

Diverse Agroforestry Systems of Central Asia: Exploring the Traditional Practices

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CLIENT II
International Partnerships for
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Sustainable
Food Systems



**HOCHSCHULE
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of Applied Sciences

Challenges ahead in Central Asia



In the agricultural and forest landscapes

- 👤 One of the most vulnerable regions to climate change (*Vakulchuk et al. 2023*)
- 👤 Greater temperature rise than other parts of the world (*Sabyrbekov et al. 2023, IPCC 2022*)
- 👤 Agricultural sector is an important source of livelihood for the rural population in Central Asia!

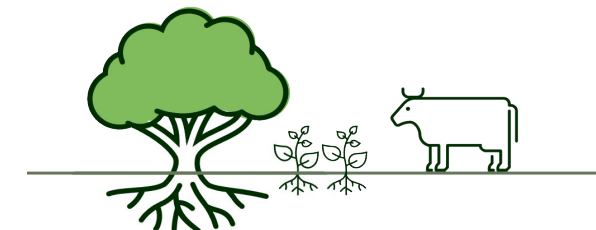
Threats now & future:

- 👤 Excessive water use & scarcity
- 👤 Land degradation
- 👤 Overgrazing
- 👤 Erosion
- 👤 Population increase



A possible solution...

Agroforestry systems (AFS)



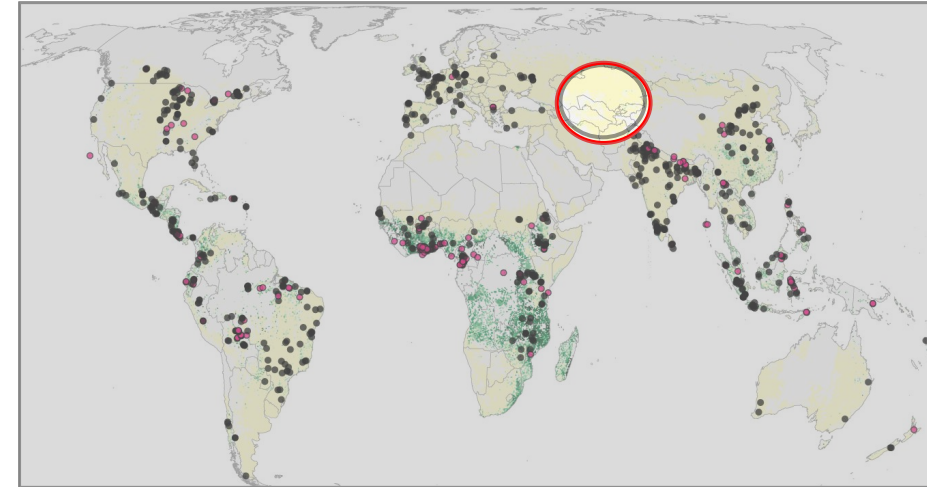
AFS in Central Asia



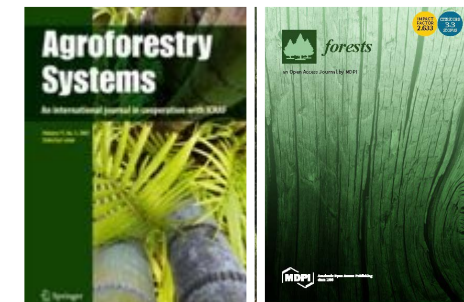
Current knowledge of AFS practices:

Practice	Spread
Alley Cropping	Moderately practiced
Silvopasture	Rarely practiced
Windbreaks	Rarely practiced
Live fences	Rarely practiced
Fruit-based agroforestry	Moderately practiced, but increasing
Kitchen gardens	Extensively practiced
Managed woodland for NTFP	Rarely practiced
Riparian buffers	Moderately practiced

Defined by *Djanibekov et al. (2016)*



Modified from *Terasaki Hart et al. (2023)*



Publications mostly describing poplar & windbreaks

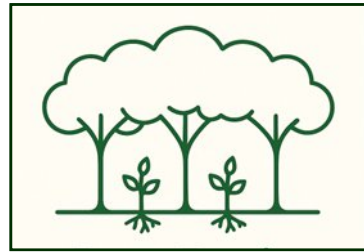
What AFS practices exist?



