, U., Stenseke, M., Molnár, Z., and Van Velden, J. (2021). Nature's contributions to people: Weaving plural perspectives. One Earth, 4(7), 910-915. https://doi.org/10.1016/j.oneear.2021.06.009

IPBES (2022) Summary for Policymakers of the Methodological Assessment Report on the Diverse Values and Valuation of Nature of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), IPBES Secretariat, https://doi.org/10.5281/zenodo.6522392

Kelly, A. B., and Peluso, N. L. (2015). Frontiers of commodification: State lands and their formalization. Society and Natural Resources, 28 (5): 473–495. https://doi.org/10.1080/08941920.2015.1014602

Kerkvliet, B.J.T. (2009) Everyday politics in peasant societies (and ours) , The Journal of Peasant Studies, 36:1, 227-243. http://dx.doi.org/10.1080/03066150902820487

Martín-López, B., Iniesta-Arandia, I., García-Llorente, M., Palomo, I., Casado-Arzuaga, I., Amo, D. G. D., ... and Montes, C. (2012). Uncovering ecosystem service bundles through social preferences. PLoS one, 7(6), e38970. https://doi.org/10.1371/journal.pone.0038970

Masterson V.A., Susanne Vetter, Tomas Chaigneau, Tim Daw, Odirilwe Selomane, Maike Hamann, Grace Y. Wong, V Mellegard, M Cocks, M Tengo (2019). Revisiting the relationships between human well-being and ecosystems in dynamic social-ecological systems: Implications for stewardship and development. Sustainability Science. https://doi.org/10.1017/sus.2019.5

McDermott, M., Sango Mahanty, Kate Schreckenberg. Examining equity: A multidimensional framework for assessing equity in payments for ecosystem services. 2012. Environmental Science and Policy. https://doi.org/10.1016/j.envsci.2012.10.006

Meacham M., Albert V. Norström, Garry D. Peterson, Erik Andersson, Elena M. Bennett, Reinette (Oonsie) Biggs, Emilie Crouzat, Anna F. Cord, Elin Enfors, María R. Felipe-Lucia, Joern Fischer, Maike Hamann, Jan Hanspach, Christina Hicks, Sander Jacobs, Sandra Lavorel,

Bruno Locatelli, Berta Martín-López, Tobias Plieninger and Cibele Queiroz (2022) Advancing research on ecosystem service bundles for comparative assessments and synthesis, Ecosystems and People, 18:1, 99-111, https://doi.org/10.1080/26395916.2022.2032356

Pascual, U., Balvanera, P., and Christie, M. (2023). Editorial overview: Leveraging the multiple values of nature for transformative change to just and sustainable futures—Insights from the IPBES values assessment. Current Opinion in Environmental Sustainability, 64, 101359.https://doi.org/10.1016/j.cosust.2023.101359

Pascual U., Phelps Jacob, Eneko Garmendia, Kate Brown, Esteve Corbera, Adrian Martin, Eric Gomez-Baggethun, Roldan Muradian. (2014) Social equity matters in payments for ecosystem services. Bioscience. 2014. https://doi.org/10.1093/biosci/biu146

Pemunta, N. V. (2014). New forms of land enclosures: multinationals and state production of territory in Cameroon. Studia Sociologia, LXI(2), 35–58.http://urn.kb.se/resolve?urn=urn:nbn:se:lnu:diva-38720

Raudsepp-Hearne C., G. D. Peterson, E. M. Bennett. (2010). Ecosystem service bundles for analyzing tradeoffs in diverse landscapes. Biological Sciences. https://doi.org/10.1073/pnas.0907284107

Rasmussen L.V., Brendan Coolsaet, Adrian Martin, Ole Mertz, Unai Pascual, Esteve Corbera, Neil Dawson, Janet A. Fisher, Phil Franks and Casey M. Ryan. (2018). Social-ecological outcomes of agricultural intensification. Nature sustainability. www.nature.com/articles/s41893-018-0070-8

Reid, W.V., Stephen. R. Carpenter, Harold A. Money, Karik Chopra. (2005) Millennium Ecosystem Assessment. Ecosystems and human well-being: synthesis. World Resource Institute.https://www.millenniumassessment.org/documents/document.353.aspx.pdf

Rigg J., Albert Salamanca, Eric C. Thompson. (2016) The puzzle of East and Southeast Asia's persistent smallholder. Journal of Rural Studies. http://dx.doi.org/10.1016/j.jrurstud.2015.11.003

Schoenberger, L., Hall, D., and Vandergeest, P. (2017). What happened when the land grab came to Southeast Asia? Journal of Peasant Studies, 44(4), 697–725. https://doi.org/10.1080/03066150.2017.1331433

Scott J. (1986) Everyday forms of peasant resistance, The Journal of Peasant Studies, 13:2,

5-35, http://dx.doi.org/10.1080/03066158608438289

Sen, A. (1999). Development as Freedom. Oxford University Press. http://www.c3l.uni-oldenburg.de/cde/OMDE625/Sen/Sen-intro.pdf

Tsing, A. L. (2005). Frontiers of Capitalism. In Friction: An Ethnography of Global Connection (pp. 27–50). Princeton University Press. https://doi.org/10.1017/S0010417505220297

de Vos R, Izabela Delabre. Spaces for participation and resistance: gendered experiences of oil palm plantation development. Geoforum. https://doi.org/10.1016/j.geoforum.2018.08.011

Windey, C., and Van Hecken, G. (2021). Contested mappings in a dynamic space: emerging socio-spatial relationships in the context of REDD+. A case from the Democratic Republic of Congo. Landscape Research, 46(2), 152-166. https://doi.org/10.1080/01426397.2019.1691983

Zafra-Calvo, N., Balvanera, P., Pascual, U., Merçon, J., Martín-López, B., van Noordwijk, M., and Díaz, S. (2020). Plural valuation of nature for equity and sustainability: Insights from the Global South. Global Environmental Change, 63, 102115. https://doi.org/10.1016/j.gloenvcha.2020.102115

Section 2

Data Collection Methods

2.1 Commonly used methods in Module 2 and 3

In the following sections we provide a short description of the main methods in module 2 and 3. These include:

a) Creating a community profile;

b) Key informant interviews;

c) Focus group discussions (FGD);

d) Household survey;

e) Collection interviews and observations;

f) Transect walk;

g) Soil Mapping;

h) Quantitative measurements of specific ecosystems services (in select sites); and

j) In-depth interviews on well-being.

Below is a figure of the ideal chronological order of the methods, depicting how the data collected from preceding methods informs the latter.

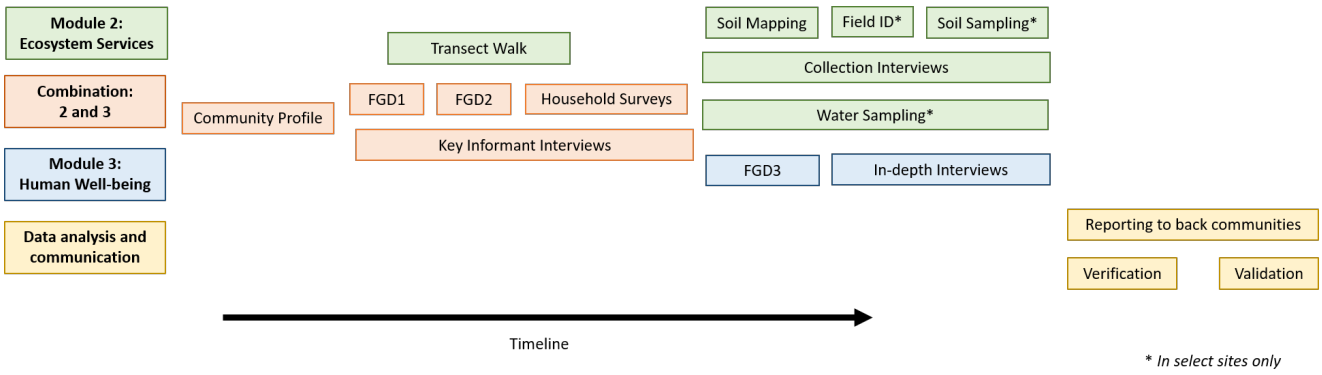


Figure 2.1: Schematic representation of the methods pertaining to each module and a suggested sequence

Informed Consent

With any method that involves human participants, informed consent must first be obtained before proceeding to indicate that the individual has decided to take part in the project of their own free will. Essentially, it is required that:

i) the participant be treated with respect; ii) their answers are kept anonymous; and iii) they are free to refuse to answer any question or withdraw from participation at any time without any repercussions whatsoever.

For each activity, all participants must be introduced to the project, its purpose and overall goal, and their rights (listed above). Their consent must be actively obtained, meaning they verbally agree to it. Below is the informed consent form for the household survey which may be used as a guide.

Introduction and Consent

Hello. My name is _____.[interviewer name]. I am working with the _____ [interviewer's research institution] and the Research Institute of Humanity and Nature based in Kyoto, Japan [if appl.].

We are conducting a survey about the benefits received from the land and how they link to ecosystem services and human well-being. The aim of this research is to understand how land use change and its drivers have affected people's quality of life and way of living in _____ [add village name].

We would like to ask you some questions about your household: your livelihood activities, assets, land and its benefits, and your well-being. It should not take longer than two hours of your time. This study takes place in five regions of the world. Approximately _____ households from this village will take part.

Your answers will be confidential and your name will not be included in the analysis or results nor will your answers be used for anything else other than research; what you say will not affect any benefits that you may receive now or in the future. There are no correct or incorrect answers; please feel free to share your opinions.

Do you consent to be part of this study? Yes/ No

You may withdraw from the study at any time and you always have the right not to answer any of the questions we may ask.

For interviewer:

Put your (i.e. interviewer's) initial here and continue with the survey if respondent understands his/her rights and agrees to be interviewed _____

2.1.1 Community Profile

Background

A community profile provides an overview of the present-day community. The aspects that it covers are: administrative organisation (levels of divisions), population (both number of households and number of individuals), infrastructure development, market access, and the social services available. The community profile will serve as a valuable source of information that can help guide participant selection (ensuring all ethnicities are covered) and can indicate some of the challenges the community may face.

Implementation

The survey respondent should be the community leader(s) as they will have access to such information. Remember to obtain informed consent. As this will likely be the first activity, ensure that there is an understanding of the FairFrontiers project, the main objectives of the research, and what is expected of each counterpart.

The questions are straightforward but effort should be made to try to turn the survey into a conversation, touching upon the different community aspects (when possible). Or some aspects may be completed through observation. The community profile questionnaire can be found in **Appendix A**.

2.1.2 Key Informant Interviews

Background

Key informant interviews are qualitative, in-depth interviews of community members who have knowledge in a particular topic of interest (to the project). Often, this is one of the first steps in carrying out field research as it is an opportunity to explore what issues are currently trending in the community and what the general practices are. Key informants include community leaders, teachers, governmental officers (e.g. agricultural extension officers), NGOs, relevant companies (e.g. seed companies), medical professionals, residents (e.g. familiar with wild products) - essentially individuals who have first-hand knowledge about the community and livelihoods.

Implementation

When planning a key informant interview, some general questions or topics should be defined; however, these should not be applied rigidly but instead the interview should follow a

natural flow. It is important to not have a strict end-point in mind as this could potentially lead to missing significant information. In selecting key informants, include individuals with a wide-range of perspectives and from different social or stakeholder groups. The exact key informants selected will depend on the issues or interesting trends identified in each community; but the common key informants will likely be residents who have a particular skill set, community leaders (not only official leaders but also leaders of social groups), governmental officers and any companies dealing within or influencing the community.

Suggested topics for key informants are listed below (should be adapted to the community/site context). Remember to obtain informed consent from the key informant before beginning.

- Resident with a skill set:
  - Description of their skill set;
  - If required, where do the materials come from;
  - What are their challenges;
  - What opportunities are available to them;
  - What changed in their profession or in their village in general in the last 5- 15 years; and
  - Are future generations interested or curious?
- Community leaders
  - Prevalent challenges and issues;
  - What opportunities exist;
  - What changed in the village in the last 5- 15 years? And in the last 30 years;
  - Future aspirations for the community and/or individuals;
  - What are the barriers to reach the 'ideal'; and
  - What needs to change?
- Government officers
  - Prevalent challenges and issues;
  - What opportunities exist;
  - What is needed to overcome the challenges;
  - What changed in the village in the last 5- 15 years? And in the last 30 years; and
  - Are there any further plans and/or aspirations?

- Companies
  - The scope and scale of their operation;
  - When they started operating in the area;
  - What kind of (operational) permits do they have, and which government agency issued it;
  - The relationship with the community/individuals;
  - What are the conditions or agreements, if any; and
  - Prevalent challenges and/or opportunities for
    * The community;
    * The company?

2.1.3 Focus Group Discussions (FGDs)

Background

Focus group discussions (FGDs) are facilitated group discussions with the purpose of gathering information about a specific or focused topic in a group environment, allowing for discussion and interaction as well as clarification by the participants. For this project, we will organize three FGDs, hereinafter called FGD1, FGD2 and FGD3. FGD1 focuses on understanding the historical and local contexts of the study sites. It aims to capture the community's history, meaning significant events such as infrastructure development, land use change, policy introduction; and to identify the drivers and stakeholders involved. FGD2 will aim to understand both the present-day land uses and how they have changed (through the use of mapping activities); and the socio-economic changes that have occurred within the community. FGD3 focuses on understanding local conception on well-being (i.e. what is required for a good life) and how frontier transformations affect (improve or detriment) local well-being. The guide for facilitating FGD3 is available in section 13 which focuses on module 3 (Well-being).

