# Farmers' perceptions and knowledge of ecosystem services: Initial findings from Nigeria

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# So why do we want to assess farmers' perceptions of and knowledge about ES?

- Because we don't know (mostly)
- Because it is important to know.

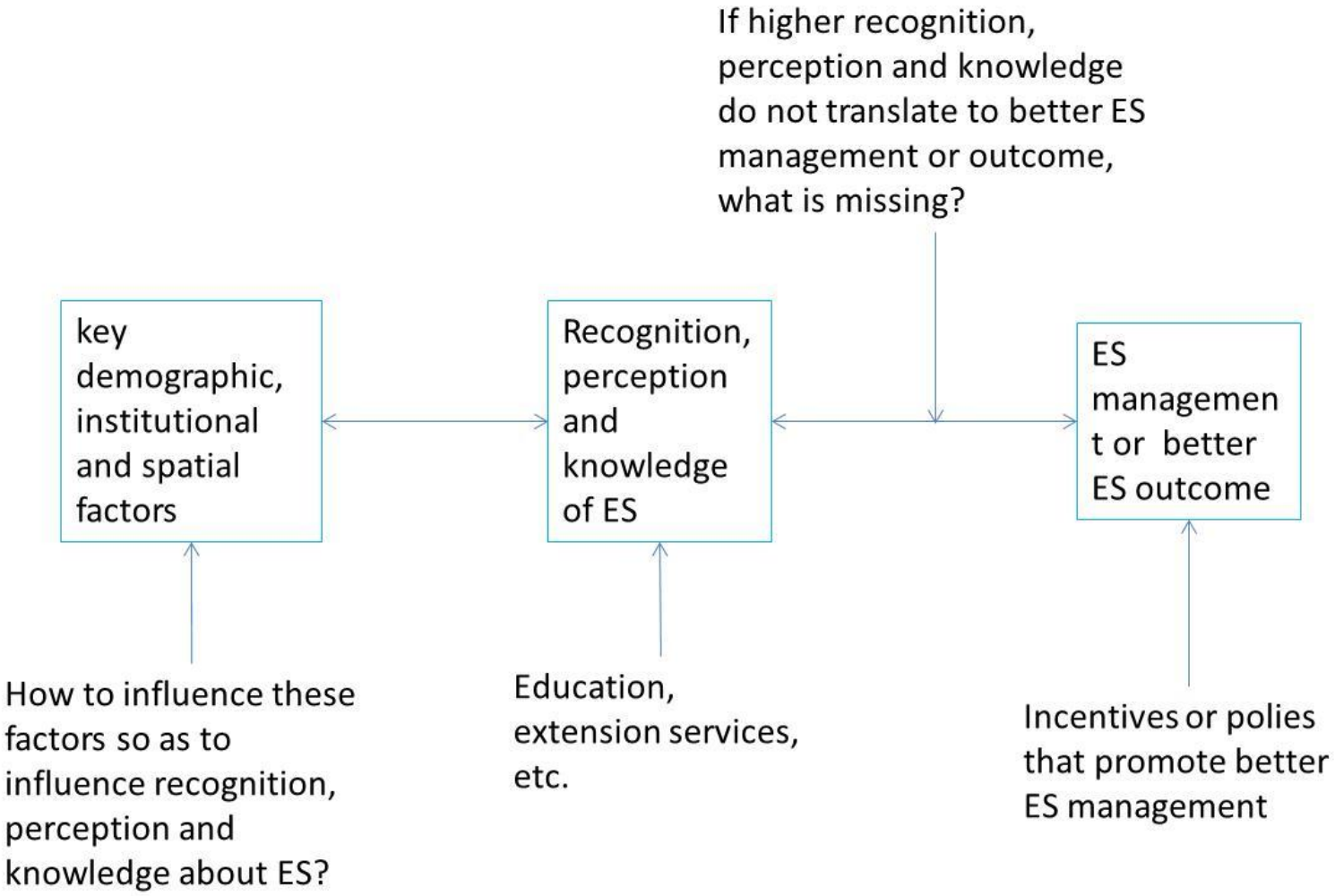
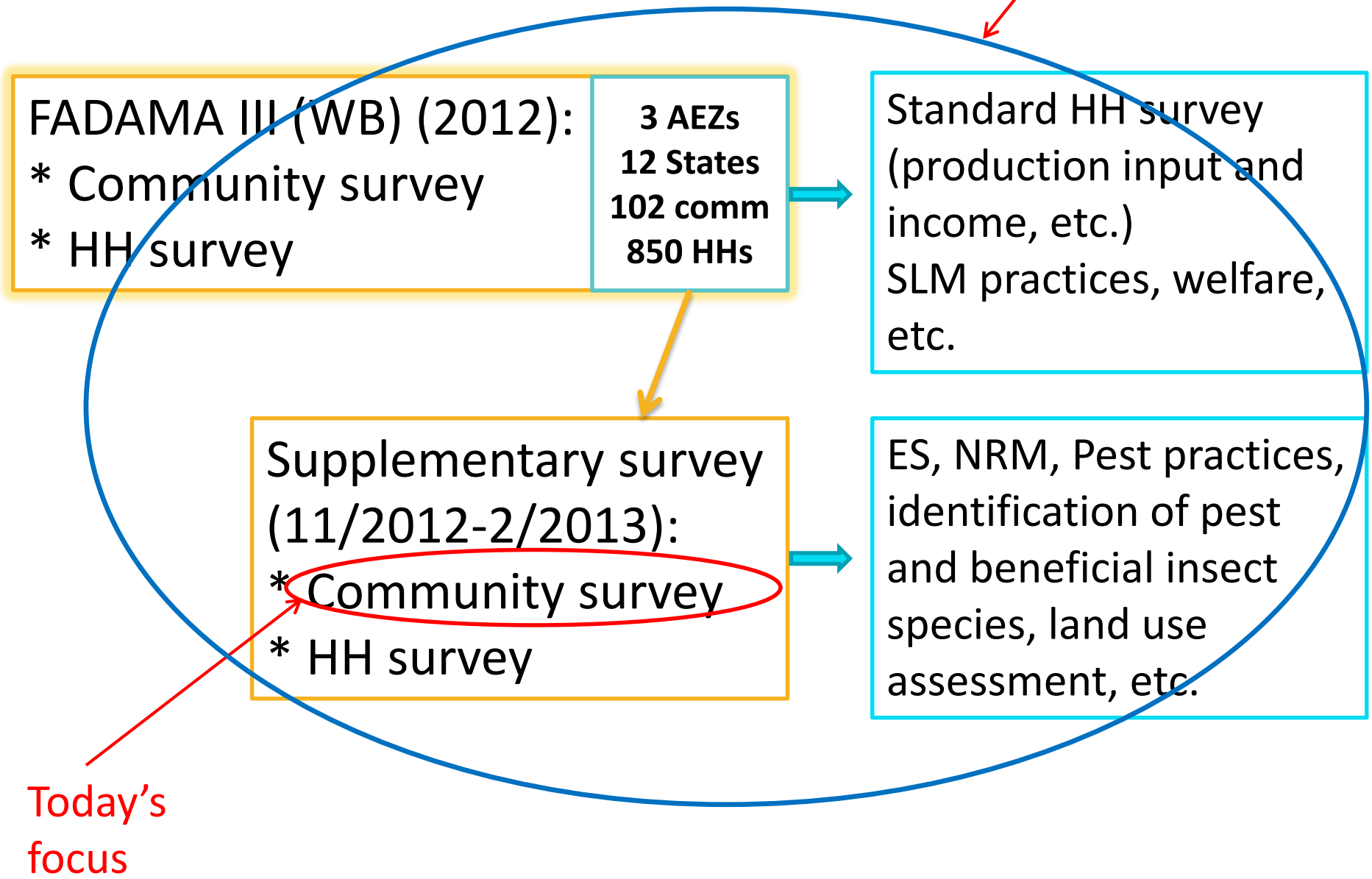
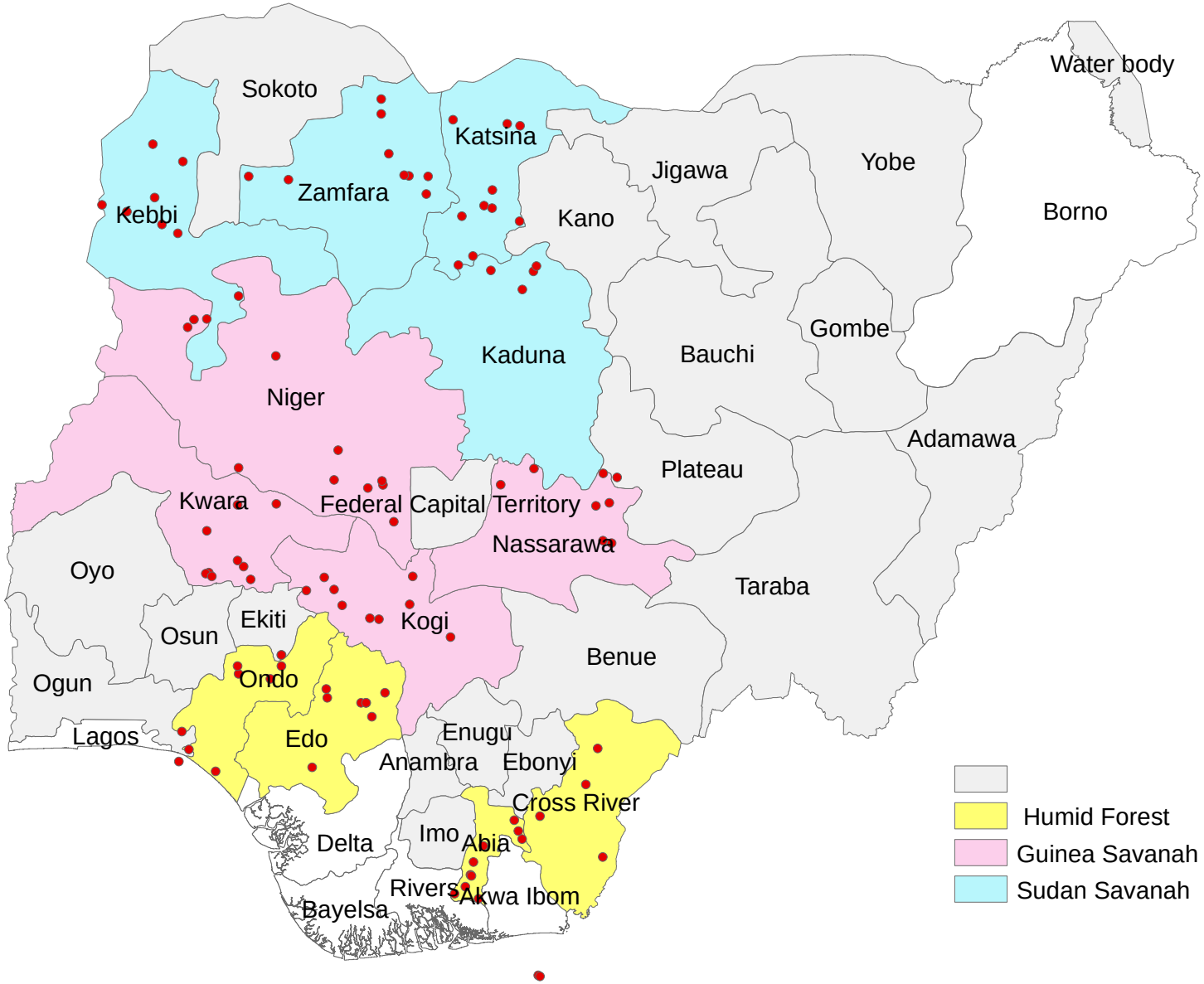



