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CDE
CENTRE FOR DEVELOPMENT
AND ENVIRONMENT

INTERNATIONAL WORKSHOP

TRANSITIONING TOWARDS AGROECOLOGY AND REGENERATIVE AGRICULTURE: A CONTRIBUTION TO FOOD SYSTEMS TRANSFORMATIONS



24-27 OCTOBER 2023, Siem Reap, Cambodia

Participatory impact assessment for climate-resilient integrated farming systems

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Organizers:



Partners:





Outline

- Introduction to project
- Impact assessment
- Key results
- Recommendations





IFAD funded project - Scaling-up Climate Resilient Agriculture (SUCRA) project (2018 - 2022)



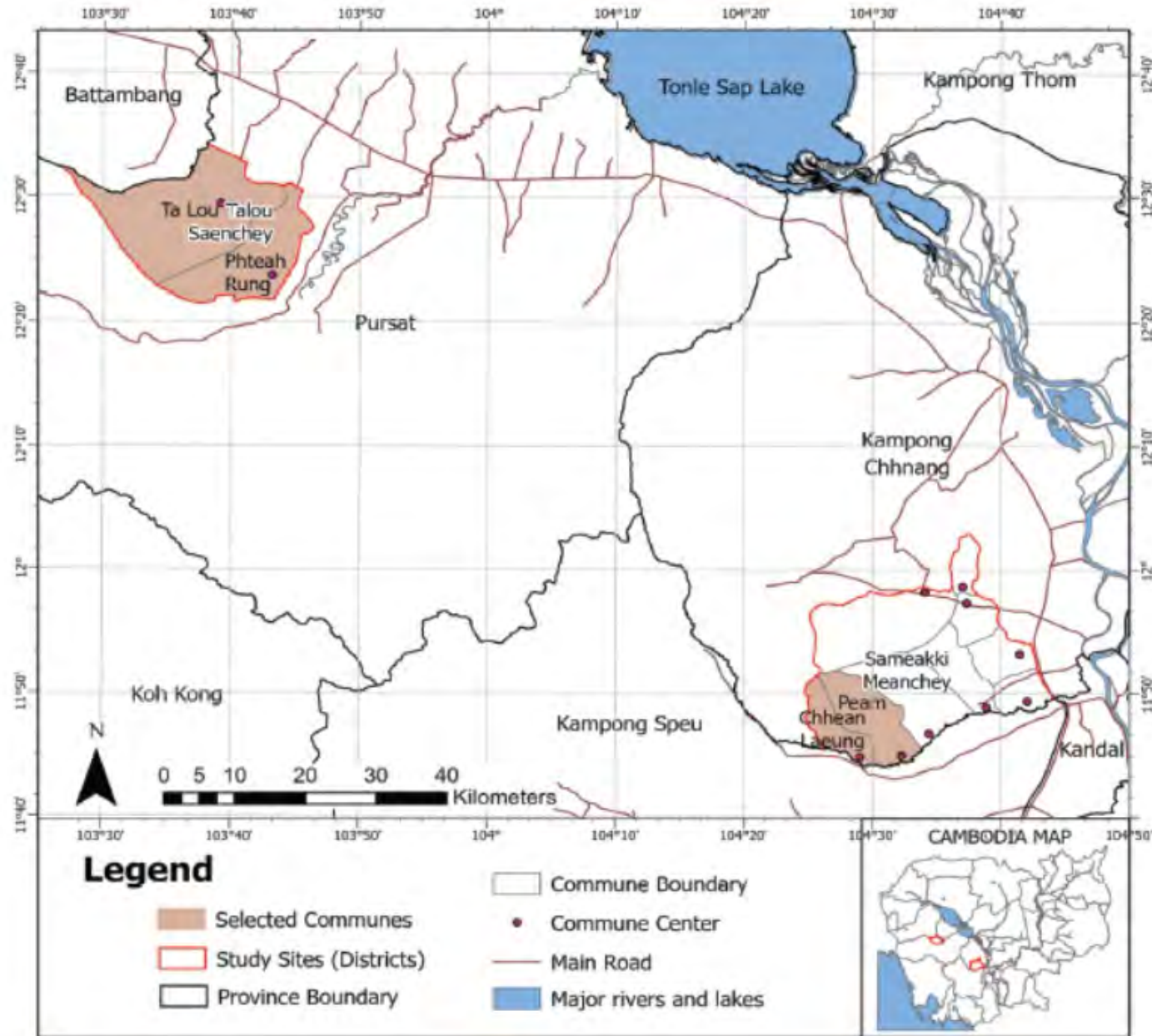
- ✓ The goal is to improve household incomes and build community resilience to climate change by promoting **integrated farming systems**.
- ✓ 1,500 smallholder farmers in Kampong Chhnang and Pursat province
- ✓ Sub-Component 3.2 of ASPIRE of MAFF

