Impact Pathways and Impact Forecast for Sustainable Land Management in northern Ghana

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COINS
co-developing innovations for sustainable land management in West African smallholder farming systems

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DecLaRe
Decision support for strengthening Land Resilience in the face of global challenges

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Sustainable Land Management in northern Ghana

Challenges:

- Land degradation
- Low soil fertility
- Low yield
- Unpredictable rainfall (crop failure)
- Inequity in access due to cultural and systemic norms
- Poverty

Proposed solutions: Sustainable intensification practices

- Revive soil, increase yield, income and farmers livelihood
- Contribute to SDGs

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Integrated Soil Fertility Management (ISFM) in northern Ghana

Baseline: Maize monoculture (traditional seed) and no soil amendment

Improved seed

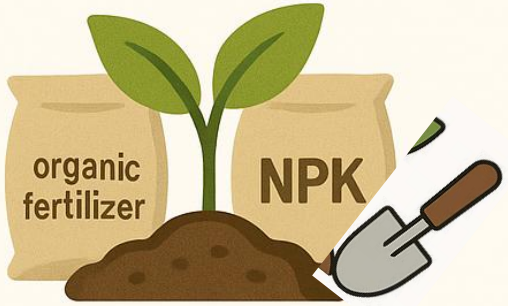
Maize & soybean

Improved seed + mineral fertilizer

Improved seed + organic fertilizer

Improved seed + fertilizer combination

Improved seed + minimum tillage



Improved seed + fertilizer combination + minimum tillage

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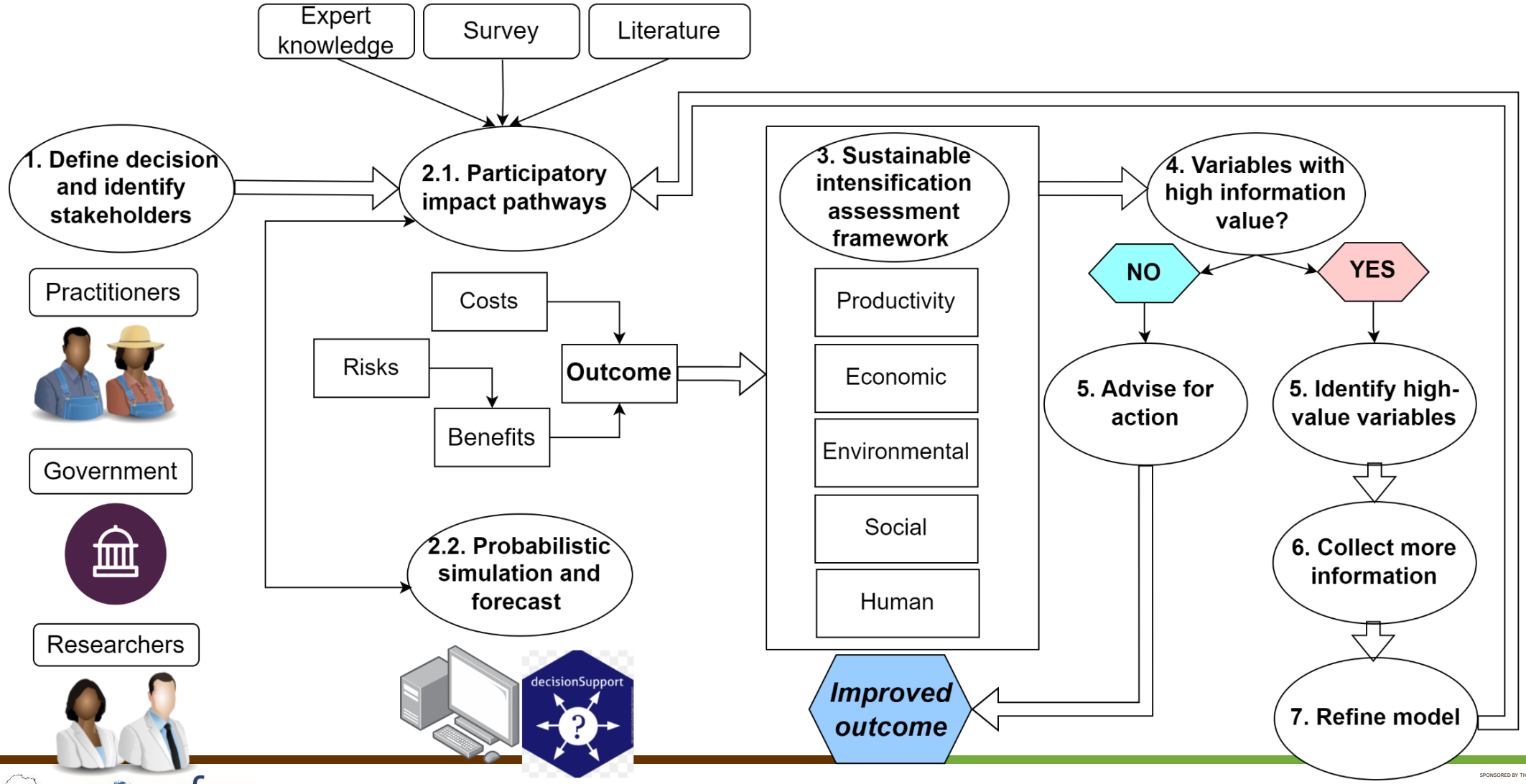
Decision making in agriculture