Photo credit: Mure Uhunamure Agbonlahor

# Methods and Data



# Sample of communities (3 AEZs, 12 states, 102 communities)



# Multi-disciplinary team


Photo credit: Wei Zhang

Photo credit: Wopke van der Werf

# Community Focus Group Survey Preliminary Results (N=102)

## Mostly descriptive, with a little bit regression…

# Land use

| Land use types | Percent of the total area of the community (%) | | |
|---|---|---|---|
| | Humid Forest | Guinea Savannah | Sudan Savannah |
| Cultivated area | 19.56 | 33.72 | 49.98 |
| Unused land | 35.44 | 21.08 | 0.84 |
| Residential | 6.09 | 12.89 | 17.16 |
| Forest | 22.44 | 13.14 | 3.03 |
| Agro-forest | 0.00 | 0.42 | 0.00 |
| Lowland floodplain | 7.79 | 8.53 | 14.28 |
| Grazing land | 0.00 | 1.11 | 2.50 |
| Woodland | 5.62 | 6.67 | 1.22 |
| Water | 2.65 | 2.31 | 6.31 |
| Total | 99.59 | 98.87 | 95.32 |

# Reported trend of change in land use in the last 5 years (% of communities reporting)

| Land use types | Humid Forest | | | Guinea Savannah | | | Sudan Savannah | | |
|---|---|---|---|---|---|---|---|---|---|
| | ↓ | ↔ | ↑ | ↓ | ↔ | ↑ | ↓ | ↔ | ↑ |
| Cultivated area | 1 | 0 | 31 | 6 | 6 | 24 | 26 | 2 | 2 |
| Unused land | 31 | 0 | 0 | 22 | 4 | 0 | 2 | 3 | 1 |
| Residential | 0 | 0 | 32 | 6 | 1 | 27 | 1 | 4 | 25 |
| Forest | 28 | 2 | 0 | 17 | 5 | 1 | 1 | 8 | 0 |
| Agro-forest | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Lowland floodplain | 29 | 1 | 2 | 20 | 12 | 4 | 16 | 6 | 7 |
| Grazing land | 0 | 0 | 0 | 5 | 3 | 0 | 3 | 8 | 0 |
| Woodland | 19 | 1 | 0 | 12 | 3 | 3 | 3 | 3 | 0 |
| Water | 0 | 6 | 0 | 8 | 8 | 1 | 17 | 5 | 9 |