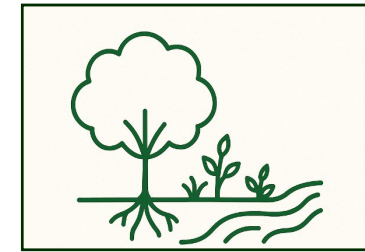
Different systems possible



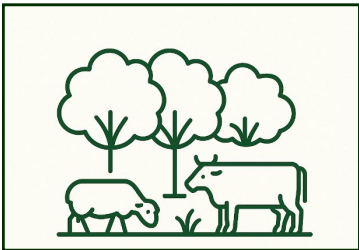
Alley Cropping



Forest Farming



Riparian Buffer



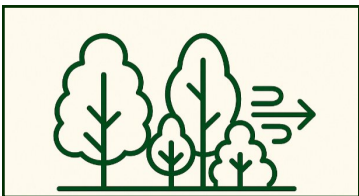
Silvopasture



Food Forest



Homegarden



Windbreak,
live fences

[...]

What inter- and intra-diversity exist?
incl. tree, crop, animal species



How to get an AFS overview?

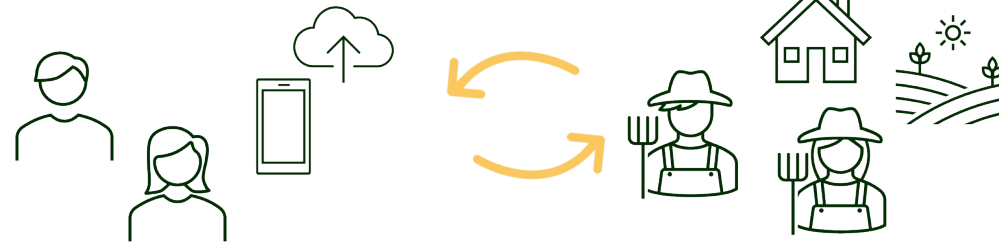


Mixed method approach: collecting observations

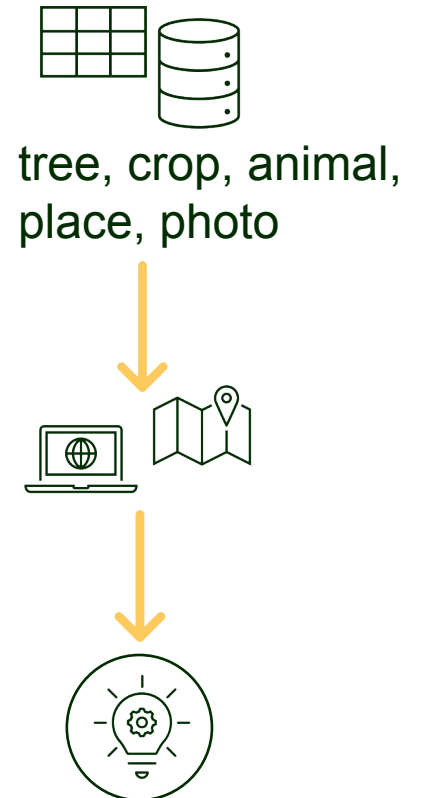
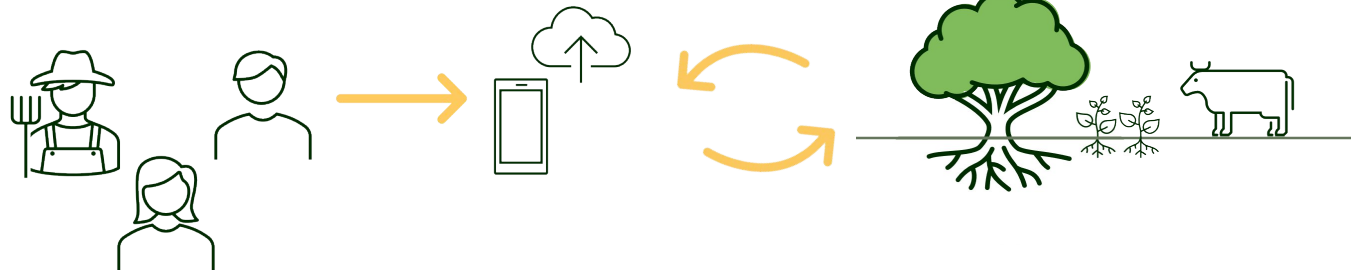
A. Literature review