Although seemingly simple, conducting a good FGD requires careful planning. As well, to ensure comparability among the different sites, the FGDs in each site need to be conducted in a similar manner. This guide is intended to help the researchers and partners in the field conduct FGDs in an effective and productive manner. In the following sections, the required planning and preparation for all the FGDs will be outlined (i.e.. required personnel and materials, reflection and documentation, tips for the facilitators, a glossary and relevant forms) with objectives and steps for implementation specific to each FGD following (FGD1, FGD2 and FGD3).

General planing and Preparation

Planning and preparation are crucial and will determine how well an FGD can be conducted. It covers matters such as the background information needed, personnel needed to conduct the

FGD (the team and division of roles), participants, venue and timing.

Required Background Information

Having sufficient background information will greatly aid in understanding context and directing the discussions. Some of the necessary general information needs to be gathered in advance (prior to FGD) either based on secondary data or key informant interviews. If not earlier, the team might arrive one day prior for background information and necessary logistic steps. The information includes:

- Location and general description (political, administrative, geographical, historical, cultural especially related to different ethnic groups)
- Main source of livelihood and income
- Land uses, tenure and conflict
- Governance systems

Project Team and personnel

The absolute minimum required is 3 persons:

- 1 Lead facilitator
- 1 co-facilitator
- 1 note taker

Local partners can be valuable resources in helping organize the FGDs; thus, it is important to identify and establish strong communication with local partners. They can help find a suitable venue and organize participants for the FGD.

The lead facilitator's roles are to:

- Introduce the overall objective of the project and FGD
- Explain the focus of discussion and any activities
- Manage participation and group dynamics
- Facilitate discussion and probe to either verify or gather additional information
- Lead reflection session after FGD

The co-facilitator's roles are to:

- Assist the lead facilitator
- Manage any of the used visual aids (meta plans, flip charts, stickers, etc.)
- Prompt the lead facilitator, when necessary, i.e. if something is forgotten

The note taker's role is to document the process, noting any comments and supplementary information. Although each FGD will be recorded, notes are still expected and must be completed as soon as the FGD concludes.

If possible, adding an 'observer' to the FGD can add another dimension as their role would be to observe the process based on the attached check lists and add their observations to the notes.

A translator is needed if none of the team members are familiar with the language used for the FGD. If this is the case, the team must include additional time for translation during the FGD. The translator needs to be someone who is familiar with the FGD objectives and process. During the FGD, the translator is expected to translate as much of the discussion directly as possible, sentence by sentence, and without simply summarizing. This allows for the facilitator to understand the dynamics during the discussion.

Materials

Standard materials for an FGD include:

- Flipchart papers
- Meta plan (different colors: yellow, green, blue, white, pink)
- Markers (different colors: green, blue, red, black; multiples of each color)
- Tape/blue tack
- Post It of different color and sizes
- Stickers with different colors (at least enough for each participant to have 5)
- Voice recorders
- Scissors and cutter
- camera
- Notebooks and pens

Participants

At the local level, the unit of analysis of this research is the smallest administrative division in the government hierarchy; for example, village or ban in Laos. But as the nomenclature of administrative divisions in each country is slightly different, we will adjust it accordingly.

In each selected study site, each FGD will be conducted twice: once with only women (mixed ages) and another with only men (mixed ages). The community will be consulted as to who should participate in which group. There will be around 6-10 participants for each FGD. Remember to ask for informed consent from all the participants. Record the participants present: their sex, age, ethnicity and occupation; there is no need to record their names. Also record the dates of the focus group discussions (**Appendix B**).

Table 2.1: Participants for FGDs/Mapping exercises

Participant	Sex (M/F)	Age (yrs)	Ethnicity	Occupation	Consent (Y/N)
1					
2					

Reflection

After each FGD, the team leader will invite all team members to sit together for a reflection session. This includes:

- Check whether team members have the same understanding of what has been discussed during FGD, whether all of the objectives have been achieved and all required data have been collected. What has been missing?
- Reflect on whether the facilitation of the discussion process has been effective. Are all questions easily understood by participants? What went well and what can be improved?
- Discuss if any issue or unexpected topics occurred.
- Write down key points from the reflection and include them in the report.

Documentation

In each FGD, documentation is crucial. This is mainly because information obtained through the FGD is **'research data'** that will be further analysed and therefore needs to be managed carefully. It is important to record everything (in the form of voice recording and photograph) as well as to make notes of important issues and or topics. This also includes taking pictures of the flip charts used during FGDs.

One of the team members will play a role as a note taker during FGD. Additional notes can be supplemented during the reflection session after the FGD.

The lead facilitator will be responsible for collecting all of the notes (including from the reflection session). She/he is responsible for checking the completeness and quality of all documentation.

Tip for facilitator

These are some suggestions that we think are important in order to facilitate the FGD effectively. They are (but not limited to):

A facilitator needs to:

1. Understand the objectives and topic of the FGD
2. Be diplomatic and careful
3. Be neutral (avoid bias)
4. Manage time
5. Be patient. Avoid pressuring or interrupting participants. Give participants enough time to think and finish their sentences.
6. Be a good listener.
7. Avoid being judgmental (usually there is no right or wrong answers)
8. Use language that is easily understood. Avoid jargon. Check if the participants understand the key terminologies. Verify assumptions and conclusions made.
9. Avoid being too dominant. Give more space and time for the participants.
10. Use probing when necessary.
11. Stay curious and open-minded. Do not presume that you know what the participants will say or do, even after facilitating some FGD sessions. Be open to surprises and new insights.
12. Take some notes to help organize your thoughts, remind yourself of topics you want to get back to, etc.

Some FGDs may involve intense and heated debates, out of topic discussion, participants get bored or the facilitator gets stuck. There are no specific tips in dealing with this, but the facilitator might:

1. When a participant becomes too dominant, leave it to the group to deal with it (if possible). Some participants might try to 'handle' the situation by suggesting the person to give the opportunity to others to talk.

2. Give a sign to the co-facilitator to step in while you try to figure things out.

3. Consider having a short break for coffee, snack or ice breaker activity.

Remember this guide is not a prescription set in stone. This guide is made to help you to conduct the FGD and ensure the discussion process is flowing well. What is most important is that you get the necessary information (see the FGD objectives), so be flexible, probe, adjust and re-adjust the guide as needed.

FGD 1: Historical Changes, Drivers and Stakeholders

Objectives and Scope

The overall objective of FGD 1 is to understand the local and historical setting of the community with the purpose of building a foundation and giving context to better comprehend the subsequent data. An overarching goal is to capture historical developments from the community's perception and identify the influential stakeholders driving change.

Focus is placed on (significant) historical events related to, for example (but not limited to) development of major infrastructure or plantation, establishment of national parks, migration, introduction to new crops, significant decrease of shifting cultivation practice, etc.

There will essentially be two main activities during the FGD1:

⇒ Building a Historical Timeline

Elements: natural disasters, mass immigration/emigration events, introductions of new crop or agricultural innovations, plantation or infrastructure development, etc...

⇒ Mapping the Stakeholders

Elements: identify relevant actors or stakeholders as well as their interest and influence towards land-use change. Whose interest drives transformations? Who benefits and who is made precarious?

Together with participants, the drawing of the timeline can be used to facilitate the natural flow of discussion. The products will serve as 'living documents' whereby additional information can be added as it becomes available or by community members themselves, evolving with the project.

In general, the flow of FGD1 follows as is depicted in Figure 2.2 below: to start, the facilitator will invite all participants to draw a timeline showing some significant historical changes

and events that have affected the community; followed by discussion on actors, their interests and influence during forest and agriculture transformation.

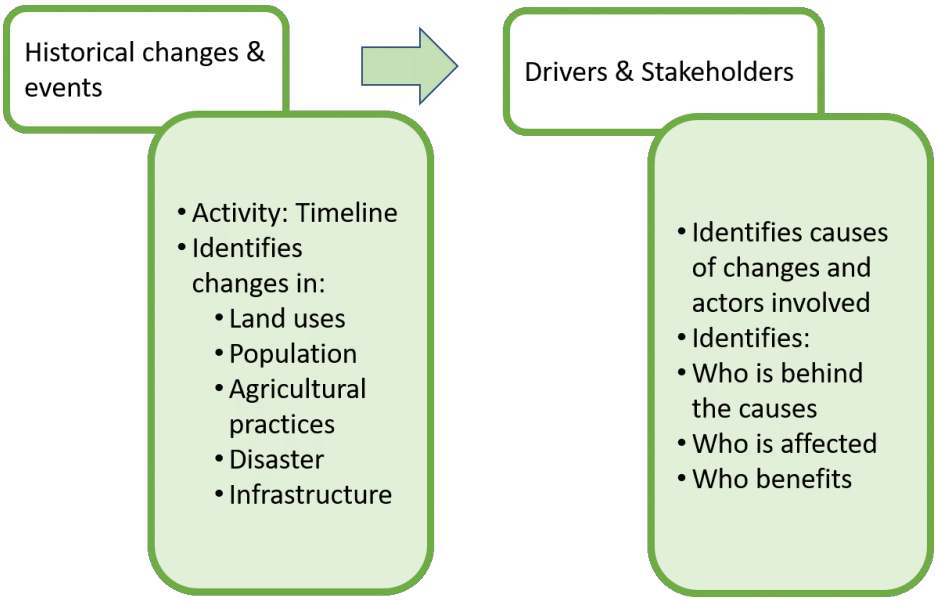


Figure 2.2: The flow and outputs of FGD 1 discussing the i) historical changes and events and ii) the drivers and stakeholders

Step for facilitating

Introduction

1. The lead facilitator begins with welcoming and thanking the participants for coming.

2. Explain briefly the FairFrontiers project its overall aim and objective. Explain about informed consent and how participation in this discussion is voluntary, that the recordings will be solely used for clarity and note taking, and that the information will only be used for the mentioned research purpose. We will also be transparent in our findings by reporting back to the community. Ensure the participants understand and agree with everything said. If there are no questions, ask if we can then proceed.

3. Explain carefully and clearly the focus of this discussion, its objectives and activities (process), and how long it may take (about 2 hours). Encourage participants to ask questions if the process is unclear or if they need more explanation at any time during the discussion.

   Timeline: Identifying changes in land use, practices, population, etc.

4. Prepare a flip chart with a drawn historical axis with the 'present' marked. Ask what major changes or events have occurred: introduction of new crops, natural disasters, plantation and infrastructure development, population. Start with the present time and work backwards. The participants should decide the time benchmarks placed on the axis (could

be a particular year or important events such as independence, policy introductions or new district/village boundaries).

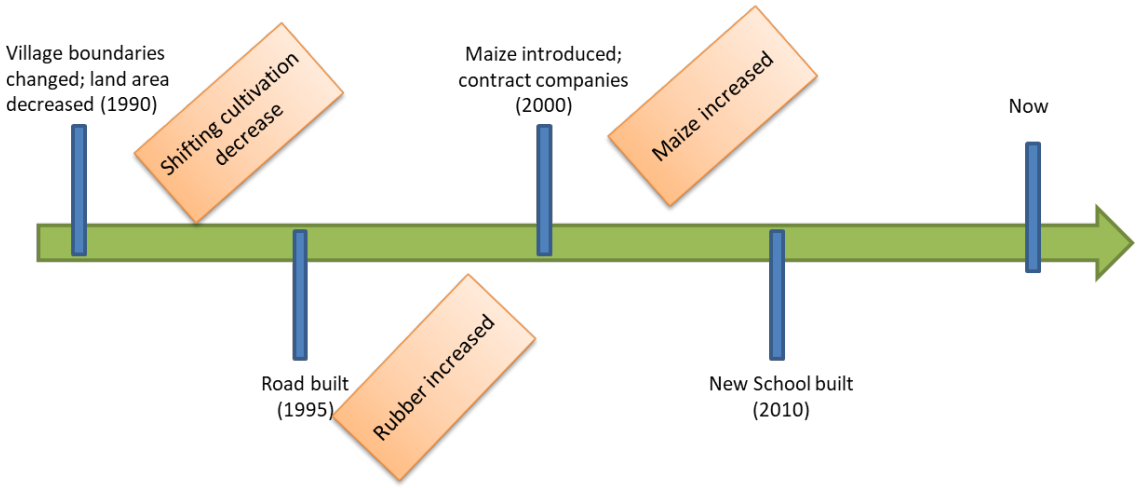


Figure 2.3: Historical timeline to identify changes in land use, practices, population etc..