# Awareness of specific ES

| | Ecosystem Services | Frequency (N=102) | % of communities |
|---|---|---|---|
| ***Provisioning Ecosystem Services:*** | | | |
| 1 | **Crops** | **102** | **100** |
| 2 | **Wild foods (plants, fish, animal)** | **89** | **87** |
| 3 | **Aqua-cultural fish** | **53** | **52** |
| 4 | **Livestock** | **75** | **74** |
| 5 | **Livestock feed** | **79** | **77** |
| 6 | **Fuel** | **101** | **99** |
| 7 | Genetic resources | 4 | 4 |
| 8 | **Fresh water** | **92** | **90** |
| 9 | **Ornamental resources** | **32** | **31** |
| 10 | **Natural/plant derived medicine** | **99** | **97** |

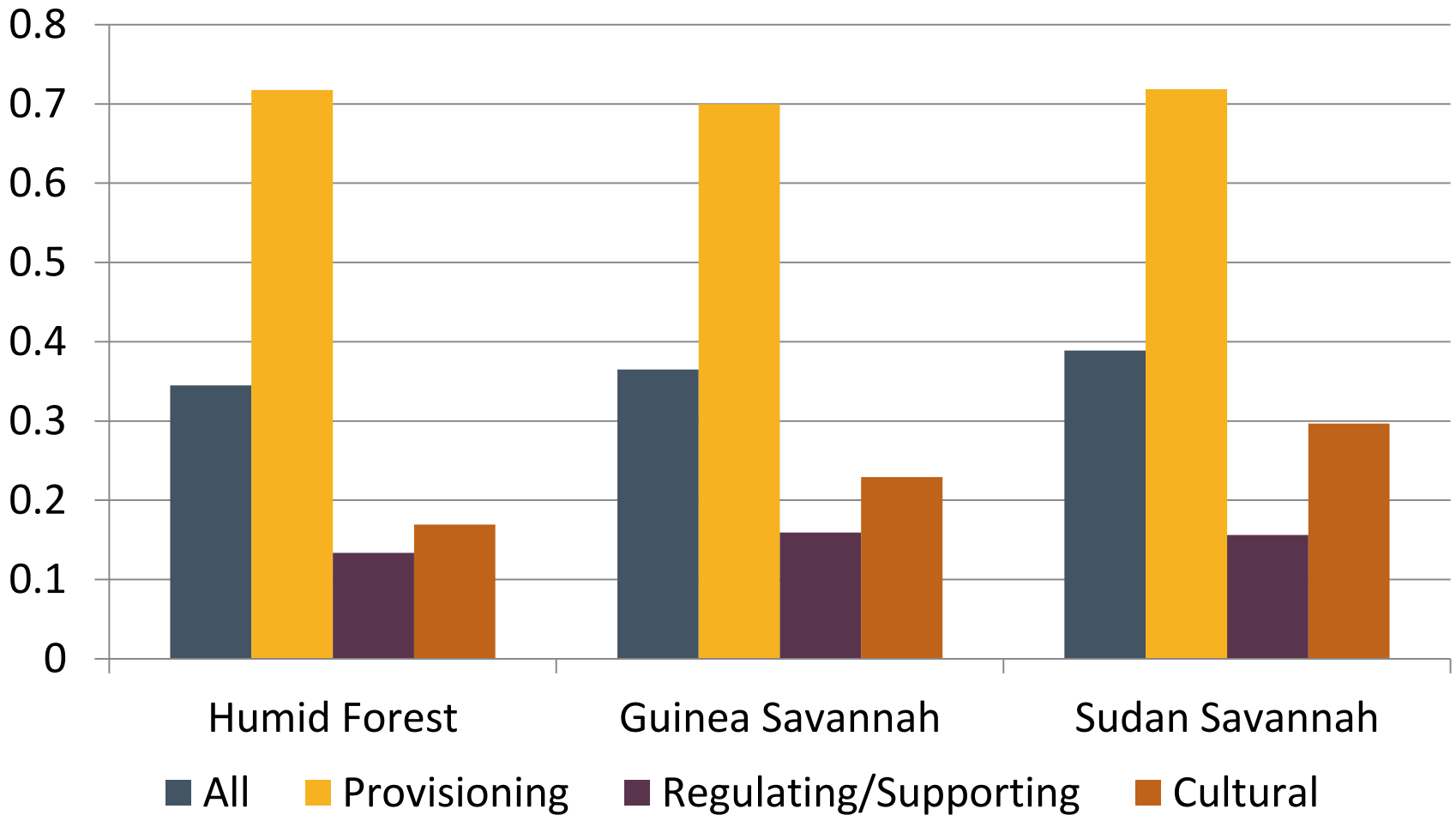
# Awareness of specific ES

| | Ecosystem Services | Frequency (N=102) | % of communities |
|---|---|---|---|
| ***Regulating and Supporting Ecosystem Services:*** | | | |
| 11. | **Regulation of air quality** | **55** | **54** |
| 12. | Water purification | 6 | 6 |
| 13. | Regulation of disease & pests | ***2*** | ***2*** |
| 14. | Pollination | ***10*** | ***10*** |
| 15. | Erosion regulation | 16 | 16 |
| 16. | Waste treatment | 8 | 8 |
| 17. | **Natural hazard regulation** | **43** | **42** |
| 18. | Climate regulation | 8 | 8 |
| 19. | Nutrient cycling | 0 | 0 |
| 20. | Noise buffering | 10 | 10 |
| 21. | Soil formation | 10 | 10 |

# Awareness of specific ES

| | Ecosystem Services | Frequency (N=102) | % of communities |