B. Household survey



C. Agroforestry survey tool



Agroforestry survey tool



A randomized and easy access approach

- 👤 Permanent survey link which allows to access via mobile or desktop
- 👤 Data collection of photos, GPS position, and more details
- 👤 Automatic upload to University's server, GDPR compliant
- 👤 Open-Source Software (ODK & Enketo)
- 👤 Shared among stakeholders

à Expected output: Online map &
structured glimpse




**Welcome to the
Agroforestry Survey Tool!**

This survey will ask you several questions about agroforestry systems (AFS). The answers will contribute to an overview of the AFS present in Central Asia. This assessment is part of the SUFACHAIN project. For more information, visit <https://sufachain.org>

The survey will guide you through you several questions.

An AFS is defined by the combination of trees with crops and/or livestock. Herein, trees include all woody structures as trees or shrubs. The term crop refers to all arable plants, including vegetables.

Please see the defining picture below:



First, which of the following best describes your role?
Select one.

☐ Researcher

☐ Farmer

☐ Consultant

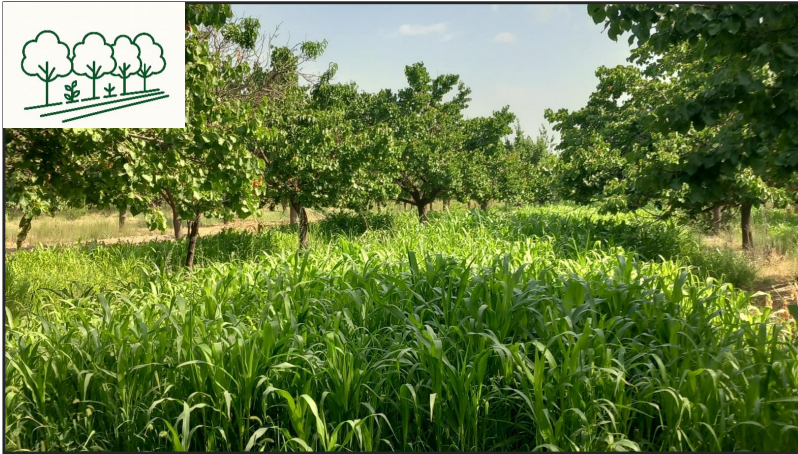
☐ Other

Results: Insights via photos

AFS inter-diversity



Visual knowledge



Case: “The land of apricots”



Apricot (*Prunus armeniaca*) in the Batken Oblast - Kyrgyzstan

- ☛ Semi-arid, cold desert climate (BWk)
- ☛ ~ 10,000 hectares of apricot orchards
- ☛ Mostly furrow irrigated and management varies
- ☛ Highly susceptible to climatic events (e.g. frost, drought)
- ☛ Variable yield (e.g. alternance)
- ☛ Main source of income for the local people
- ☛ Export: mostly CIS countries, and increasingly to the EU