Farmers always have a decision to take when choosing practices

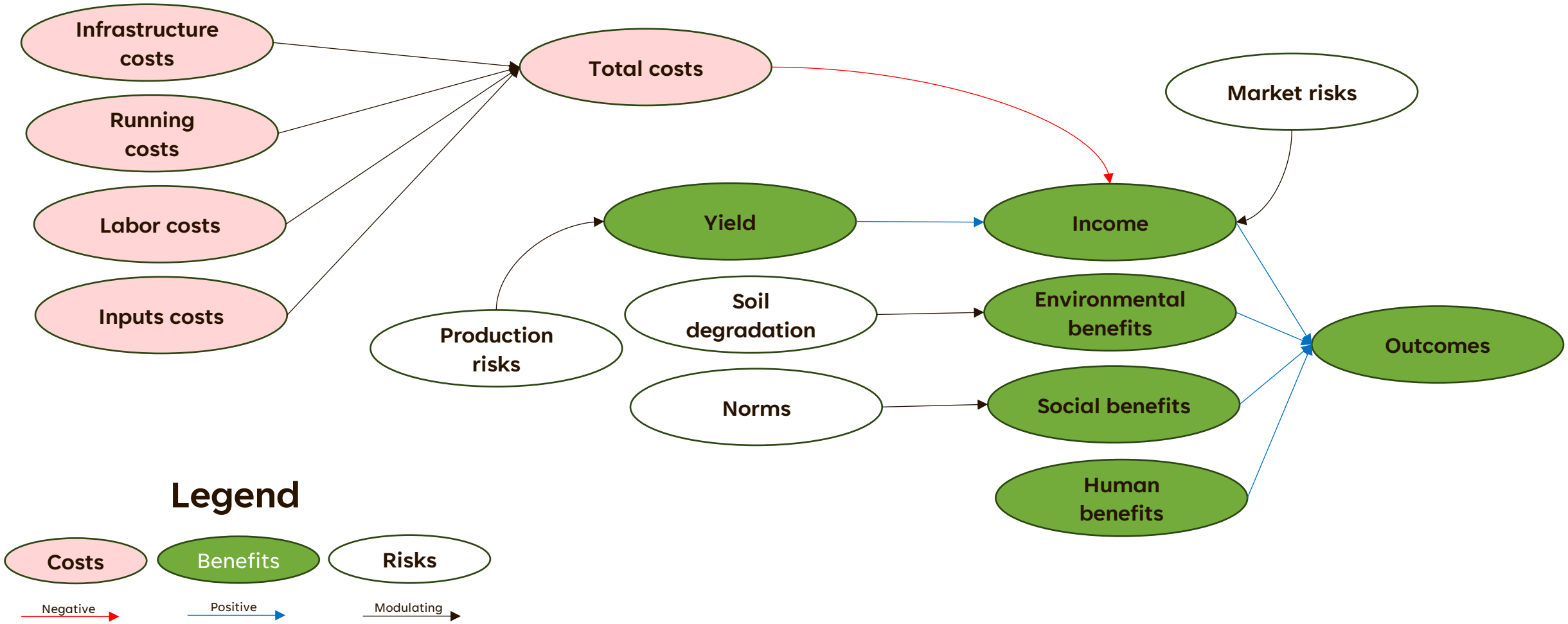
Ideal option: multiple benefits, while minimizing costs and risks

How can we simulate and forecast the impact of ISFM options?