Integrated farming systems (IFS): aim to combine multiple crops (e.g., cereals, legumes, tree crops, vegetables) and multiple enterprises (e.g., livestock, apiary, aquaculture) on a single farm in an integrated manner (Behera et al., 2015).

→ **Fostering sustainable land management/agro-ecological practices**



Study sites

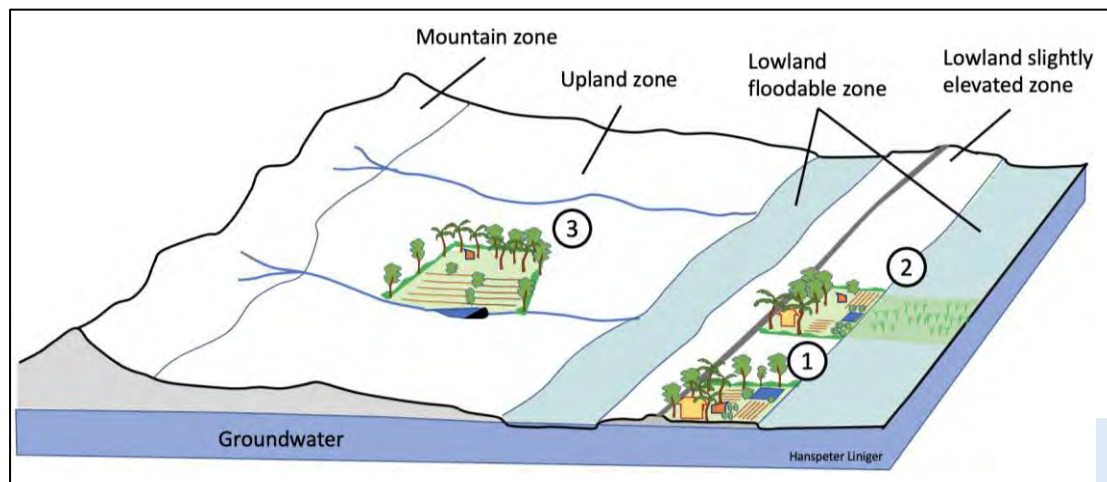


[Tim et al., 2023](#)

Figure 1. Map showing locations of the study sites in Pursat and Kampong Chhnang provinces.



General Landscape Units (GLU) identified



Key biophysical and social criteria	General Landscape Units (GLUs)		
	HOMESTEAD	HOMESTEAD WITH RICE	CHAMKAR
Agro-Ecological Zone	Lowland / flood plains; Upland above floodplains	Lowland / flood plains	Mostly upland
Slope	Flat (0-2%)	Flat (0-2%)	Gentle, moderate to rolling (<15%)
Groundwater table	Shallow (<1m) to medium (<5m)	Shallow (<1m) to medium (<5m)	Very deep (>10m) to inaccessible (>50m)
Settlement history	Settled >30 years ago	Settled >30 years ago	Newly settled / cleared land / forest
Residential house	Yes	Yes	No
Average farm size [ha]	0.52	0.78	0.67
Labour availability (family / casual workers)	Medium to high	Medium to high	Low