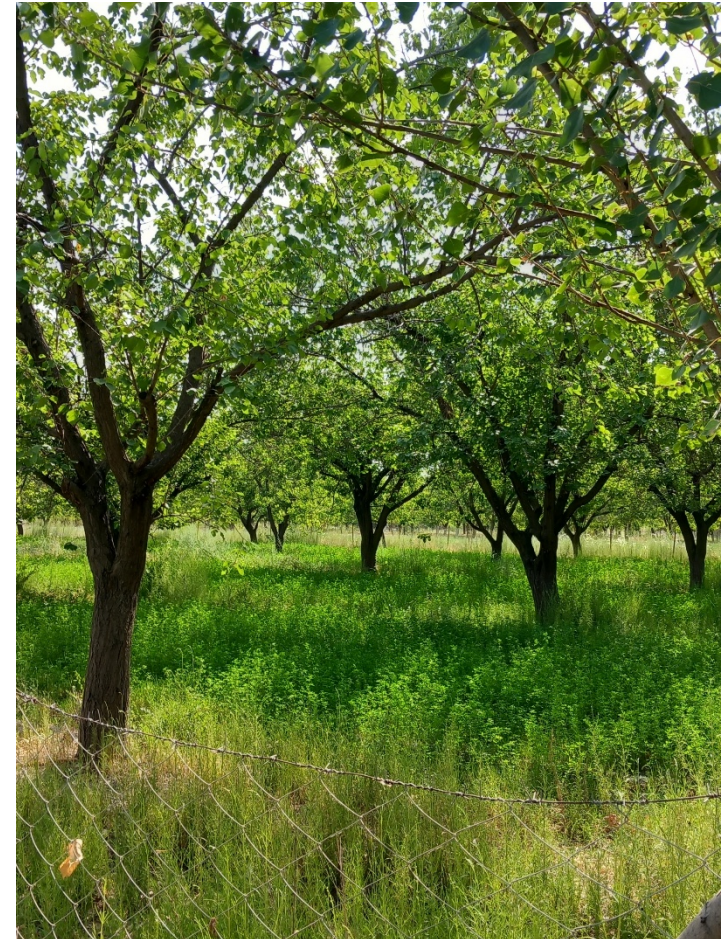
“Land of apricots” I



AFS intra-diversity



AFS of apricot & alfalfa



“Land of apricots” II



AFS intra-diversity



More combinations, apricot & ...



Maize



Barley



Sorghum

“Land of apricots” III



AFS intra-diversity



More combinations, apricot & ...



Potato



Strawberry



Grapes

“Land of apricots” IV



AFS intra-diversity



More combinations, apricot & ...





& animals...

What to expect?



Preliminary conclusions

Inter-Diversity

- ☛ Manifold AFS practices exist
- ☛ Photos create visibility

Intra-Diversity

- ☛ Apricot AFS show several examples of combinations:
 - ☛ crops
 - ☛ animals

Future research (ongoing)

- ☛ Assessing AFS management: apricot, walnut
- ☛ Creating a map of AFS practices
- ☛ Understanding distribution

Discussion

- ☛ AFS practices definition?
- ☛ Multifunctionality and resilience assessment?
- ☛ Response via AFS tool very low, how to improve?

A paradigm shift...



Diversified agriculture outperforms specialized agriculture!

Science

HOME > SCIENCE > VOL. 384, NO. 6691 > JOINT ENVIRONMENTAL AND SOCIAL BENEFITS FROM DIVERSIFIED AGRICULTURE

RESEARCH ARTICLE | FARMING PRACTICES

Joint environmental and social benefits from diversified agriculture

LAURA VANG RASMUSSEN, INGO GRASS, ZIA MEHRABI, OLIVIA M. SMITH, AND CLAUDE KREMER

Vol 384, Issue 6691 · pp. 87-93 · DOI: 10.1126/science.adj1914

Rasmussen et al. (2024)

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Find out more www.sufachain.org