The facilitator can also draw out the trends associated with the changes of i.e. land use alongside the axis. For example, whether oil palm cultivation has increased, decreased or remained constant between specific time benchmarks. An example is below:

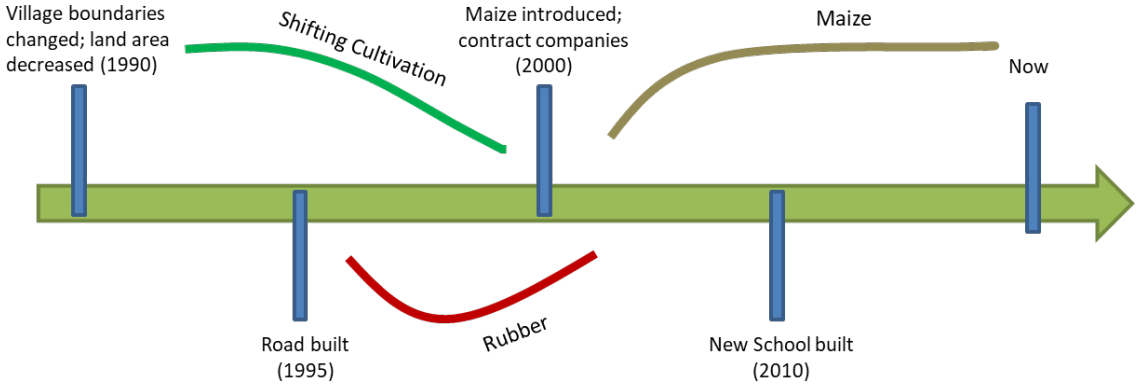


Figure 2.4: Examples of timelines showing important events and trends in crop production

Probe: *how has the livelihood structure changed across time? The livelihood structure might have been different in the past. For example, rubber may have replaced shifting cultivation as an important source for livelihoods. It is useful to refer to the rankings of the land uses to probe for more clarification or triangulation.*

Identifying drivers of land uses/livelihoods' changes

5. Explain to participants that now we will discuss the reasons for the changes in livelihoods that have been identified. If many changes have been identified, focus on one particular change first (i.e. the change that seems to resonate with many of the participants, e.g.

decreasing shifting cultivation). During this process explore why changes occurred and what are the impacts.

Depending on the dynamics of the discussion so far (i.e. if some participants are not as actively engaged as others) you may want to give participants meta plans so that they can each write or draw a picture of what they perceive are the causes for the change (one meta plan per cause). Keep in mind that this is possible only if participants are willing to write/draw on their own; if not, continue with more of an open discussion and write their answers on the meta plans. Add the meta plans to the timeline flip chart. During this process participants might come out with some more causes, note down each of these additional causes on a meta-plan and add to the flip-chart.

6. When discussing the changes above, facilitators can also ask about the key actors involved in these changes.

   Closing: Summary, verification, and thank you

7. The last part of the FGD is closing the discussion. The facilitator summarizes the discussion, which serves as a last verification of the information that has been collected. Thank the participants for their active engagement in the discussion process. As a final step, the facilitator may invite the participants to ask questions,i.e. about the FairFrontiers project in general or relating to the FGD.

FGD 2: Past & Current Land Uses

Objective and scope

The overall objective of FGD 2 is in line with that of FGD 1: it is to give a better understanding of the local and historical setting of the community, which in turn will not only provide a foundation but will help adapt subsequent methods to ensure that they match the community context. An overarching goal of the focus group is to identify the current land uses, understand how land uses have changed and capture the socio-economic changes in the community. Focus will be placed on the general land use practices of the community, available natural resources and social services, developed infrastructure (roads, irrigation channels...) and changes in the past and present.

The two central activities of FGD 2 are:

⇒ Activity 1: Mapping (two maps - past and present)

Elements: General land use areas, village/district boundaries, points of reference, natural resources (rivers, forests), infrastructure, clinics/schools, segregated areas (if. appl.).

⇒ Activity 2: Discussing Past & Present
Elements: Exploring the major land-use and socio-economic changes that have occurred.

As mentioned, the products will serve as 'living documents' whereby additional information can be added as it becomes available (by the team or community members themselves; although any changes should be made known to everyone involved), evolving with the project. The maps will be directly used for the soil mapping and transect walk.

In general, the flow of FGD 2 follows as depicted in Figure 2.5 below: to start, the first mapping activity will discuss the current land uses, their locations; organically leading to the second mapping activity which will explore how these land uses have changed; and finally, focusing on the socio-economic changes related to the land uses, the collection of wild products, customary rules, etc.

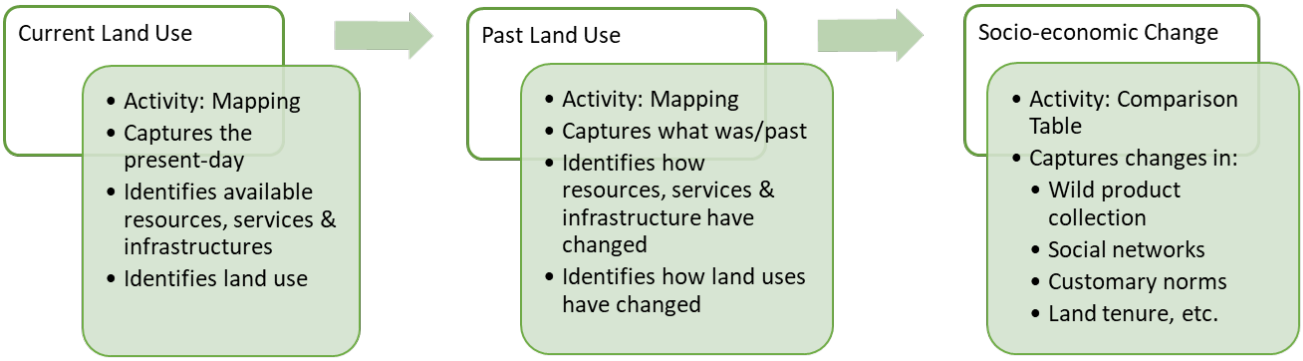


Figure 2.5: The flow of discussion, activities and the expected outcomes of FGD 2.

It is expected that this focus group discussion will take approximately 2 hours to complete; as the discussions can be animated and lengthy (depending on the participants' engagement), the facilitator should be aware of the energy-level of the group if continuing past the 2 hours.

Preparation

1. The materials required are stated above (Refer to Material on page 24); specific to this focus group discussion, ensure you have: 3 large chart papers, masking tape and markers of different colours (multiples of each).

2. Find an open neutral space. Tape two of the large chart papers on the floor (if indoors) to hold in place and distribute the markers around.

Step for facilitating

*Reminder: Do not control the discussion or activities; take a step back and listen to the participants and their leads. Try to keep a natural flow as much as possible.

Introduction

1. The lead facilitator begins with welcoming and thanking the participants for coming.
2. Explain briefly the FairFrontiers project - its overall aim and objective. Explain about informed consent and how participation in this discussion is voluntary, that the recordings will be solely used for clarity and note taking, and that the information will only be used for the mentioned research purpose. We will also be transparent in our findings by reporting back to the community. Ensure the participants understand and agree with everything said. If there are no questions, ask if we can then proceed.
3. Explain carefully and clearly the focus of this discussion, its objectives and activities (process), and how long it may take (about 2 hours). Encourage participants to ask questions if the process is unclear or if they need more explanation at any time during the discussion.

   Mapping: present land uses/livelihoods, infrastructure, natural resources, etc.
4. Invite the participants to gather around one of the large chart papers. Explain to them that this activity is to map their community, through their eyes. Remind them that geographical accuracy is not important or the focus. The facilitator can start the mapping activity by placing one or two obvious markers on the map, i.e. the group's current location, adjacent house or school/clinic.

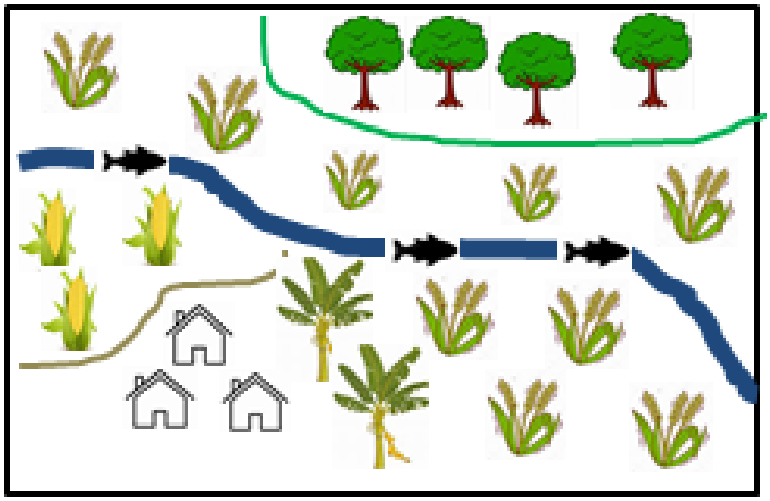


Figure 2.6: Example of a community map

Invite the participants to continue drawing a map of their community. The facilitator may encourage the process by asking the extent of the house(s), how the river flows, the road network or surrounding mountains. This will help set the scale of the map; it is meant to be a simple rough sketch but do ensure that the map is somewhat to scale (in terms of area). See figure to the left.

5. As participants draw, the facilitator can ask probing questions such as what an area of land is used for or what is cultivated in the uplands. The facilitator (or note-taker) should summarize the discussions as they occur.

Examples of land use:

- Agricultural land: upland field, vegetable garden, irrigated paddy field, maize, etc.
- reserve forest and/or agroforestry system: rubber, fallows, etc.
- Forest: state forest, state protected areas etc. – also variations of official community forest schemes.
- Plantations: oil palm or other largescale monoculture (rubber, eucalypt, maize, sugarcane, etc.)
- Other uses: mining, roads, settlement, school, clinic, etc.

Probe: are there gender differences in management of the different systems? Facilitator notes down if gender differences were mentioned; this can be revisited during the seasonal calendar activity.

6. Once the participants are satisfied with their community/land use map (probe: Is there anything else to add or that is missing?), direct their attention to the second blank chart paper. Explain to them that now it would be interesting to know how land use and their community has changed from . . . 10 years ago (or pick a more significant time period that was brought up during the timeline exercise). Looking at the map that was just drawn, again pick out two marks and draw them on the blank chart paper.
7. Ask the participants to now draw how the community and land uses were 10 years ago. The facilitator may probe by pointing out a land use in the 'present' map and asking what was there 10 years ago. Or, was there a road/school/clinic 10 years ago? And so on.
8. Once the participants have completed the map (or during the activity - gauge whether or not it would be disrupting), the facilitator may ask more in-depth questions, such as:

- What are the reasons behind the observed land use changes?
- How have people's lives been affected?
- What are the negatives/positives of any relevant infrastructure development?
- What would they like to see change in the future?
- What is the community missing?

Past and present comparison

9. Before moving on to the past and present comparison activity, ask participants if they have any questions or would like to add anything. If the participants are ready, explain to them that the next and final activity is discussing the socio-economic changes in the community in regards to for example, customs, cultural identity, property rights, NTFP reliance, etc.

10. Place the prepared table in the center (or on a board). See the table below for an idea.

Table 2.2: Socio-economic changes relevant to the land-use change

Element	**Past**	**Age Present**	**Consequences** (to well-being, quality of life…)
NTFP Reliance *Use the flashcards, tape them here & refer to how each changed			
Reliance on: 1. Subsistence crops 2. Cash crops			
Culture, Spirituality, Identity (especially, but not limited to, the forest)			
Customary Rules/Norms*	*Informal rules/customs followed by a community; eg. holding the door open, axe-rights to land vs formal land titles		
Land/Property Rights			
Community Conflicts& Social Relations			
Attitudes & Values (especially related to the forest)			
Migration Patterns (in & out migration dynamics)			

**These days involve data for a part of the day*

Notes:

⇒ On the NTFP Reliance: please cover all the NTFPs – wild meats, wild fish & aquatics, wild plants, fibre, timber, medicinal plants

11. Start with discussing the difference between the "past" and "present" (column 2 & 3 in the above table). Focus on the transition from before to after, for example the introduction

of the national park and/or agro-industry in terms of the elements in table above.

12. Once finished with the "past" and "present" columns, start discussing the overall effects or consequences on community and/or individual wellbeing/quality of life (or any other consequence). If there are two or multiple drivers of change, e.g. both national park and agro-industry are present or mentioned, clarify which is responsible for what change & consequence.

Closing: Summary, verification, and thank you

13. Once finished with the "past" and "present" columns, start discussing the overall effects or consequences on community and/or individual wellbeing/quality of life (or any other consequence). If there are two or multiple drivers of change, e.g. both national park and agro-industry are present or mentioned, clarify which is responsible for what change & consequence.

14. As a team, remember to debrief!

2.1.4 Household Survey

Background

The purpose of this survey is to collect information on household demographics, assets and livelihood activities; land uses and the associated supply of ecosystem services; and well-being bundles. The survey is divided according to the following topics:

- Household demographics
  - household composition and size, gender, age, marital status, education and work status, migration status
- Livelihood activities and assets:
  - income breakdown; material goods, land, livestock
- Ecosystem Services:
  - supply/importance per land use
- Well-being assessment
  - food security
  - health (physical, mental, environment)
  - social relations

- freedom and agency
- justice (recognition, procedural and distributional justice)
- life sarisfaction and happiness

The survey participants will be largely randomly selected from a household list. The sample size depends on the village size: all households should be surveyed if there are 15 households or less; at least 50% of households should be surveyed if there are 16 - 50 households; and at least 30% of households should be surveyed if there are over 50 households. This is a guideline and may have to be adjusted according to field time, etc. However, please ensure marginalized households are also included; identify these households through observation, village transect walks or through conversation with village members. The household head should be the targeted respondent; as gender will play a role in the responses, please ensure to include female-headed households if applicable. Refer to Appendix D for printing the survey questionnaire.

INTERVIEWER PLEASE NOTE:

1. ENGAGE: This questionnaire is intended as a guideline to hold a conversation and discussion. It requires engagement, discussion, and probing how to get the information.
2. RESPECT: Be interested in what the respondents are saying and maintain focus throughout the interview. To facilitate this please work in pairs so that the interviewer can focus on the respondents while the note taker takes notes.
3. BE PREPARED: This requires that you understand the questionnaire and the links between the questions by heart. Also, read site specific information make yourself fully familiar with the overall context of the site (ethnic composition, geography, existing projects etc.)