GLU Types:

1. Homestead
2. Homestead with Rice
3. Chamkar

Homestead – IFS including artificial pond and aquaculture (GLU1 – IFS M3)



- Vegetables, fruit trees, multi-purpose crops, small livestock, and **artificial pond and aquaculture**:
- 1: Farmhouse
 - 2: Pond with fish
 - 3: Irrigated leafy vegetables
 - 4: Irrigated climbing/fruit vegetables
 - 5: Agroforestry with fruit trees
 - 6: Banana, herbs along walk path
 - 7: Small livestock (chickens, ducks)
 - 8: Wells
 - 9: Water storage tanks
 - 10: Vegetable nursery
 - 11: Living fence, multipurpose trees, indigenous trees

Photo: Hanspeter Linger

Homestead with Rice – IFS including paddy rice-fish aquaculture (GLU2 – IFS M5)



- Vegetables, fruit trees, multi-purpose crops, small and **large livestock** and forage, and **artificial pond and paddy rice-fish aquaculture**:
- 1: Farmhouse
 - 2: Staple of large livestock (cows)
 - 3: Chicken house
 - 4: Forage under coconut trees
 - 5: Vegetables
 - 6: Sugar cane between fruit trees
 - 7a-7b: Bamboo
 - 8: Compost making place
 - 9: Newly planted mango and citrus
 - 10: Rice field
 - 11: Rice-fish-pond aquaculture
 - 12: Indigenous trees
 - 13: Irrigation canal

Photo: Sophea Tim

Chamkar – IFS including irrigated commercial crops (GLU3 – IFS M7)



- Irrigated commercial crop cultivation** integrating vegetables, fruit trees, multi-purpose crops:
- 1, 2, 3: Cashew plantation
 - 4: Excavated pond for water harvesting in a natural stream
 - 5: Natural shrub as a stream buffer
 - 6: Irrigated mixed vegetables intercropped with fruit trees
 - 7: Lemon trees
 - 8: Mango trees
 - 9: Resting shade

Irrigation from pond and natural stream

Photo: Hanspeter Linger

[Tim et al., 2023](#)

Integrated Farming System (IFS) Models



7 IFS Models:

M1: IFS including **small livestock** – agroforestry – fruit/vegetable production

M2: IFS including **large livestock** – agroforestry – fruit/vegetable production

M3: IFS including **artificial pond and aquaculture** - agroforestry – fruit/vegetable production – small/large livestock

M4: IFS including **paddy rice cultivation** - agroforestry – fruit/vegetable production

M5: IFS including **paddy rice-fish aquaculture** - agroforestry – fruit/vegetable production

M6: IFS including **rainfed commercial crops** - agroforestry – fruit/vegetable production

M7: IFS including **irrigated commercial crops** - agroforestry – fruit/vegetable production

Key components / characteristics	HOMESTEAD			HOMESTEAD WITH RICE		CHAMKAR	
	IFS M1	IFS M2	IFS M3	IFS M4	IFS M5	IFS M6	IFS M7
IFS Model including	Small livestock	Large livestock	Pond & aquaculture	Paddy rice cultivation	Paddy rice-fish-aquaculture	Rainfed commercial crops	Irrigated commercial crops
Mixed vegetables							
Multi-purpose crops/bushes/trees							
Leguminous crops							
Commercial crops							
Fruit trees							
Small livestock							
Large livestock (>2)							
Pond and fish culture							
Paddy field							
Paddy field-fish aquaculture							
Composting (fertilizer)							
Bio-digester (gas production for cooking and lighting)							
Water source: Pond/well/tap water							
Irrigation (importance)	+++	+++	+++	+++ (dry season)	+++	Mostly rainfed	++

Colour legend:

Key component

Additional component

Optional component

Tim et al., 2023

(Tim et al., 2023)

TARASA23



Activities

- ✓ Farmer mobilization and training on IFS and related topics
- ✓ Development of IFS farm plans
- ✓ **Decision support workshops with farmers**
- ✓ Training farmers on post-harvest technologies
- ✓ Implementation of farm plans
- ✓ **Assessment framework and monitoring of IFS**

Key figures

- ✓ 1,502 HHs (female: 834) trained on IFS and related topics
- ✓ 1,500 IFS farms set up (all with farm plans)
- ✓ 28 communities of practices (CoP) groups formed

Lead: IIRR and RUA



Objectives of the Impact Assessment

- ✓ To assess impact of the IFS practices on a farm
- ✓ To compare initial and end of project assessment using bio-physical and socio-economic indicators (monitoring)
- ✓ To identify suitability of IFS practices for different landscapes.
- ✓ To train the project team and stakeholders (PDAFFs) on data collection, data entry, data analysis and dissemination of results.



Co-development of Impact Assessment Framework

- The tools are **co-designed** through an online process building on existing tools
- Process includes **capacity building** components on IFS



SUCRA
ASSESSMENT TOOLS

Core team

CDE/WOCAT
(leading)

RUA Team

Local Consultant

Executive partner

International Institute of
Rural Reconstruction
(IIRR)



Assessment of Impacts



Google Earth image



Nov 2019

Drone picture



Aug 2021

VS

The Assessment Tools consist of five parts – plus a field manual

- Part 1: General farm assessment
- Part 2: Farm layout, land use, IFS practices and water
- Part 3: Biophysical indicators assessment sheet
- Part 4: Social-economic indicators assessment sheet
- Part 5: Data entry analysis



SUCRA Part 1: General farm assessment
Data record sheet

drop down - simple
drop down - complex
write in excel cell (no drop down)

1. General information about the farm Assessment Farm x

Part 2: Farm layout, land use and water resources

Preparation before the field visit:

PART 3
SUCRA Field record sheet: biophysical indicators
Date: 07.09.2021 Legend: drop down - simple

PART 4
SUCRA Field record sheet - socio-economic indicators
Date: 07.09.2021 Legend: drop down - simple
Name observer(s): Yutha Nida/ Teamhy Farmer assessment F write in excel cell (no drop down)
Farm ID / Assessment: PP-CR104 Interviewer assessm I
General Landscape Unit: 3 Together I/F
IFS Model: 7

No	SE Indicators	Assessment	Mapping unit 1	Mapping unit 2	Mapping unit 3	Mapping unit 4	Mapping unit 5			
I/F E1	Given name of mapping unit	Transfer result from part 3 E1	Farmstead	Fruit Tree inter cropping	Pond					
I/F E2	Mapping unit	Transfer result from part 3 E2	Ab-1,39-BKNP	Gb-13-BKOP	Cb-43-W					
I/F E2a	Land ownership	A: State; B: Company; C: Communal/ village; D: Group; E: Individual - not titled; F: Individual - titled (soft); G: Individual - titled (hard); H: Other	F	F	F					
I/F E2b										
I/F E2c										
I E2d										
I/F S2	Land use rights	A: Open access (unorganized); B: Communal (organized); C: Leased (rental); D: Individual; E: Other	D	D	D					
I/F S3	Water use rights	A: Open access (unorganized); B: Communal (organized); C: Leased (rental); D: Individual; E: Other	D	D	D					
I/F E4	INPUTS on each mapping unit for last year (or since the last assessment), (judgment by land user)	1 to 5 Labour (compare mapping units): 0: No, 1: Very low, 2: Low, 3: Medium, 4: High, 5: Very high Costs for material/inputs (compare mapping units): 0: No, 1: Very low, 2: Low, 3: Medium, 4: High, 5: Very high	Labour (all the labour by the farmer, his family members, or by hired labour)	Costs for materials, including hired as well as own machinery	Labour (all the labour by the farmer, his family members, or by hired labour)	Costs for materials, including hired as well as own machinery	Labour (all the labour by the farmer, his family members, or by hired labour)	Costs for materials, including hired as well as own machinery	Labour (all the labour by the farmer, his family members, or by hired labour)	Costs for materials, including hired as well as own machinery
I/F S5	Land preparation	Labour (compare mapping units): 0: No, 1: Very low, 2: Low, 3: Medium, 4: High,	2	2	3	2	2	2		