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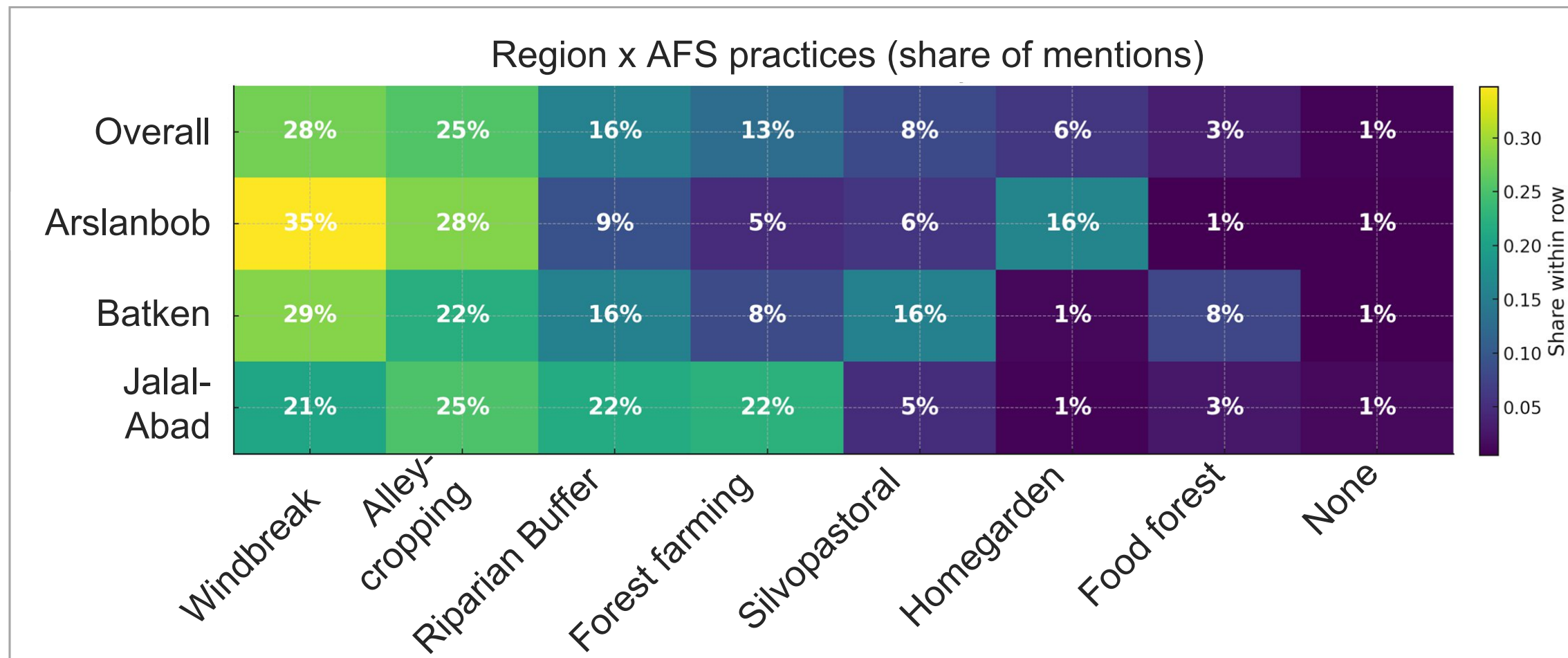
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Household survey: Kyrgyzstan



First insights: distribution (n=250)





Walnut &
Alfalfa



Walnut &
Pasture & Cow

An aerial photograph of a rural landscape. A prominent, winding line of trees, identified as a poplar windbreak, runs diagonally across the center of the image. The trees have a mix of green and yellow foliage. To the left of the windbreak is a dense forest of dark green trees. To the right and above the windbreak are several large, open fields in various stages of cultivation, some appearing brown (plowed) and others green. A dirt road or path winds through the fields on the right side. In the bottom left corner, there is a white rectangular box containing the text "Windbreak Poplar".

Windbreak
Poplar

A photograph showing a group of people harvesting potatoes in a field. In the foreground, a young walnut tree stands next to a large pile of harvested potatoes. Several workers are visible in the background, using tools to dig up more potatoes. The field is surrounded by mature trees, and snow-capped mountains are visible in the distance under a cloudy sky.

Walnut &
Potatoe

A photograph of a flock of black turkeys in a grassy field. The ground is covered with fallen yellow leaves. In the background, there are trees with bright yellow autumn foliage. A white text box is in the bottom left corner.

Walnut &
Turkey

A photograph of a lavender field. In the foreground and middle ground, there are several rows of tall, green lavender bushes. To the left, there is a large, dense green tree. In the background, there are rows of cherry trees with green leaves. The sky is overcast with grey clouds.

Lavender
& Cherry

Hazelnut

Onion

Birch

Thistle