2.2 Module 2: Ecosystem Services

2.2.1 Transect Walk: Land Use Effects on Ecosystem Services

Background

A transect walk can be viewed as a mobile interview, replacing the usual 'constricted' setting of an interview to one which emphasizes the power of observation. The guide, in this case, is the interviewee, answering questions as you move through the landscape along a predetermined transect; the community/land use map can help identify a transect which would cut across the majority of the practiced land uses. The main objective of this transect walk, and to which the questions should be focused on, is to understand the link between land use and ecosystem services, and how the local community perceives this.

Aim to do multiple transect walks. Be mindful of any social groups or divisions that are present, e.g. include guides from different ethnic groups, mix gender and age.

Implementation

Remember to obtain informed consent from the guide(s).

Ideally, the transect walk will be done before the household survey to identify the local terminology used for the ecosystem services included therein (refer to Household Survey, Section 7). Allocate approximately 3 hours for the transect walk, and as stated above, ensure the planned transect includes the major land uses practiced by the community. The guide should be someone who is well aware of the environment and the land uses; a maximum of two guides should be set to avoid people talking over one another. Besides the interviewer, there should be a translator (if required) and one additional team participant to help take notes and ask follow-up questions. Having a Global Positioning System (GPS) device can be a useful tool as interesting points can be marked and used to clarify i.e. views from google earth.

As you move through the landscape, be observant of the different land uses, point out any interesting aspects (e.g. 'What is growing on that steep slope?'), ask about plant/animal species - this will all create an open discussion with a natural flow.

Some guiding questions/topics are:

- What ecosystem services are supplied by or important to each land use?
- How have the supply and importance of ecosystem services changed?
- What are the drivers of these changes?
- What have been, are or will be the threats to the practiced land uses/ecosystem services?

- How have these changes impacted the livelihoods of the community? And well-being?

Again, these are guiding questions; while the interviewer(s) should allow for a more natural flow of conversation, keep in mind what the main objective is. Furthermore, be aware and familiar with the land uses that were brought up during the community/land use mapping activity and any associated challenges/opportunities that have already been mentioned. This is a time to gain a deeper understanding of such links.

The purpose of this transect is to also understand the perception of and local terminology used for ecosystem services. Do not force the term 'ecosystem services', instead, try to find a relatable term or concept. For example, when walking past a fallow, ask if the vegetation is used for anything - a gateway for a conversation on general non-timber forest products (NTFPs) or wild products.

The ecosystem services that will be mentioned in the household survey, which should be familiarised beforehand, are in the table below; the table is in Appendix C to print for use during the transect walk and to record local terminologies.

Table 2.3: The list of included ecosystem services and their definitions

Ecosystem Service	Definition/Elaboration	Local Terminology/Definition
Subsistence crop	"Food crop not for sale, home consumption"	
Cash crop	"Majority for sale; food or not"	
Grazing	"For livestock"	
Wild plants	"Plant not grown by people but collected for food, for self or sale"	
Wild meat	"Not livestock but caught for food-for self or sale"	
Wild fish & Aquatics	"Fish & aquatic species (not farmed) caught for food or sale"	
Fiber	"Wood, dung... for cooking or heat"	
Fuel	"Wood, jute, hemp...for cooking or heat"	
Timber	"For construction-for self or sale"	
Natural Medicines	"Medicine grown or wild-for self or sale"	
Water regulation	"Filtering; provides clean water"	
Biodiversity maintenance	"Number of different animals & plants above-and below ground"	
Ecotourism	" Tourists visit to see the land use/landscape"	
Recreation	" Use of land for yourself; hiking, swimming, walking..."	

These ecosystem services should be touched upon, with the local terminology noted and used during the household survey ecosystem services ranking question.

2.2.2 Collection Interviews & Observations

Background

The purpose of the collection interviews is to gather data on household collection of wild products (i.e., for consumption, sale, fuel, building material, etc.) in order to gauge households' reliance on their surrounding ecosystem. Furthermore, an understanding as to who is most vulnerable or resilient as forest-agriculture frontiers transform can be gained. From this, it can be stipulated as to what is required (i.e. policy reform) to avoid adverse effects to both the environment and livelihoods.

Additionally, the collection interviews will provide insight into the biodiversity found in the surrounding ecosystem. The number of different species collected and used by the households will serve as a proxy measurement of biodiversity; the higher the number of different species, the greater biodiversity of the surrounding ecosystem. Furthermore, interviewees will be asked for their observations of any signs of animals that they may have come across during their collection (e.g. prints, scat, sounds).

Implementation

The collection interviews will be held in groups of 2 to 3 people to help facilitate discussion. While there are no strict criteria for participation, selected interviewees should be knowledgeable and engaged in NTFP collection; therefore, account for any gender role differences by either mixing genders or doing separate interviews for each gender, e.g. if hunting is pursued by males or plant collection by females. Aim to conduct 2-3 collection interviews; 2-3 collection interviews for each gender, if separated. Collection interviews should be done during each field visit to the village (it does not have to be with the same individuals), ideally every 3-4 months.

Interviewees will be asked about the wild products they collected during the previous week; specifically: which wild products (plants, meat, etc.), their origin (where the product was collected), the intended use (food, medicine, building material, fuel, craft, etc) and if the product is for household consumption, trade or sold (at the market, middlemen, other households). The table below can be used to record the required data. Be sure to be specific in where the product was collected, for instance, if: i) in a fallow, how old is the fallow; ii) in a cropped field, what crops; or iii) in a forest, what type of forest (mature, secondary, community- or state-managed).

Remember to obtain informed consent for participation in the collection interviews.

Observations

To add a 'biodiversity' dimension to the group interviews, as interviewees discuss what

Table 2.4: The data to be recorded during the collection interviews

Products	**Origin**	**Use**	**For...**
Plant, meat, fungi, insect, fish...	Fallow (list age), Field (list crop), forest (list type)	Food-sell or subs., medicine, building material, fuel, crafts...	Household use trade or Market

products they collected, ask them if they observed any signs of animals during their collection, e.g., prints, scats, sounds, crop damage. As a follow-up, ask if there have been any changes, in their opinion, and why. This may be made broader to refer to any changes in the availability of wild products as well and the ease in collecting them.

2.2.3 Soil Quality Measurements

Background

Soil quality, a regulatory ecosystem service, helps in the support of plant and animal productivity, and the maintenance or enhancement of water and air quality in natural and managed ecosystems. Thus, it infers the overall health and sustainability of the surrounding ecosystem and its assessment gives meaningful insight. Specifically, the measurement of soil quality will investigate the effects of land use at the forest-agriculture frontiers.

Farmers' management practices and land use decisions are influenced by the soil type, i.e. fallows are shorter on soils that are higher in fertility or certain land uses are restricted to specific soil types. Thus, one cannot approach the question of land use effects on soil quality without considering the social aspect. Farmers' preferences and the local soil classification should be considered during field selection.

To fully capture the effects of land use transitions (from shifting cultivation to alternative land uses) on soil quality, and in acknowledging the important role of local perceptions and management of soil, two methods will be applied in succession: i) mapping soil types; and ii) soil sampling and analysis (in selected sites).

Participatory Mapping: Soil Classification & the Changes

The objective of this participatory mapping exercise is to create a map depicting the soils that are present in the area, using local soil classification. In this exercise, the previously-drawn community/land use maps will serve as a valuable foundation and resource. Focus will be placed on: i) the soil type, according to local classification, found in certain land use areas

(identified from the community/land use map); ii) how soil type relates to quality; and iii) how the soils have changed. Who the targeted participants are is context-dependent. As detailed knowledge of soil is needed, participants should be directly involved with farming activities (or at one point in their lives, if older); if farming activities are strongly gender-biased, for instance, then the gender who is likely to have more knowledge on soil should be targeted. The participants should be mixed in age to capture the historical changes. Remember that a geographically accurate map is not the primary goal; instead, listen to the participants, observe how they engage with one another and what issues are brought to light. Participatory mapping is a technique in which the community can showcase their perception of their own surrounding environment.

Estimated activity time: 1.5 - 2.0 hours

Remember to ask for informed consent from all the participants. Record the participants present: their sex, age, ethnicity and occupation. Also record the date.

Table 2.5: Table for recording the participants and whether their consent has been given

Participant	Sex (M/F)	Age (yrs)	Ethnicity	Occupation	Consent (Y/N)
1					
2					

⇒ Materials and Outline

Materials Required

- Large chart paper
- Masking tape
- Markers of different colours, multiples of each
- Community/land use map

Team Participants

- Facilitator
- Interpreter (if required)
- Note-taker (Observer)

Outline

1. Keep in mind that it is not the facilitator's role to take control of the mapping activity by drawing. The role of the facilitator is to facilitate, allowing the participants to draw and add to the map themselves, probing with short questions such as 'what other soil types are there?', 'what soil type is in this area?' if needed. Only after the participants have finished drawing the map should the facilitator ask more in-depth questions. Remember to place the previously-drawn community/land use maps nearby for reference; as the participants may be different, there may be aspects of the maps that are contested. Take note.

2. Find a large open area and, if possible, tape the edges of the chart paper down. Distribute the markers around the paper.

3. Introduce your project and the overall objectives & aims. Remind the participants that their involvement is voluntary and they may at any time withdraw from the activity. Explain the activity to the participants, showing them the previously-drawn community/land use map and pointing out that we are now interested in mapping the soils found in the area. Emphasise that we are interested in how they classify/identify soils and that discussion is encouraged.

4. Start a conversation about the different soil types found in the area, specifically the local names, their qualities and what land uses they are most often associated with. **As a note**: often, local classification systems include a mix of soils with pedogenic differences and soils with properties based on human use (likely differing in land use suitability).

You may ask more in-depth questions, such as:

- What characteristics does the soil type have?
  - What is the colour?
  - Is it wet? Dry?
  - Hard/soft?
  - Does it have a smell? Taste?
- What is the soil suitable for, in terms of cultivation/use?
  - What are the positive traits? Negative traits?
  - How are these soils managed?

5. Ask the participants to gather around the paper, laying the two community/land use maps next to it. Point out one or two landmarks from one of the maps and draw them on the blank paper. You may point to an identified land use area in the community/land use map to use as an example, asking 'what soil is found here?'

6. Step back and ask them to continue, probing only when needed. The observer should be taking notes on the discussions that take place and the interactions.

7. Now, pointing at certain areas on the present community/land use map, and then at the corresponding area on the past community/land use map, highlight the change in land use seen (e.g. an upland area that now grows maize when it once was cultivated with upland rice). Ask has the soil changed? In what way? What has caused these changes? What are the impacts of such changes? Listen for key concepts such as: erosion, nutrient cycling, soil degradation, productivity, water regulations. Remember to be an active listener and participant. Probe for more information to fully understand the local soil classification, what has changed and how such changes have impacted management practices, productivity and the general environment.

Note: The questions merely serve as a guide to obtain the desired information. Allow for there to be a natural flow to the conversation; listen to participants and let them also drive the conversation. Try not to force the discussion.

8. When completed, thank the participants for their input and involvement.

9. **Debriefing:** As a team, reflect on the mapping activity, highlighting any interesting discussions or observations. Share notes.

Soil Sampling& Analysis

NOTE: Soil sampling analysis will not be done for all sites, dependent on the site context and resources available (i.e. time, lab resources, equipment, capacity, overall objective). The soil sampling & analysis and soil protocols are relevant for only the sites where soil sampling will be carried out.

The land use transitions included in the soil survey will be determined on a case-by-case basis; the major trends in land use transitions for the site in question should be captured, however, as the objective is to estimate the effects from shifting cultivation to alternative land uses, a fallow site (of an age so that it contains woody vegetation) must be included. To capture the changes in soil quality, a 'space-for-time' approach will be used, meaning it is assumed that the reference fallow represents the pre-transition soil in the alternative land use sites (Powers & Veldkamp, 2005). Furthermore, due to the complexities from regional and within-site landscape variation, and varying field histories and management practices, site clusters will be identified and the relative differences in soil quality will be compared between clusters, sites and regions.

Paired fields will be located in three clusters; how many paired fields will depend on the site-relevant land uses identified. For example, if the identified major land uses in a site are rubber, oil palm and a designated national protected area, then a cluster would contain a rubber

and oil palm plantation, national protected area and a fallow with woody vegetation; the fallow here would represent the reference 'pre-transition' soil (Figure 2.7).

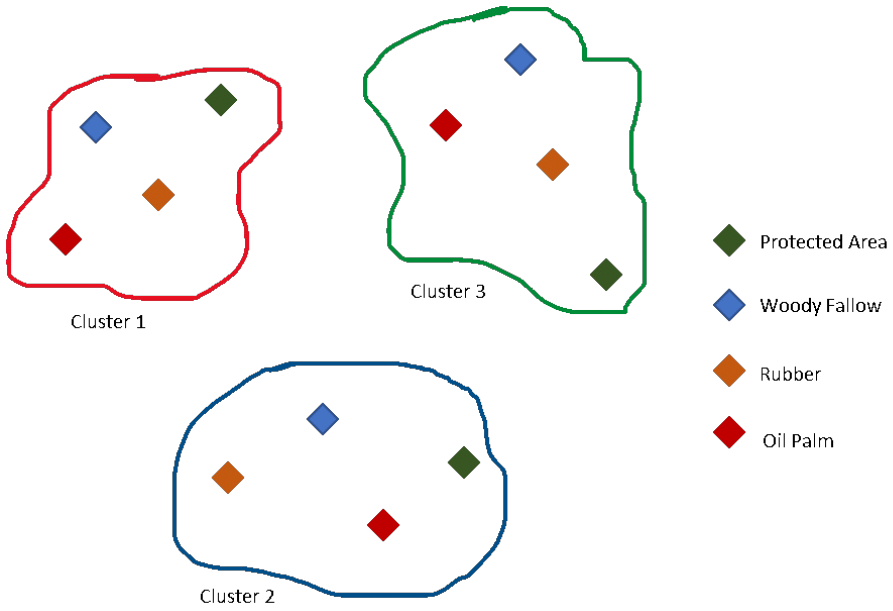


Figure 2.7: Schematic illustration of the three clusters containing four paired sites. In this case, a total of 36 composite soil samples would be collected (3 per field x 4 land use x 3 clusters); explained in detail later.