a) Overview

Data collection at an IFS farm



Drone picture and mapping unit delineation



Interview the farmer



Observe the farm and collect bio-physical data

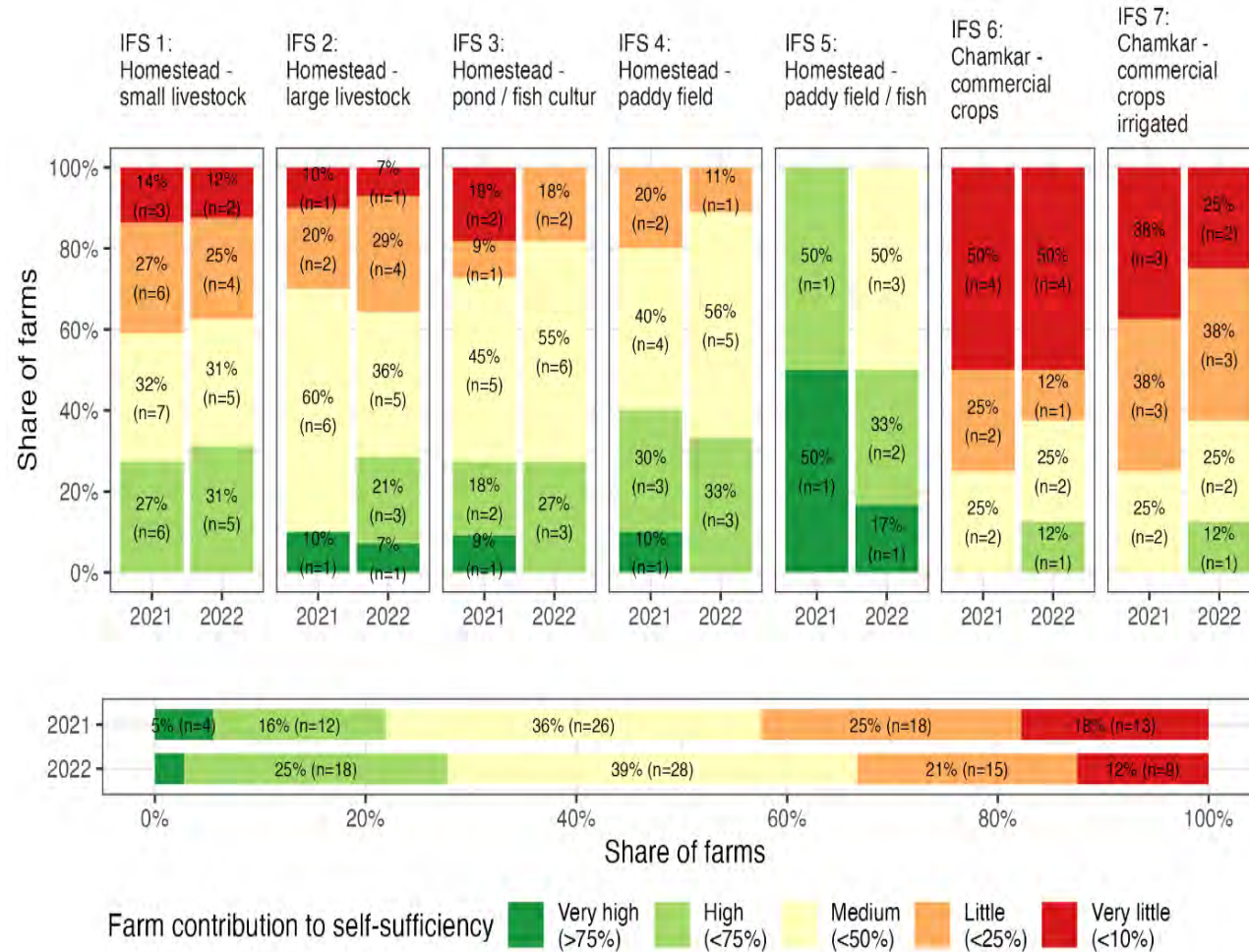


Panorama photo

Key
results



Farm contribution to self-sufficiency by IFS



Impact assessment allows to compare different IFS models, e.g. **self-sufficiency**.

- Homestead with rice & fish (IFS 5) has highest contribution.
- Chamkar (IFS 6 & 7) has the lowest as it is market oriented.