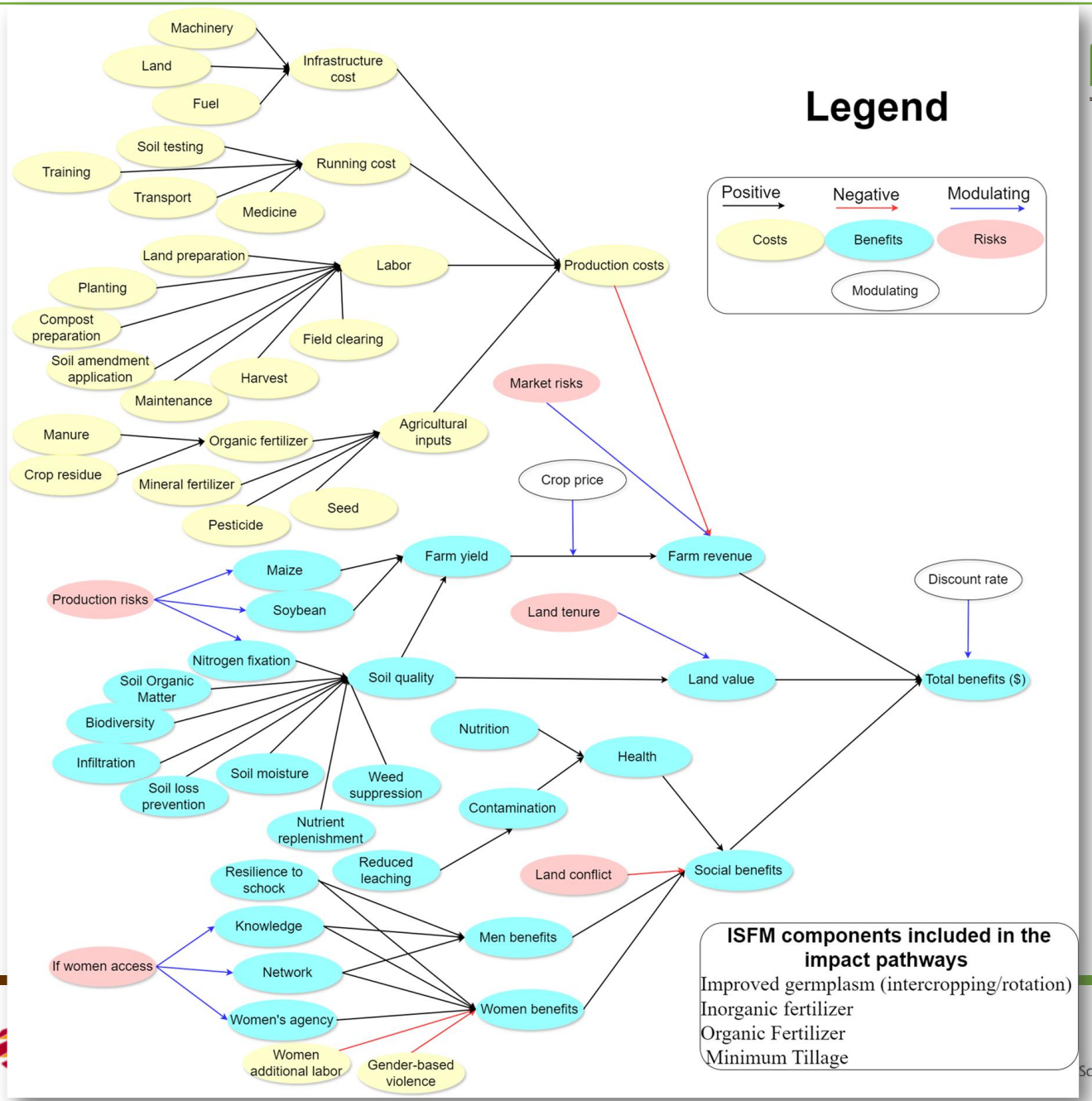
Probabilistic modeling approach



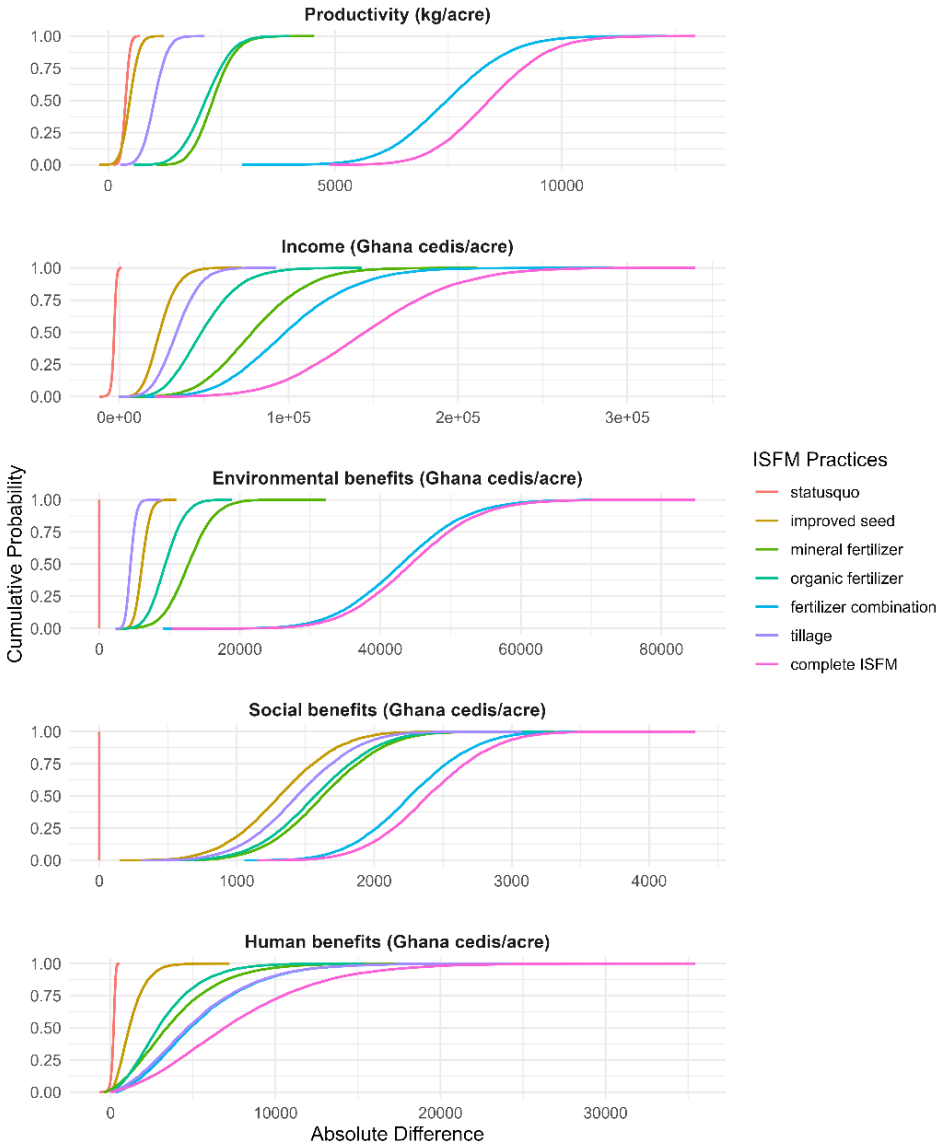
Impact pathway of farm-level benefits



Impact pathway of farm-level ISFM



Farm-level benefit of ISFM practices on sustainable intensification outcomes



- Probabilistic model forecast on a 10-year time frame
- Complete ISFM is the most beneficial and sustainable option compared to the status quo