Fields within a cluster should meet the following criteria in order for comparisons to be made:

- The soil type should be the same, based on local soil classification;
- Field history - a field should be under the respective land use for approximately the same duration (years);
- The slope should be comparable.

Ensure that external input use is consistent across land uses; meaning if chemical fertilizers are applied in one oil palm field, then ensure all the oil palm fields sampled for the whole site (not just cluster) have had chemical fertilizers applied.

Remember that the land use map, soil map and household survey can all help to identify potential field candidates which meet the above criteria. Before sampling, permission from the land owner/user should first be obtained and field information should be verified (i.e. the field history, use of external inputs). Sampling within a site should be done at the same time and be comparative across regions.

Before sampling, remember to obtain informed consent.

⇒ Land Use & Field Characteristics Survey for Field Selection

To help identify field sites, it helps to collect additional data on the general physical characteristics (i.e. is it sloped and, if yes, how much), management practices and land use history (refer to 'Field Survey' in **Appendix F**). The Field Survey should be completed for any fields that are potential matches to verify if they do indeed meet the criteria.

To collect data on the land use history, a timeline exercise will be employed (example below). Starting with an axis drawn on a paper with the present day marked, work slowly backwards, filling in the gaps of the field's land use history. It can help to use significant events identified during the i.e. village timeline activity as reference points. Please remember to assign the field a unique ID, to be kept consistent. If the area (ha) is unknown, note 'unknown.'

Timeline: Example

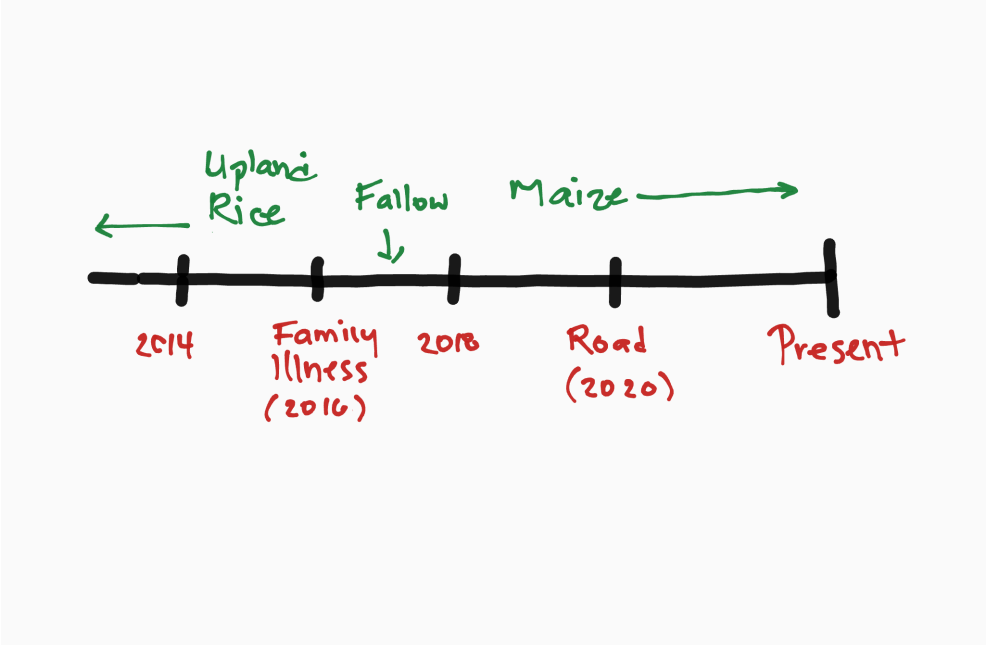


Figure 2.8: An example of a timeline of land use and management practices for a field.

If external input (fertilizers, pesticides, mechanical ploughing) use is not the norm, fields should then be divided into groups with and without external inputs. Sampling should then be either or, if comparisons are to be made.

Using all of the information collected insofar, identify clusters and fields ensuring they meet the listed criteria above. It should be noted that fields should be distributed evenly within a cluster, if possible.

⇒ Field Survey and Plot Set-Up

Soil sampling is to be completed at the same time of year (i.e. season) or within the same stage of the agricultural cycle, meaning all soil sampling should be done after e.g. harvest. When samples are taken will thus depend on logistics and resources. Damage to crops should be avoided; sampling may be best either before planting or after harvesting.

Three 6m by 6m plots will be marked in the field by placing i.e., poles or surveyor flags at each corner. Remember that the plots should be representative of the entire field; do not pick areas that are comparably low-lying (wet), near an anomaly or near the field edge, i.e. plots should be set at least 6 m in and 6 m apart. Number plots from 1 to 3, starting from the left (if facing the field). Within each plot: i) four penetrometers readings; and ii) one composite soil sample will be taken.

Once the plots are set, the Field & Plot Survey (Appendix G) should be completed. Identification should follow the following format: Site & Household ID. Field ID. Plot #. Please remember to keep field IDs unique and consistent. If sampling within a rowed field, adjust the sampling locations so that there is a mix of inter- and intra-row samples.

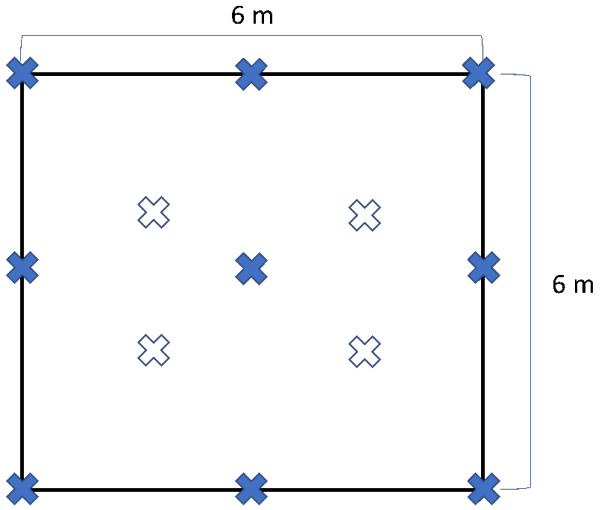


Figure 2.9: The 6m-by-6m plots for sampling; the solid 'x's mark the locations for soil sampling while the clear 'x's mark the locations for the penetrometer readings.

Be sure to sketch in any anomalies or rows (and sub-sample locations) within the plot sketch (Field & Plot Survey, question 9).

Soil Protocols

The following parameters will be measured to indicate overall soil quality: soil compaction, pH, soil organic carbon (SOC), texture and permanganate-oxidizable carbon (Pox-C). The depth of A horizon should be measured (cm) and noted in the Field & Plot Survey (Appendix G). Refer to Figure 2.9 for reference of where to sample; keep in mind the locations are approximate.

Soil compaction will be measured before soil sampling at the four center points in each plot (Figure 2.9); precaution should be taken to not trample the area beforehand as this will influence measurements.

Dig a pit deep enough to expose the entire A horizon (and some of the B horizon) at the center point in each plot. Ensure that leaf litter and partially-decomposed organic matter is removed (O horizon). Measure and record the depth of the A horizon on the Field & Plot Survey, question 9. Take samples for texture from A and B horizon. Geotag the sampling location.

For pH, SOC and Pox-C, 9 soil sub-samples from 0-20 cm will be taken in each plot, using a soil auger, and, after mixing well in a clean bucket, one composite soil sample of approximately 500 g will be bagged (Figure 2.9). Place a label inside the bag with the following information: your name, land use, date and sample ID (Site& Household ID. Field ID. Plot # (1-3). Ensure that leaf litter and roots are removed before sampling. pH and Pox-C protocols can both be adjusted for field conditions; if so, ensure the remaining bagged soil samples are still brought back for SOC analysis.

Ensure that all soil samples brought back are sieved (2 mm) and air dried.

⇒ Soil Compaction

To measure the soil compaction, a penetrometer will be used. Place a mark on the rod at 20 cm from the tip; this is the depth at which resistance will be measured. Generally, a resistance reading of 300 psi or more is considered as limiting to root growth. The best time for compaction measurement is at about 24 hours after rain or when the soil is at field capacity; wet soil will underestimate compaction while dry soil will overestimate. Make note of the field conditions (i.e. moisture level) when measuring compaction.

Procedure:

1. Use the correct cone (usually two cones are supplied with the penetrometer, with diameter of either ¾ “or ½ “); the ¾ “cone is appropriate for soft soils while the ½” cone for hard soils.
2. At each of the four central points within the plot (Figure 2.9; unfilled ‘x’s), drive the rod slowly into the soil, as perpendicular as possible, until the 20 cm mark is reached.
3. Record the psi readings

⇒ SOC & Texture Analysis

A small amount of each soil should be weighed, bagged and labelled separately for SOC analysis (approximately 20 g for security); samples should be dry and ground. Lab-specific protocols for SOC analysis should then be followed.

Texture will also be analysed for A and B horizons. For each plot, there will be one sample from the A horizon and one sample from the B horizon; a total of 3 samples of each horizon for each field (3 plots). Lab-specific protocols should be followed.

⇒ pH in a 1:2.5 Soil: Water Solution

To adjust the protocol below for field conditions, prepare the soil by crumbling it. removing any stones/roots and allowing it to air-dry for 15 min on a black piece of paper. In lieu of a scale, you may replace it with a scoop calibrated to 2.5 g; for analysis, then add four scoops of the soil sample. Use a portable pH electrode and shake the samples by hand, to the best of your ability.

Materials:

- 50 mL Falcon tubes
- Scale (resolution to 0.1g)
- Laboratory scoop
- Weighing boats
- Graduated cylinder (25 mL)
- Wash bottle
- Tube rack
- pH electrode
- Laboratory shaker
- milliQ water

Procedure:
Three replicate measurements per sample

1. Weigh 10.0 g of soil in a 50 mL Falcon tube
2. Add 25 mL of milliQ water
3. Shake for 20 minutes

4. Leave for 30 minutes – uncapping the Falcon tube and allowing for the sediment to settle
5. Calibrate the pH meter using the pH 4 and pH 7 buffer solutions (See manual)
6. Measure pH of the sample using the electrode, allowing the reading to stabilize (see manual)
7. Clean the electrode with milliQ water between each measurement. When done, make sure to discard the solution in a correct manner.

When all samples have been measured the Falcon tubes (with content) and the milliQ water in the glass are collected in a plastic bag; dispose correctly. Or, if possible, discard the solution and clean the Falcon tubes for reuse.

⇒ Permanganate-Oxidizable Carbon (Pox-C)

Pox-C is said to represent a more active carbon fraction of the total soil organic carbon pool responsive to changes in management practices (Weil et al., 2003). Pox-C is determined by how much carbon is oxidized in a solution of 0.02 M $KMnO_4$ in 0.1 M $CaCl_2$ at pH 7.2; a handheld spectrophotometer (or laboratory-based) measures the bleaching of the purple $KMnO_4$ solution, which is proportional to the amount of oxidizable carbon in the soil sample, i.e. the greater the colour loss, the lower the absorbance reading and the higher the oxidizable carbon (Weil et al., 2003).

To adjust the protocol for field conditions, ensure the $KMnO_4$ solutions are kept cool and equipment like the pipettes should then be replaced with more field-appropriate equipment, i.e. plastic transfer pipettes, sealable wash bottle. Prepare the soil by crumbling it, removing any stones/roots and allowing it to air-dry for 15 min on a black piece of paper in direct sunlight. In the field, soil can be measured using a scoop calibrated to 2.5 g for simplicity. Ensure both the stock solution and sample solutions are protected from direct sunlight.

The below protocol is adapted from Weil et al., 2003.
Materials

- 50 ml Falcon tubes
- Pipettes
- Wipes
- Wash bottle
- milliQ water

- Laboratory scoop
- Weighing boats
- Scale
- pH electrode
- Magnetic stirrer
- Handheld or lab-based spectrophotometer

Chemicals

- $CaCl_2$* $2H_2O$
- $KMnO_4$
- HCl
- NaOH

Procedure
0.2M $KMnO_4$ in 0.1 M $CaCl_2$ at pH 7.2 stock solution preparation

The stock solution can be prepared beforehand, wrapped in foil (to minimize light exposure) and stored in a fridge to be kept cool. If conducting this method in the field, keep the stock solution in a cooler and maintain it as cool as possible.

1. 1 M $CaCl_2$: Weigh 147 g of $CaCl_2$* $2H_2O$ and add it to a 1000 ml flask that is half-filled with milliQ water. Add the rest of the milliQ water (to 1000 ml mark) and shake.
2. Pour half of the 1 M $CaCl_2$ in to a 2 l glass beaker (500 ml)
3. Weigh 31.608 g of $KMnO_4$ and add it to the same glass beaker and shake
4. Fill the beaker with approximately 90% of the 1 M $CaCl_2$
5. Adjust pH to 7.2 using NaOH (if too acidic) or HCl (if too basic) while stirring with a magnetic stirring device, if available. Be very careful when adjusting the pH level as changes are sudden.
6. Add the rest of the 1 M $CaCl_2$ and shake. Transfer the solution to a capped glass bottle wrapped in aluminium foil. Store in the cold and dark.