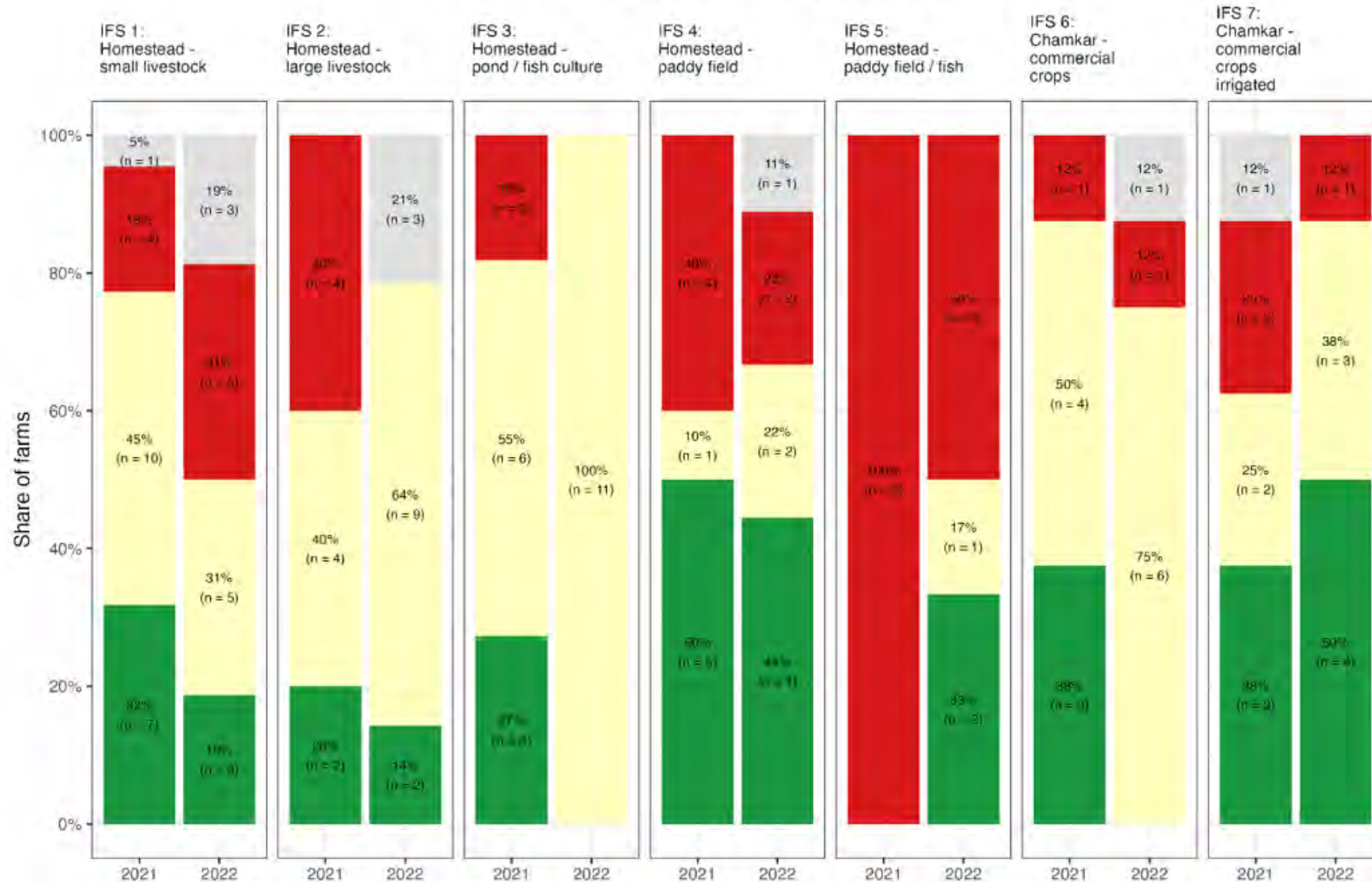


Market value of farm products

Market value of farm products ■ Increased ■ Stable ■ Decreased ■ Do not know



Market value of farm products by IFS model

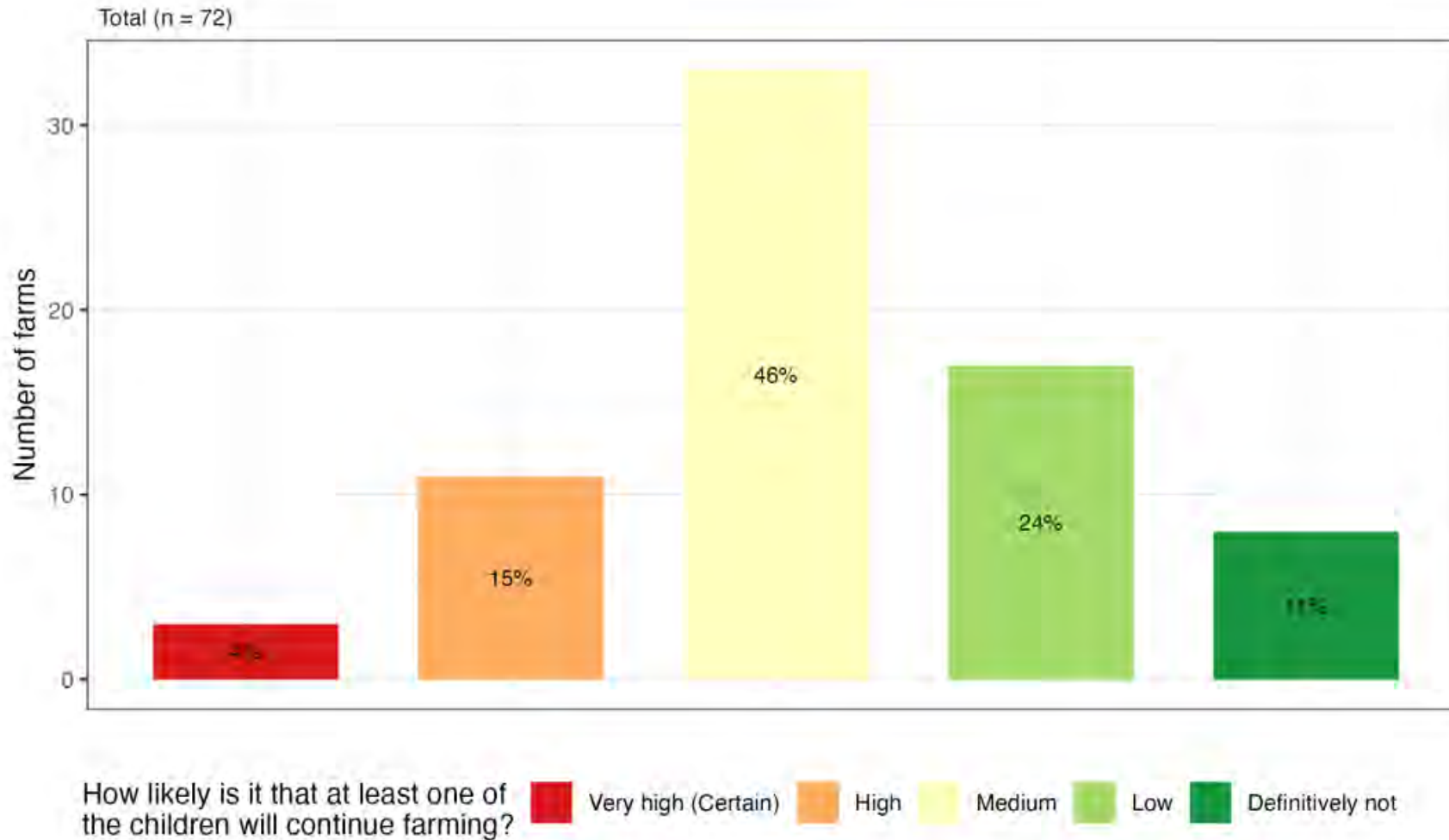


Market value is mostly increasing for all IFS

→ More indicators have been assessed: soil health, impact of climate extremes, ...



Likelihood of children continuing farming



Key concern for the future:
Few young farmers are interested to continue farming

→ What would make farming more attractive?



Knowledge Products by the Project



- SUCRA leaflet
- Posters of 7 IFS models
- Guideline of IFS community of practice (CoP)
- Guideline of IFS promotion with farmers
- Journal article (Tim et al. 2023)

The SUCRA leaflet is a colorful document with multiple sections, including text, images of farmers, and diagrams illustrating agricultural systems. It features the IIRR and IFAD logos at the top.