Gender and intersectionality

https://ospe.on.ca/advocacy/intersectionality/

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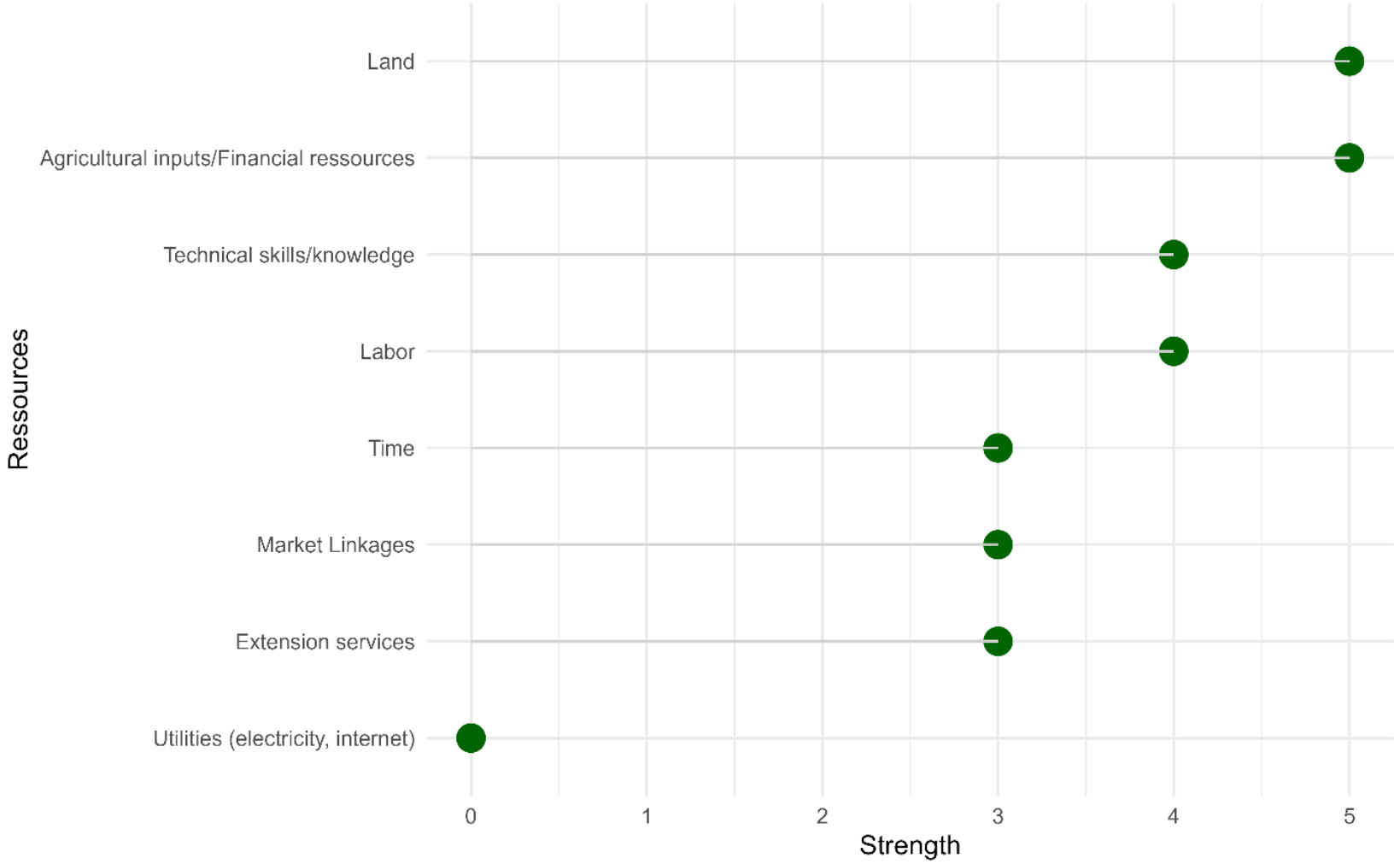
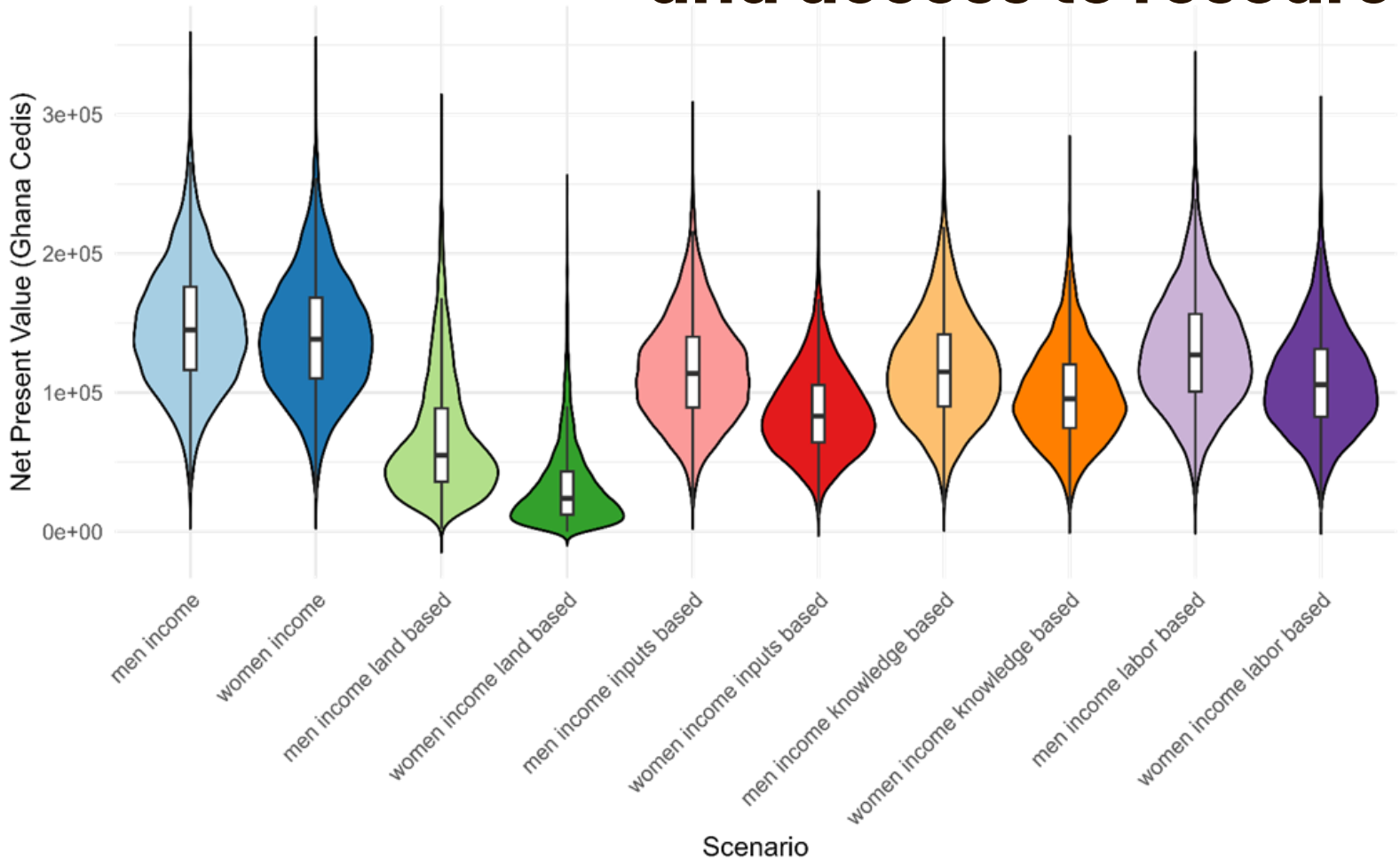
Beyond gender: intersectionality in agriculture