Spectrophotometer calibration

7. Prepare standards (0.005, 0.01 and 0.02): Add 1.25 ml, 2.50 ml and 5.00 ml of the 0.2 M $KMnO_4$ stock solution to 50 ml Falcon tubes and dilute to the 50 ml mark with milliQ water.

8. Calibration: Add 1 ml of the 0.005 M standard to a 50 ml Falcon tube and add 19 ml of milliQ water (20-fold dilution); repeat for the remaining standards. Use the prepared solutions to calibrate the spectrophotometer according to the user manual.

Sample Analysis
Three replicate measurements per sample

9. 2.5 g of soil to a Falcon tube.

10. Add 18 ml of milliQ water and 2 ml of 0.2 M $KMnO_4$ stock solution (sequentially).

11. Shake for 2 minutes and let the sample settle for 10 minutes, uncapped.

12. Transfer 1.0 ml of the supernatant to clean tubes and add 19 ml of milliQ water (20-fold dilution); the chemical reaction (i.e. reduction of $KMnO_4$) stops at this point, thus be aware of and consistent with the timing beforehand.

13. Transfer the diluted solution to the spectrophotometer's vial (to the mark) and measure concentration.

Calculation

14. Estimate the amount of oxidizable carbon in the soil sample by using the following equation, assuming that 1 mol of MnO_4 is consumed (reduced from Mn^{7+} to Mn^{4+}) in the oxidation of 0.75 mol (9000 mg) of C.

*Pox-C (mg/kg) = [0.02 mol/l – (a mol/l)] * (9000mg C/mol) * (0.02 l solution/0.0025 kg soil)*

0.02 mol/l is the initial solution concentration

'a' is the concentration measured in the supernatant

9000 mg is mg C oxidized by 1 mol of MnO_4

0.02 l is the volume of $KMnO_4$ solution reacted

0.0025 kg is the weight of the soil being used

2.2.4 Water Quality Measurements

NOTE: Water analysis will not be done for all sites, dependent on the site context and resources available (i.e. time, lab resources, equipment, capacity, overall objective).

Background

Land use changes such as the intensification of agriculture and deforestation have an impact on water quality, influencing both water as a provisioning ecosystem service (i.e drinking water supply) and as a regulatory ecosystem service (i.e. water purification).

Implementation

The overarching goal, as with the soil quality measurements, is to compare the relative effects of land use on water quality across the study sites in all five regions; for instance, comparing the relative change in total dissolved solids (TDS) of a river when land use systems adopt management practices that incorporate external inputs (e.g. chemical fertilizers) or mechanization (e.g. ploughing). Thus, the potential (negative) land use effects such as surface run-off of chemical pollutants, eutrophication or increased sediment load from erosion and their associated land use and management practices can be assessed. Implementation of water testing will be on a case-by-case basis as it is dependent on the site context.

Site Selection

For testing, a site must have surface water flowing through (rivers, streams) or accumulating (lake, pond). Depending on the context, water quality can be compared across land uses (if i.e. a river flows through an area with a specific land use) or landscapes (if i.e. a river flows through an area under shifting cultivation). Thus, there are no specific criteria for sites, other than containing surface water; testing will likely occur in rivers by comparing water quality differences between samples taken upstream and downstream of the land use/landscape in question.

Once a site and water sampling locations have been determined, the site survey should be completed (**Appendix H**). Keep the timing of sampling in mind (i.e. rainy season) and when the last rainfall event had occurred as this will influence the total solids in the water. Ensure the samples are given a unique ID (Site ID. Water ID. upstream/downstream. Rep 1-3).

Water testing Protocols

The specific water parameters to be tested and the sampling procedures and protocols will be provided by the contract laboratory (i.e. a third-party laboratory) or by in-country partners. Likely parameters are: pH, total suspended solids (TSS) and total dissolved solids (TDS).

2.3 Human Well-being

2.3.1 FGD 3: Local Perception on Well-Being

Objectives and scope

The objective of the FGD3 is to understand local perception on well-being bundles (i.e. what is required for a good life) and how frontier transformations affect (improve or detriment) local well-being. In general, the FGD3 consists of several elements (Figure 2.2).

Some of the topics discussed during FGD 3 include:

- Local conception of a 'good life' (well-being)
- What is required to have a 'good life'
- Evolution of well-being bundles
- Drivers of change in well-being
- Who benefit and who is made precarious

Group discussion sessions will be recorded with permission from participants, transcribed and translated to English.

Steps for facilitating

Introduction

1. The lead facilitator begins with welcoming and thanking the participants for coming.
2. Explain briefly the FairFrontiers project - its overall aim and objective. Explain about informed consent and how participation in this discussion is voluntary, that the recordings will be solely used for clarity and note taking, and that the information will only be used for the mentioned research purpose. We will also be transparent in our findings by reporting back to the community. Ensure the participants understand and agree with everything said. If there are no questions, ask if we can then proceed.
3. Explain carefully and clearly the focus of this discussion, its objectives and activities (process), and how long it may take (about 2 hours). Encourage participants to ask questions if the process is unclear or if they need more explanation at any time during the discussion.

Well-being bundles

The discussion on local perception of well-being followed five steps that are described below, from 4 to 8.

4. The lead facilitator starts the session with a brief discussion on how participants define a "good life" or "living well". S/He can ask: "What does it mean for you to have a good life?". This will lead to another question on "what is required in order to have a good life or to live well in this village?

   Facilitators will write these well-being components on a flipchart (See table below). At the initial stage, the facilitators should avoid giving any suggestions on well-being components until the participants had mentioned all components they could think of. After that, if not mentioned already, the facilitator can use the pre-determined list (prepared by FairFrontiers team) to probe further well-being components not listed so far in the discussion.

Table 2.6: Table used for FGD to guide discussion

Well-being components	**Why is this important?**	**How do you satisfy these components?**	**Changes in the ability to achieve well-being (compared to the last decade) ***	**Cause of change**
Example: Income	Money is needed to buy food, pay school fees		++ (Moderately higher)	Changing to a new boom crop gives a better income to (some) villagers
Property rights (e.g. Land ownership)	Land is critical for their livelihood (farming)		- - - (Significantly lower)	Farm lands have been taken away for plantation development

**Changes are rated highly positive/increase (+++), moderately positive (++), slightly positive (+), no change (0), slightly negative (-), moderately negative (- -), highly negative (- - -).*

5. Once all components are included in the list (see table above), the facilitator will ask the participants to score components by relevance or importance. We give participants 5 stickers and ask them to put the stickers next to particular elements that they think most relevant for them. This ranking exercise will help determine which well-being elements to be further discussed in the next step, starting with the elements that receive the highest score.

6. Explain to the participants that now we want to understand why certain well-being components are considered important. This discussion will reveal what value some particular components have for their well-being. The facilitator will write down the answers on the flipchart.

7. Now ask participants how their ability to satisfy these well-being components have changed in the last 5-10 years. The facilitator will ask participants to rate whether a given component has improved (symbolized with +), decrease (-), or relatively the same (0). Changes are rated highly positive/increase (+++), moderately positive (++), slightly positive (+), no change (0), slightly negative (-), moderately negative (- -), highly negative (- - -).

8. Now ask participants what drives/affected these changes in their ability to satisfy their well-being needs?

Closing: Summary, verification, and thank you

The last part of the FGD is closing. Facilitator summarizes the discussion and conducts a last verification. Thank participants for their active engagement in the discussion process. As a final step, the facilitator might invite the participants to ask questions.

2.3.2 In-Depth Interview on Well-Being

Objectives and Scope

The overall objective of in-depth interview, specifically for module 3 is, first, to gain deeper understanding (and in more detail) on some specific and possibly interesting issues regarding people's well-being found in earlier data collection processes such as if there are some paradoxes, extreme cases or other interesting cases found. This includes exploring in depth a respondent's point of view, experiences, feelings, and perspectives. In that sense, some of the questions will be tailored based on the results of the FGD and HH survey.

The second objective of the in-depth interviews will be to gain understanding of the political economic context shaping well-being outcomes, something that is not fully covered in other methods (FGD, HH survey).

Implementation

In-depth interview will involve a one-on-one interview with purposely selected key informants including those who either participated in the earlier HH survey and FGD, or a completely new respondent who can give additional explanation on the specific topic. Some sets of questions might be more relevant for specific actors while some others are not.

The general topic or questions for the in-depth interview will be in line with the key research questions in module 3, including:

- How do the bundles of well-being evolve when the forest-agriculture frontier is transformed?
- How do local people exercise agency in engaging, negotiating and/or resisting development interventions and changes in forest and land governance?

- Do these changes create differentiated social and gendered vulnerability and precarity? How does it influence local perception of equity?
- How do contextual institutional factors and the underlying power structures across different scales affect outcomes?
- What are the enabling and hindering conditions (e.g. historical, social, political or environmental) for equitable and sustainable development pathways?

*Remember to obtain informed consent from all participants before starting any interviews (see example in the HH Survey questionnaire section).

List of possible questions for in-depth interviews

*Note that the list of questions below is intended only as a guideline and there might be additional questions later on based on the preliminary findings of HH Survey or FGDs. The list and sequence of questions will also need to be tailored depending on respondent's profile and specific context; Also, not all questions will be asked in the same way in all interviews/respondents.

QUESTIONS FOR COMMUNITY MEMBERS/LEADERS

A. Political and economic contexts

1. Are you aware of any laws or regulations (including at local, provincial or national levels or customary laws) that may affect people's ability to access and gain benefit from ecosystem services? Could you please explain these to us?
2. How have these laws and regulations affected people's well-being (quality of life)?
3. Do you have any recommendations or aspirations on what needs to be changed in these policies or laws? What do you think are possible policy options that can deliver more ecologically sustainable and equitable for local communities?

B. Relationship between people and nature

1. How can you describe the relationship between local people and forest (or nature) in this area? How important is forest for people who live in this area? Can you give some examples?
2. Is there any relationship (or links) between forests with the culture and identity of people in this village?
3. Does nature or forest have any role in the spirituality or religious practice of people in this village?

4. Has the establishment of national park affected or changed people's behaviour and attitude towards forests (including the protection of forest)? Please explain how and why.

5. Has the establishment of logging companies in this area changed people's behaviour and attitude towards forests (including the protection of forest)? Please explain how and why.

6. How does land-use change (e.g. establishment of agro-industrial plantations) affect the relationship among villagers? And how do these changing relationships affect people's lives?

7. How has that (social relationships) changed over the past 5 years and what caused the change?

C. Access to natural resources

1. How can you describe the different ability of villagers to access natural resources (including forests) in this area? What are the factors that enable or prohibit people from accessing natural resources?

2. Who controls access to forest resources in this area? (Also look at the broader context at sub-national and national level)?

3. 3. Who controls access to land in this village (also look at the broader context at sub-national and national level)?

D. Equity/Justices

1. Who gets more benefits, and who gets the least benefits (or not getting benefit at all) from the establishment of agro-industrial plantations in this area? Why do these different groups of people get different levels of benefits?

2. Who gets more benefits and who gets the least benefits from the establishment of national park in this area? Why do these different groups of people get different benefits?

3. Do you think the distribution (or allocation) of benefits and burdens from the establishment of the national park and agro-industrial plantations was fair (just)? What do you consider as "fair"? Please elaborate your answer.

4. To what extent are the people's rights over natural resources (e.g. forest, land) recognized and respected by the governments, the national park or companies operating in this area? Please explain.

5. Do you think all people here are treated equally in terms of access to natural resources?

E. Relationship between villagers, companies and National Park

1. Did the national park authorities involve or consult local villagers in the management or decision making of the national park?
   Prompt: Have the National Park invited local villagers in their meetings to discuss National Park's management? Have you or other villagers participated in any meetings organized by the national park authorities to make decisions on National Park management?

2. How can you describe the relationship between the community and the company operating in this area? Are they in a good or bad relationship? Has the relationship changed over time?

3. Is there any social tensions, disagreements or contestation between local communities and companies (or national park) operating in this area?

4. How the incoming plantation companies or logging companies affect the relationship between villagers? Please elaborate your answer.

5. How has the relationship among villagers changed over the past 5-10 years and what caused the change?

F. Impacts and Community strategies

1. What do you think are the impacts of large-scale agro-industrial plantations to the community living in this area? (This can be negative and positive impacts)

2. How do local people respond when large-scale agro-industrial plantations came to this area? What kind of strategies did the people take to adapt, navigate and negotiate the benefits from the incoming plantations?

3. How united was the community during the struggle? Describe how and why the community was (not) united?

4. How do local people respond when the national park was established in this area? What kind of strategies did the people take to adapt, navigate and negotiate change?

5. What was the outcome of the struggle? What has the community achieved? And what are the key factors that affected these outcomes?

6. What are the roles of NGOs in supporting the communities in their struggle? Do you remember the name of these NGOs and their roles?

G. Sense of security and concerns

1. What are the biggest worries facing your household (and the broader community) in recent years? and how well do you feel able to overcome these?
2. What were your major concerns 5-10 years ago? Do you feel that, in general, things are improving or do you find it more difficult?
3. How do you see your quality of life in the future? How secure do you feel? Do you think you can maintain your current situation? Do you feel that it will improve or decrease in the future (e.g. next 3-5 years)?
4. What do you think is needed in order to make sure that you can maintain or improve your current situation or quality of life in the future?