A collection of posters for 7 IFS models. The central poster is titled 'សាកលវិទ្យាល័យកម្ពុជា' (Cambodia University) and 'កម្ពុជា' (Cambodia). It includes a diagram of an Integrated Farming System (IFS) with various components like rice, livestock, and aquaculture. Other posters show photos of farmers and agricultural fields.

Two guidelines related to IFS. The top one is titled 'គម្រោងស្តីពីការពង្រឹងបច្ចេកទេសកសិកម្មដែលផលិតទំនេកសាសនា' (Project on Improving Agricultural Techniques for Producing Quality Rice). The bottom one is titled 'គម្រោងស្តីពីការពង្រឹងបច្ចេកទេសកសិកម្មដែលផលិតទំនេកសាសនា' (Project on Improving Agricultural Techniques for Producing Quality Rice). Both include text, photos, and diagrams.

Journal article cover for 'Strengthening climate resilience of rural communities by co-producing landscape-specific integrated farming systems in Cambodia'. The authors listed are Sophea Tim, Isabelle Providoli, Teamhy Sien, Sokphors Yim, Soben Kim, and Hanspeter Liniger. The journal is 'Journal of Land Use Science', 2023, Vol. 18, No. 1, 152-175. It is published by Taylor & Francis and is available as an open access article.

A stack of various knowledge products, including posters, guidelines, and a journal article. The products feature the IIRR and IFAD logos and show images of farmers and agricultural fields. The stack is arranged in a way that shows multiple copies of the same materials.



Recommendations and outlook



- ✓ Farms and IFS practices have to be linked to the respective **agro-ecological zone/landscape**.
- ✓ **Proper monitoring and evaluation** of the impacts of IFS is needed to show the benefits and reveal constraints for large-scale implementation of IFS.
- ✓ Implementation projects should support **long-term impact assessment** including bio-physical and socio-economic indicators.
- ✓ The approach is suitable for **upscaling to other projects and areas/provinces** in Cambodia.
- ✓ Farming should be made **more attractive for the young generation** by promoting new business opportunities.



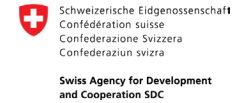


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