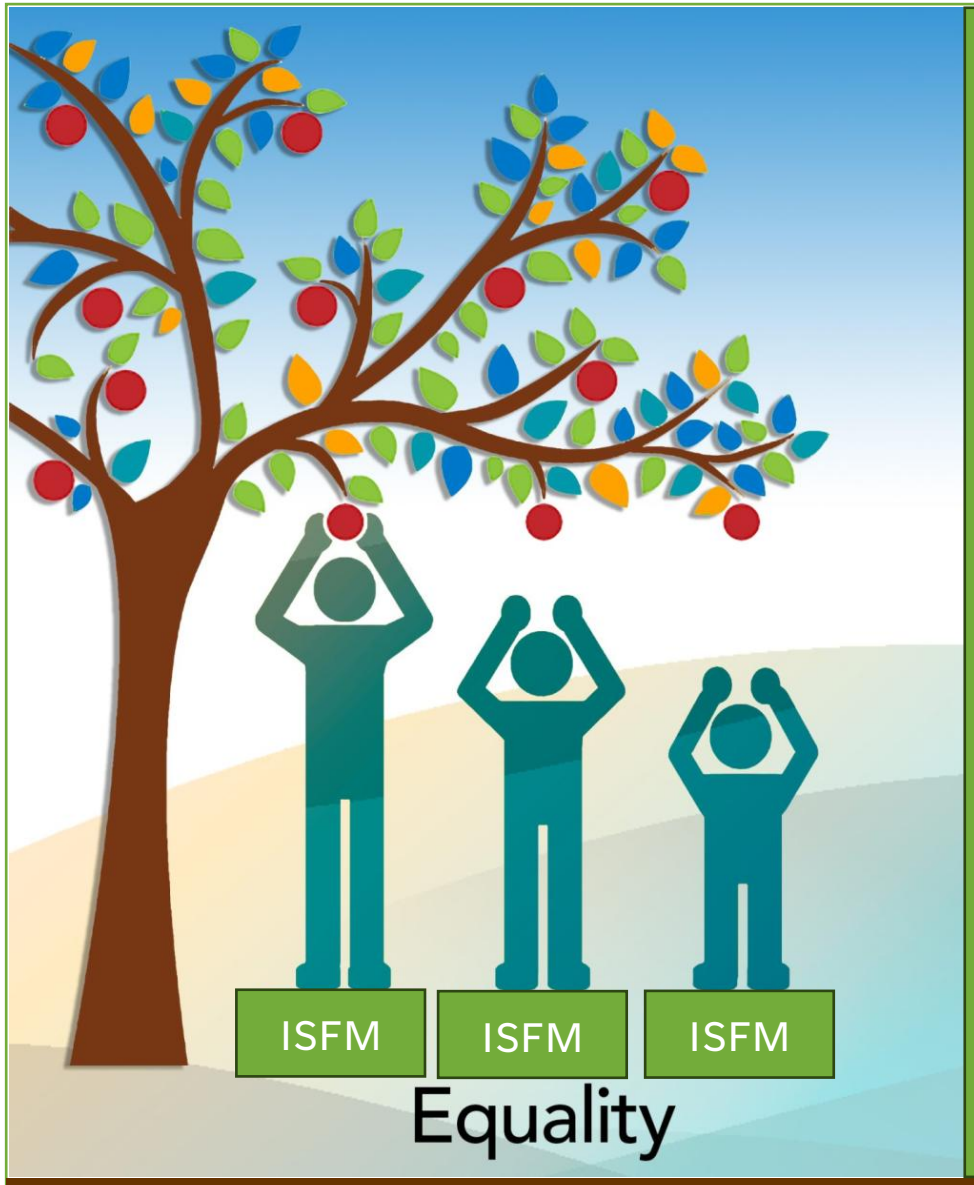


- Gender and resource endowment shapes who benefits from agricultural innovation.
- A gender-sensitive, intersectional lens is essential for equitable agricultural transformation.

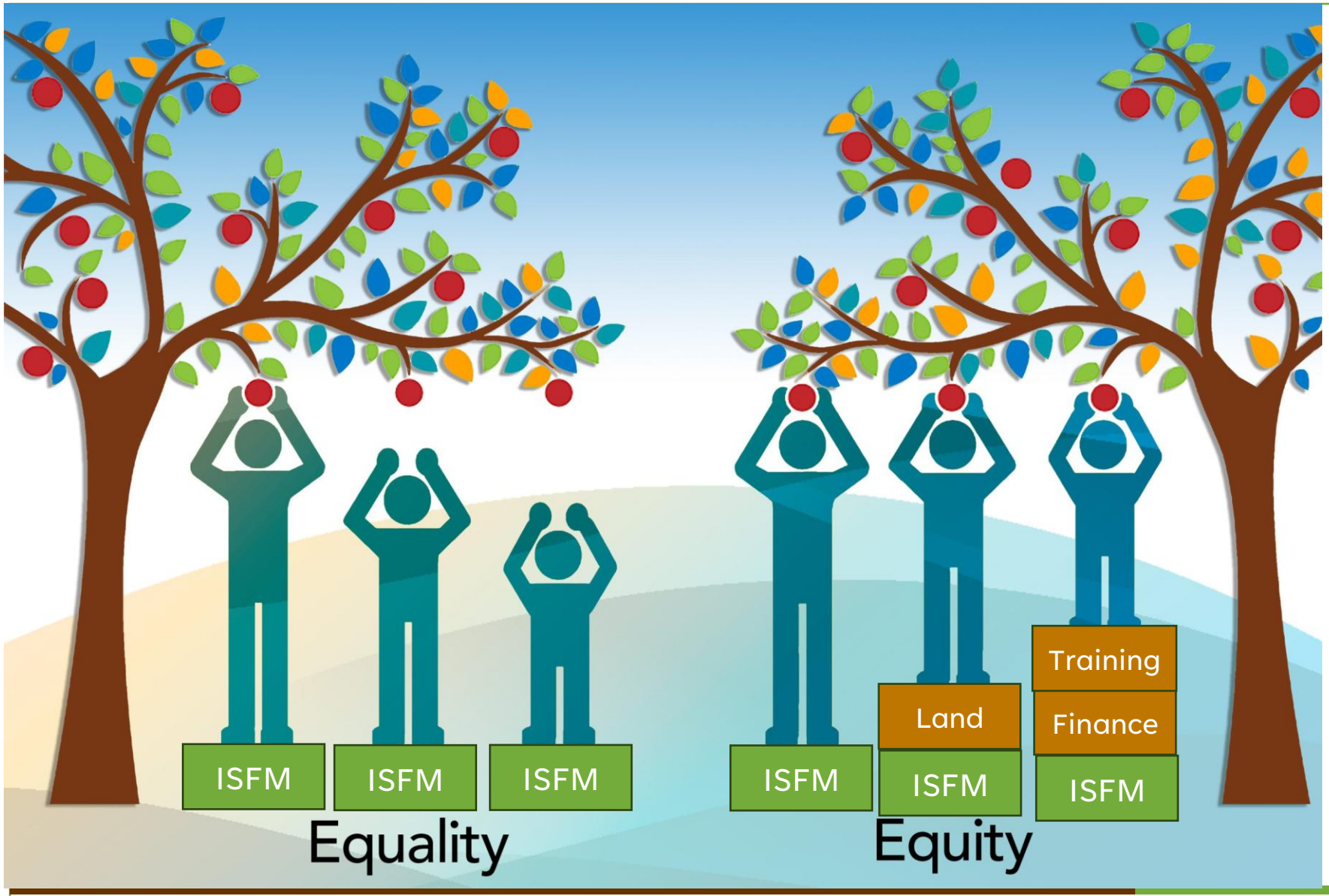
Complete ISFM benefit shaped by gender and access to resources