QUESTIONS FOR NGOs

Name of NGO: _____

The role/position of the informant in the NGO: _____

A. General activity of the NGO

1. When did your NGO start the activity in this village (or in the research site)?
2. Can you describe what kind of activities or support you provide to the community?
3. What kind of objectives/goals do you want to achieve? And what are you trying to advocate?
4. What are your strategies to achieve those objectives?
5. How often do you (or your NGO) come to the village?
6. From those programs, what have you achieved so far?
7. What are the challenges that you faced in providing support to this community?
8. From your observation, what changed in the the last 5- 15 years?

B. Impacts and Community strategies against agro-industrial plantations

1. What do you think are the impacts of large-scale agro-industrial plantations to the community living in this village? (This can be negative and positive impacts)?
2. How do local people respond when large-scale agro-industrial plantations came to this area?

3. What kind of strategies did the people take to address those impacts and negotiate the benefits from the incoming plantations?
4. How do you describe the relationships between villagers and the agro-industrial plantations in this area?
5. How united was the community during the struggle? Describe how and why the community was (not) united?
6. What are the roles of NGOs in supporting the communities in their struggle? How did the NGO help the community?
7. What was the outcome of the struggle? What has the community achieved?
8. What are the key factors that affected these outcomes?

C. Impacts and Community strategies against national park

1. How do you describe the relationships between villagers and the national park?
2. What do you think are the impacts of the national park to the community living in this area? (This can be negative and positive impacts)
3. How do local people respond when national park was established in this area? What kind of strategies did the people take to adapt, navigate and negotiate change?
4. What are the roles of NGOs in supporting the communities in their struggle? Which NGOs involve?
5. What was the outcome of the struggle? What has the community achieved?
6. What are the key factors that affected these outcomes?

D. Fairness and justice

1. Do you think land-use changes that occurred in the village (i.e. the establishment of agro-industrial plantations or the national park) and their distribution of impacts perceived to be fair? Please elaborate your answer.
2. What do you consider as “fair” / justice?
3. What has been done by the community or the NGOs to address or solve justice issues that is happening in this village?
4. What has been the outcome?
5. What are the challenges that you and the community faced in achieving justice?

E. Policy and recommendations

1. What are the government policies related to forest and agriculture that you think are affecting people's quality of life (well-being) in this village?
2. What do you think are possible policy options that can deliver more equitable outcomes (more justice)?

Thank you for your time and participation in this study! We really appreciate it.

Appendices

Appendix A: Community Profile Survey

Date: Village:

Respondent: Administrative Organisation (province/district/subdistrict):

Interviewer:

Translator, if appl.:

1. Number of households:
2. Total population:

   Male:

   Female:

3. Name of village head: _____
4. Ethnic groups present and their populations:

   _____ _____
   _____ _____
   _____ _____
   _____ _____

5. Language(s) spoken in the village:

   _____ (%) _____ (%)
   _____ (%) _____ (%)

6. Main occupation of villagers:

   _____ (%) _____ (%)
   _____ (%) _____ (%)
   _____ (%) _____ (%)

7. Religion and their populations:

   _____ (%) _____ (%)
   _____ (%) _____ (%)

8. Any customary institutions exist in the village? **Y / N**. If yes, please specify:

   _____ _____
   _____ _____

9. Any (community) organizations exist in the village? (e.g. youth organisation, farmers group, women group, etc.) **Y / N**. If yes, please specify

   _____ _____
   _____ _____

10. Infrastructure:

    - Road to the village **Y / N** Material _____
      Is it accessible all year? **Y / N**
    - Electricity **Y / N** Proportion of households: _____
    - Running water **Y / N** Proportion of households: _____
    - Private toilets **Y / N** Proportion of households: _____

11. Is there a food market? **Y / N**
    Is the market a modern indoor facility? **Y / N**

12. If not, how far is the nearest food market: _____

13. Is there access to:

- Public transport? Y / N
- Medical centre? Y / N
- Primary School? Y / N
  If not, how far is the nearest primary school:
- Secondary School? Y / N
  If not, how far is the nearest secondary school:
- Places of worship? Y / N

  List: _____ _____

  _____ _____

  _____ _____

14. Is there any plantation company that operates in (or near) the village? Y / N. If yes, please specify:

    _____ _____

    _____ _____

15. Is there any conservation or protected area in (or near) the village? Y / N. If yes, please specify:

    _____ _____

    _____ _____

16. Are there any NGOs (local, national, international) working in the area? Y / N. If yes, please specify:

    _____ _____

    _____ _____

17. Open Observations/Remarks:

Appendix B: Participants for FGDs/Mapping Exercises

Participant	Sex (M/F)	Age (yrs)	Ethnicity	Occupation	Consent (Y/N)
1					
2					
3					
4					
5					

Appendix C: Ecosystem Services Definitions and Local Terminology

Ecosystem Service	Definition/Elaboration	Local Terminology/Definition
Subsistence crop	”Food crop not for sale, home consumption”	
Cash crop	”Majority for sale; food or not”	
Grazing	”For livestock”	
Wild plants	”Plant not grown by people but collected for food, for self or sale”	
Wild meat	”Not livestock but caught for food-for self or sale”	
Wild fish & Aquatics	”Fish & aquatic species (not farmed) caught for food or sale”	
Fiber	”Wood, dung... for cooking or heat”	
Fuel	”Wood, jute, hemp...for cooking or heat”	
Timber	”For construction-for self or sale”	
Natural Medicines	”Medicine grown or wild-for self or sale”	
Water regulation	”Filtering; provides clean water”	
Biodiversity maintenance	”Number of different animals & plants above-and below ground”	
Ecotourism	” Tourists visit to see the land use/landscape”	
Recreation	” Use of land for yourself; hiking, swimming, walking...”	

Appendix D: Household Survey Questionnaire

Introduction and consent

Hello. My name is _____ [interviewer name]. I am working with the _____ [interviewer's research institution] and the Research Institute of Humanity and Nature based in Kyoto, Japan [if appl.].

We are conducting a survey about the benefits received from the land and how they link to ecosystem services and human well-being. The aim of this research is to understand how land use change and its drivers have affected people's quality of life and way of living in _____ [add village name].

We would like to ask you some questions about your household: your livelihood activities, assets, land and its benefits, and your well-being. It should not take longer than two hours of your time. This study takes place in five regions of the world. Approximately _____households from this village will take part.

Your answers will be confidential and your name will not be included in the analysis or results nor will your answers be used for anything else other than research; what you say will not affect any benefits that you may receive now or in the future. There are no correct or incorrect answers; please feel free to share your opinions.

Do you consent to be part of this study? Yes/ No You may withdraw from the study at any time and you always have the right not to answer any of the questions we may ask.

For interviewer:
Put your (i.e., interviewer's) initial here and continue with the survey if respondent understands his/her rights and agrees to be interviewed _____

Household ID:	District & Village:	Country	Date of interview
Interviewer:	Note taker/translator:	Time start:	Time finish:
Checked by:	Checking date:	Data entry by	Entry date
Note (if any):			

A. Household (HH) composition

1. Who is in your household?
   Number of children aged 5 years and under:

Note: Fill the table below for household members above 5 years old

HH member above 5 years old	**Relation to HH head** 1=Head 2=Spouse 3=Daughter/Son 4=Grandchild 5=Mother/Father 6=Sister/Brother 7=In laws 8=Other, please specify	**Gender**	**Age**	**Education completed** 1=No formal schooling 2=Some basic schooling 3=Completed basic schooling 4=Some secondary schooling 5=Completed secondary schooling or equivalent 6=Completed college/pre-university/university 7=Completed post-graduate	**Primary occupation** 1=Crop farming/farm labour 2=Off-farm labour (informal) 3=Job (formal, please specify) 4=Entrepreneur/ shopkeeper 5=Civil servant 6=Livestock 7=Other, please specify	**Secondary occupation** 1=Crop farming/farm labour 2=Off-farm labour (informal) 3=Job (formal, please specify) 4=Entrepreneur/ shopkeeper 5=Civil servant 6=Livestock 7=Other, please specify
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

2. Are all members of this HH belong to the same ethnic group?
   1=Yes
   0=No
   Please specify the ethnicities _____

   _____

3. Are all HH members originally from this village?
   1=Yes
   0=No
   If No, when moving here? And what was the primary reason for moving here?

B. Household income

4. What are your HH's sources of income over the past 12 months?

Which of the following are sources of income for your HH? (please mark all that apply in the next column)	**Tick (√) all that apply (relevant) below**	**Mark the top 3 most important source of income here** 1=first most important 2=second most important 3=third most important
Sale of food or subsistence crops (e.g. rice, maize, wheat)		
Sale of cash crops (e.g. rubber, sugarcane, coffee, tea, cotton, tobacco, etc.)		
Sale of timber products		
Sale of wild products Sale of livestock and its products (live animals, meat, cheese, etc.)(e.g. NTFPs, medicinal plants, bush meat)		
Sale of livestock and its products Sale of livestock and its products (live animals, meat, cheese, etc.)		
Sale of fish, shrimps or other aquatic species		
Wages and salaries (cash), specify source		
Cash remittances ((transfer of money from family or relatives outside the village or from abroad)		
Business/trade/shop keeping		
Property (house, land) rent		
Government allowance/support		
Pension		
Other, please specify		

Please estimate the amount of income from all HH members over the past 12 months (in local currency): _____

5. How has the amount of income changed compared to **5 years** ago (same, increased or decreased)? Please explain why.

C. Household assets

We would like to ask about your household's livestock holdings and other assets.

6. Which of the following does your household have*?
   *Some of these could be based on observation and tailored based on local context

	1= Yes 0= No	**How many now?**	**How many 5 years ago?**
Large livestock (cattle, buffalo)			
Small livestock (goats, pigs, sheep)			
Chickens, Ducks, Turkeys			
Electricity that is connected?			
Solar, battery, or generator for power?			
Running water in working order?			
Mobile Phone?			
Motorcycle/scooter?			
Car/truck?			
Motor boat?			
Tractor/plough?			

D. Food Security

These next questions are about the food eaten in your household in the last 12 months, and whether there are any changes in your household' ability to fulfil and/or afford the food you need.

7. What is your/your household's source of food?

Source	**Percentage (estimate)**
a. Own production	%
b. Purchase/buy	%
c. Collected from environment/forest	%
d. Borrowed	%
e. Received as gift	%
f. Food Aid	%
g. Other, specify	%

8. In terms of food security, which category best describes your household situation in the last 12 months?
   1 = My household experience a major or significant food shortage
   2 = My household experience a minimal or limited seasonal food shortage
   3 = My household never experience food shortage throughout the year

   If the answer is 1 or 2, approximately how many days did you suffer a shortage of food over the last 12 months? _____ days.

9. Has your ability to fulfil your food needs improved or decreased in the last 5 years? 0 = Pretty much the same
   1 = Decreased
   2 = Increased

   Could you explain why/how it decreased/increased?

   _____

   _____

E. Health

10. a) In the last 12 months, have you and other members of this household experienced major illness/injuries/ diseases which require special health treatment? **1=Yes / 2 = No**

    If YES, approximately how many times in total per year your household members experienced this over the last 12 months? _____ times per year.

    b) What was the common type of illness/diseases? _____

    _____

    c) Do you think any of these illnesses/diseases have any relation (or links) with the changing of nature/environment in this area? Please explain your answer

    _____

11. a) How would you describe the quality of water you use (for drinking and cooking) in terms of the level of risk for diseases?
    1 = Unsafe (high risk for diseases)
    2 = Low risk for diseases
    3 = Safe (No risk for diseases)

    b) How has the quality of water changed and what caused the change? _____

    _____

F. Social relation, security and safety

12. a) How much trust do you have that your neighbours or other people in this community would provide help to you (financially or non-financially) in the case of an emergency? (for example, when your agricultural crop fails or when you lose your job)

    1 = It is unlikely that other people in this village will provide help
    2 = There is low likelihood that other people in this village will provide help
    3 = It is highly likely that other people in this village will provide help

    b) Can you explain why? _____

13. a) Do you feel safe living in this village? [i.e. safe from any physical or non-physical violence, conflicts, intimidation, threats, abuses, theft, etc.]
    1 = I don't feel safe
    2 = It's neither safe nor unsafe
    3 = I feel safe (fully or to a large extent)

    b) Can you explain why or provide an example? _____

14. a) To what degree do you have the opportunity to participate in the decision making regarding natural resources, forest management and/or land-use in this area?
    0 = I have no opportunity or not invited to participate in meetings about this
    1 = I was invited and participated in meetings but could not influence the decision
    2 = I was invited and participated in meetings but have limited influence to the decision
    3 = I was invited and participated in meetings and can have a strong influence over the decision

    b) Please explain how and why _____

G. Freedom

15. a) How difficult is it for you to access, use and get benefit from natural resources such as forest and land in this area? (for example: for income-generating activities, etc.)
    1 = Very difficult or could not access natural resources
    2 = Have limited access, use and get benefit from natural resources
    3 = Have full access, use and get benefit from natural resources

    b) How has your access to forest and land changed compared to in the past?
    0 = Pretty much the same
    1 = Decreased
    2 = Increased

    Please explain why or with some examples:

    _____

    _____

    _____

H. Justice

16. Focus on the local situation in the last 5-10 years:

    a) In regard to government policies about land-use change in this area (such as the expansion of agro-industrial plantations or the establishment of national parks), to what degree have your community's rights and culture been recognized and respected?
    1 = Not recognized/respected at all
    2 = Low or some degree of recognition
    3 = To a large extent or fully recognized

    b) Please explain _____

    _____

17. a) In your opinion, to what degree have the distribution of benefits and burdens from land-use change (such as from the expansion of agro-industrial plantations or establishment of national parks) been fair?
    1 = It is not fair at all
    2 = Somewhat fair
    3 = Fair

b) Could you please elaborate/explain why? _____

c) So, what do you consider as "fair"? (please write a direct quote of the answer if possible)

I. Life satisfaction

18. In your opinion, what is required in order to have a "good quality of life" in this village? (*Please choose max. of 3, starting from the most important one)

What is needed to have a good quality of life?	**Why is this important?**
1.	
2.	
3.	

19. a) Please think about your life as a whole, how satisfied are you with your life?
    1 = Not satisfied at all
    2 = Barely satisfied (very low satisfaction)
    3 = Partially satisfied
    4 = To a large extent satisfied
    5 = Fully satisfied

    b) Can you explain your answer?

J. Household land use

20. Does your household own/use land? Yes / No

    If Yes, please fill out the table below

A. Field/Plot ID If multiple plots, please number them	**B. Size & unit** (e.g. hectares, acres)if not known, write unknown	**C. Land tenure***	**D. Source of land*** how do they get access to the land	**E. Current land use*** 'Human use of land'	**F. Plant species, if appl.** rice, maize, rubber; don't list if fallow/forest	**G. When was the plot planted with current land use (or left fallow)?**	**H. Prior to this, what was on the land?**
1							
2							
3							
4							
5							

***Key:**

C. Land Tenure	**D. Source of land**	**E. Current land Use**	
1=Land title, issued by central govt	1=Allocated by chief or customary leader	1=Upland-subsistence	1A = subsistence
2=Land title, issued by local govt	2=Allocated by government	2= Lowland-subsistence	
3=Owned but not titled	3=Opened individually	3=Upland-cash	3A = cash crop
4=Communal land	4=Given by family or inheritance	4=Lowland-cash crop	
5=Rented	5=Buy	5=Unmanaged fallow	
6=Other, specify	6=Other, specify	6= Managed fallow	
		7=Tree plantation	
		8=Mixed	
		9=Livestock	
		10=Forest	
		11=Other, please specify	

21. If shifting cultivation [3] is practiced, have fallow lengths changed compared to in the past? 1 = Yes; 2=No; 3=Not applicable If yes, please explain how it changed and why?

22. a) Has the size of your land changed compared to 5 years ago? 1 = Yes; 2=No; 3=Not applicable If yes, please explain how it changed and why?

b) Has the production of your crops changed compared to 5 years ago?
1 = Yes; 2=No; 3=Not applicable
Please explain how and why

K. Ecosystem Services and Supply/Importance

Each of the above ecosystem services will be illustrated on a card and written in the local language. Set all the cards out, in any order, face up. Look through the cards and ask the respondent if they have any questions regarding the meaning of any of the ecosystem services. If they do, listen and clarify what is meant by that ecosystem service(s). Using the information from Table in the section J. Household land use, the land uses practiced by the household, ask what other land uses they use; an example of a used land use would be a community forest. Write all the relevant land uses in the column headings of the 'participatory table.' Ask the respondent to place the ecosystem services cards under the land uses in terms of supply or importance and in order from the greatest/most to the least. Some ecosystem services relate to the effect that land use has, i.e., soil degradation or biomass production. Cards may be placed side by side (meaning they are a 'tie') or not used at all. As the respondent works through the ranking exercise, the interviewer will fill in the table below; '1' is the most important or greatest while cards not used are given a '0'. If it is easier, a picture may be taken instead and Table in the section J. Household land use may be filled out later.

[3] A land use (e.g. farming) system that uses a natural or improved woody fallow phase that is longer than the cultivation phase. Fallow vegetation is usually then cleared using fire. Active (planted) plots are rotated with fallow plots.

23. What is the supply/importance of or effect on ecosystem services from each land use practiced or used by the household?

    Ecosystem Services (Flashcards; Appendix E)

    - Subsistence Crop
    - Natural Medicines
    - Cash Crop
    - Water Recharge/Purification
    - Grazing
    - Biodiversity Maintenance
    - Wild Plants
    - Culture: Identity & Sense of Place
    - Wild Meats
    - Ecotourism
    - Wild Fish & Aquatics
    - Recreation
    - Fibre
    - Fuel
    - Timber

    Referring to the ecosystem services cards again:

24. Of these ecosystem services, which three are the most important to you? Record the three in order from the most to the least important in the table below.

    *If respondent cannot prioritize or says that they are equally important, record their answer and ask why.

Ecosystem Service	**Reason for importance**

25. In regards to wild products (NTFPs, timber, fuel), has the access to and provision (i.e. supply) of wild products changed **when compared to 5 years ago?**

    1 = No change to access or provision
    2 = I have access to land (i.e. fallow) for collection of products but it is farther away/harder

to reach
3 = I have access to land for collection but the usual/same products are difficult to find (there are fewer)
4 = I have access to land for collection but the products are not the same as 5 years ago
5 = I do not have access to land for the collection of wild products to the same extent I did 5 years ago
6 = Other:

_____

_____

_____

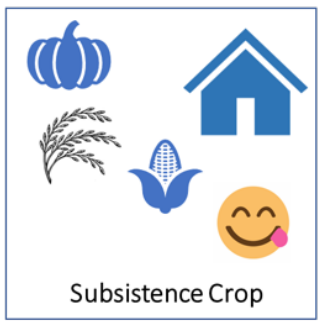
L. Closing

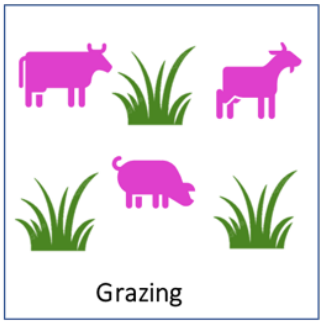
Are there any important changes or issues locally or for your household that we have not discussed today? Is there anything else you wish to discuss? Do you have any questions for us?

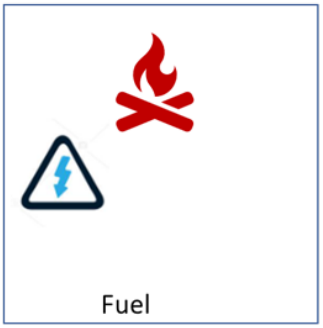
Thank you for your time and participation in this study! We really appreciate it.

[END OF SURVEY FOR]

Appendix E: Ecosystem Services Flashcards







Appendix F: Field Survey

Date:	Site & Household ID:	Field ID:
Respondent:	Slope: Y / N	Area (ha):
Interviewer:	Slope position (of field) • Top • Mid • Bottom	External inputs: Y / N :
Translator:		
Land use:	Slope estimate: • Gentle • Medium • Steep • Very steep	External inputs:

Local Soil Type: _____

General Management (incl. external inputs):

_____

_____

_____

_____

Timeline:

Additional Remarks:

_____

_____

_____

Appendix G: Field and Plot Survey

Required Equipment

- Hoe
- Tape measure (10 m)
- Pole/surveyor flags (4 for each plot corner)
- Bucket
- Auger (marked at 20 cm), if using (or shovel/trowel at 20 cm)
- Trowel
- Bags (for samples) + elastic bands (or equivalent for bags)
- Labels
- Permanent marker (for labeling outside of bags)
- Penetrometer
- Waterproof bag to carry equipment in
- Bag to carry soil samples
- GPS/Camera
- Data sheets (Field Survey + for Penetrometer readings)
- Pen!
- Clinometer

Survey

Date:	Site & Household ID:	Field ID:
Surveyor:	Land use:	Area (ha):
Respondent, if appl:	Stage within cycle/management:	Local Soil Classification
Translator, if appl.:		

Field-Level Data

1. GPS coordinates (lat/long):
2. Elevation (m a.s.l.):

3. Pictures: Take a picture from your standing point in each direction
    - North (image # _____)
    - East (image # _____)
    - South (image # _____)
    - West (image # _____)
4. Slope Angle: Measure with a clinometer and choose one of the following
    - 0 - 2 % Level
    - 2 - 4% Very gently sloping
    - 4 - 8 % Sloping
    - 8 - 16% Moderately sloping
    - 16 - 30% Strongly sloping
    - 30 - 50 % Very steep
    - > 50% Extremely steep
5. Evidence of erosion? Y / N Area affected (
6. Flooding Frequency: Choose one of the following
    - Daily
    - Weekly
    - Monthly
    - Biannually
    - Annually
    - Every 2 - 4 years
    - Every 5 - 10 years
    - Rare
    - Don't know

    Plot-Level Data
7. General field sketch with plot locations (1 - 3) marked:

    ii) General sampling plot location ('X'): Choose A, B or C for Plot 1, 2 and 3

    Plot 1: _____ Plot 2:_____ Plot 3: _____
8. Sketch and Vegetation Cover Estimates (%): Note anomalies, row crops (& sub-sample locations) and estimate vegetation cover using Appendix A.

A. On top of a relief B. On a slope C. Flat/Plateau

Plot 1

Vegetation Cover %: _____

*Appendix I

GPS Coordinates (lat/long); center point:

_____

A Horizon depth: _____

Plot 2

Vegetation Cover %: _____

*Appendix I

GPS Coordinates (lat/long); center point:

_____

A Horizon depth: _____

Plot 3

Vegetation Cover %: _____

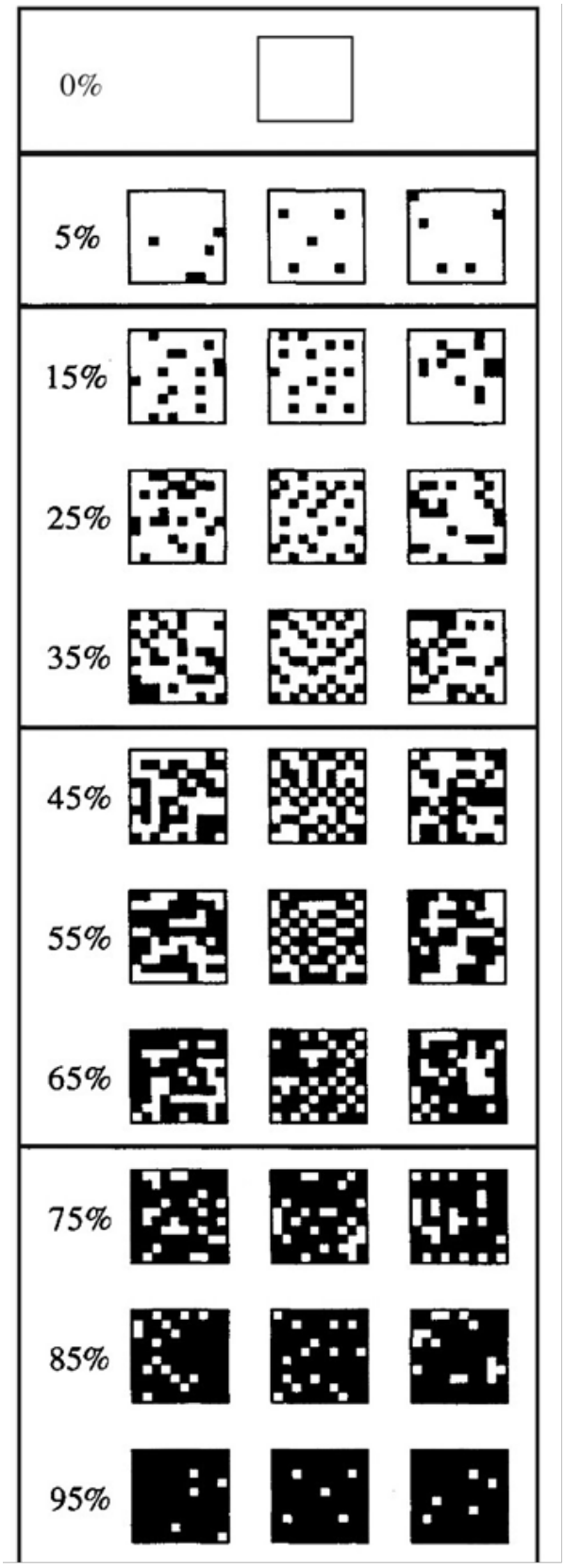
*Appendix I

GPS Coordinates (lat/long); center point:

_____

A Horizon depth: _____

Appendix H: Reference plots for vegetation cover estimates



Narragansett Bay Estuary Program, 2022

Appendix I: Site Survey for Water Sampling

Date:	Site ID: Water ID:
Surveyor: Respondent, if appl.: Translator, if appl.:	Dominant land use/general landscape:

1. GPS coordinates (lat/long):
    - Upstream:
    - Downstream:
2. Elevation (m a.s.l.):
3. Pictures: Take a picture from your standing point in each direction
    - North (image # _____)
    - East # _____)
    - South (image # _____)
    - West (image # _____)
4. Last rainfall event:
5. General description of area (incl. land uses and general practices, if appl.)

References

Powers Jennifer S., Edzo Veldkamp. Regional variation in soil carbon and d13C in forests and pastures of northeastern Costa Rica. Biochemistry. 2005. https://doi.org/10.1007/S10533-004-0368-7

Weil Ray R., Kandikar R. Islam, Melissa A. Stine, Joel B. Gruver, and Susan E. Samson-Liebig. Estimating Active Carbon for Soil Quality Assessment: A Simplified Method for Laboratory and Field Use. American Journal of Alternative Agriculture. 2003. https://www.researchgate.net/publication/273919178