Net Present Value (NPV) of the economic benefits based on the intersection of gender, land, labour, knowledge and inputs availability



- Farmers are not homogeneous
- Agricultural innovations do not benefit farmers equally



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- Complementary innovations to the main innovation (ISFM) are needed.

No farmer should be left behind

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Microdosing in Savannah region-Ghana

- Fertilizer micro-dosing as a promising innovation for smallholder farmers in agroforestry system (maize and shea tree)

Maize + shea

Maize + shea + recommended fertilizer

Maize + shea + fertilizer micro dosing

- How does it perform in the long run compared to the status quo ?

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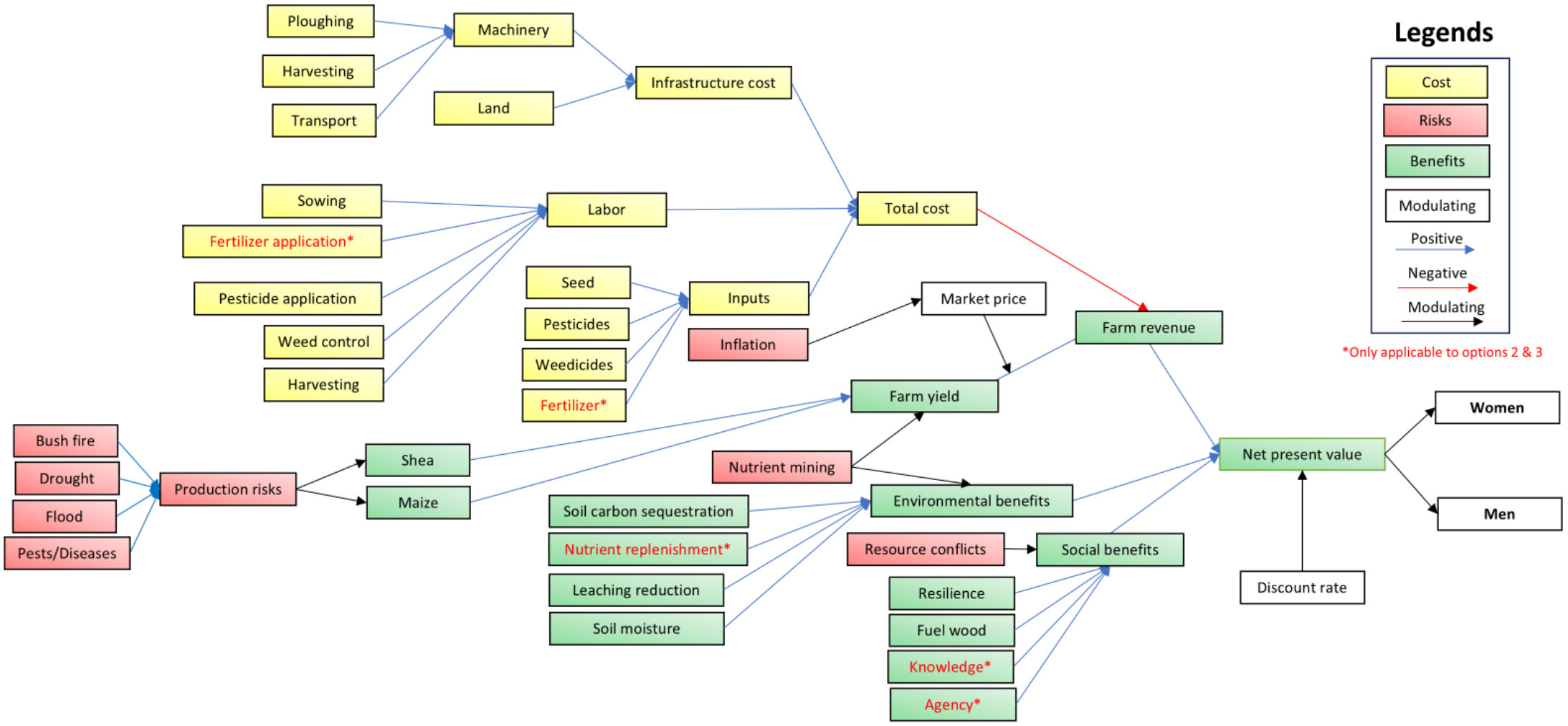
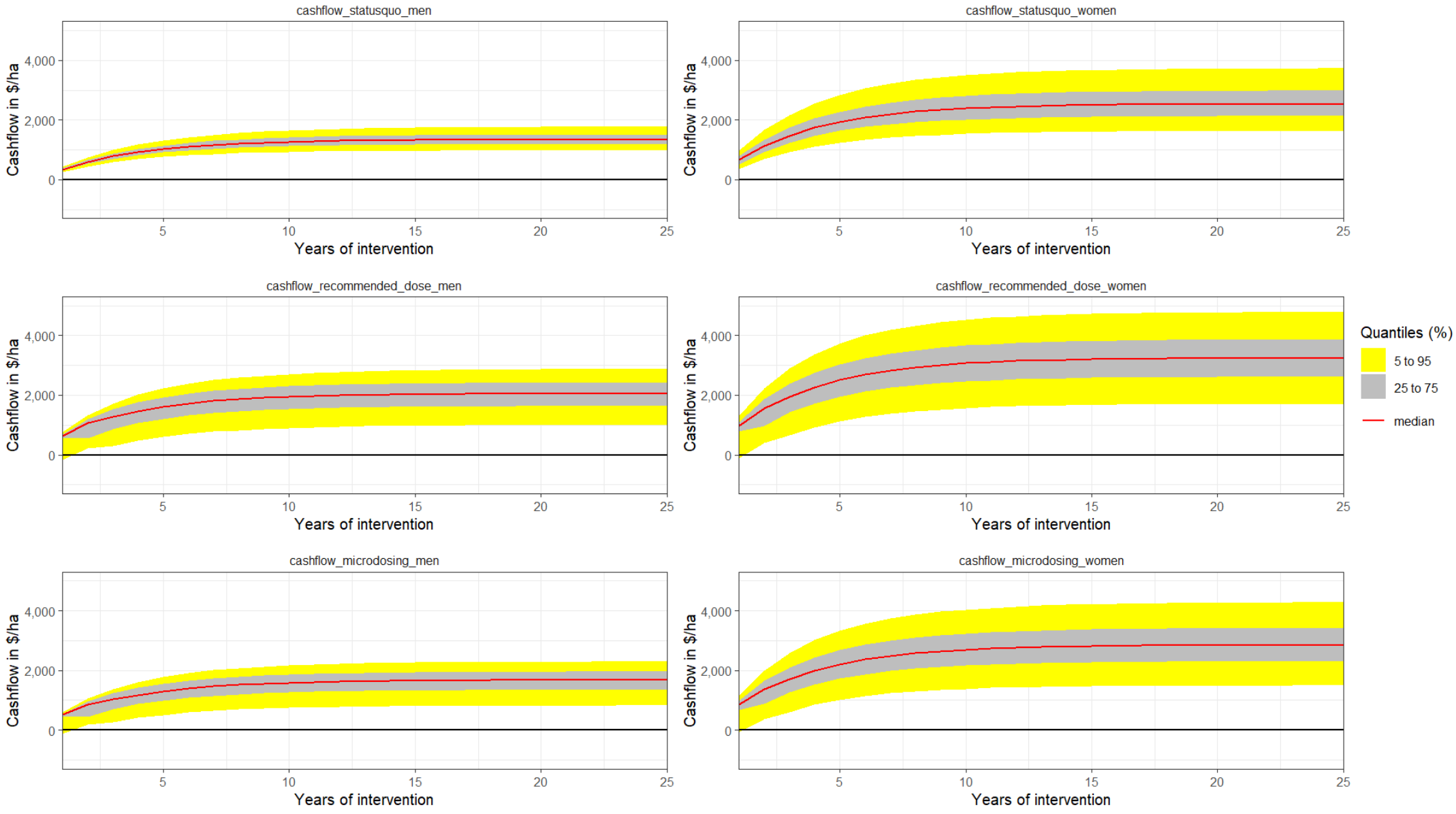
Impact pathways of microdosing in parkland system



Preliminary probabilistic simulation results



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