|---|---|---|---|
| ***Cultural Ecosystem Services:*** | | | |
| 22. | **Spiritual values** | **60** | **59** |
| 23. | **Aesthetic values** | **39** | **38** |
| 24. | Sense of place | 14 | 14 |
| 25. | **Recreation** | **35** | **34** |
| 26. | Ecotourism | 0 | 0 |
| 27. | Cultural heritage | 16 | 16 |
| 28. | Cultural practices | 12 | 12 |
| 29. | Education and knowledge Systems | 12 | 12 |

# Level of awareness (Recognition index)



# Perceived trend of ES provision (% of communities reporting)

| | Ecosystem services | Declining | No Change | Increasing | Don't know |
|---|---|---|---|---|---|
| 1 | Crops | 42 | 39 | 4 | 51 |
| 2 | Wild foods | 47 | 46 | 1 | 49 |
| 3 | Aqua-cultural fish | 17 | 4 | 7 | 9 |
| 4 | Livestock | 33 | 5 | 23 | 41 |
| 5 | Livestock Feed | 30 | 34 | 4 | 42 |
| 6 | Fuel | 62 | 26 | 3 | 49 |
| 8 | Fresh Water | 32 | 18 | 3 | 47 |
| 9 | Ornamental resources | 41 | 15 | 1 | 43 |
| 10 | Natural/plant-derived medicines | 46 | 43 | 4 | 49 |
| 11 | Regulation of air quality | 21 | 13 | 15 | 7 |
| 17 | Natural hazard regulation | 12 | 9 | 5 | 6 |
| 22 | Spiritual Value | 47 | 25 | 6 | 48 |
| 23 | Aesthetic Value | 32 | 12 | 1 | 39 |
| 25 | Recreation | 13 | 10 | 4 | 7 |

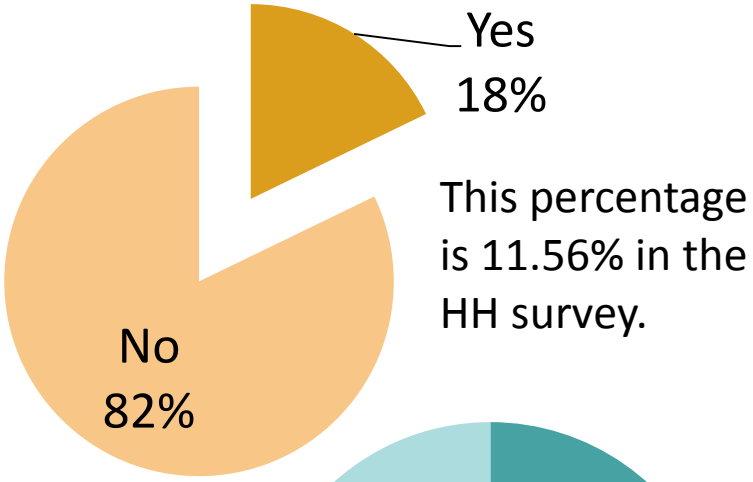
# Perceived importance of ES to community livelihood and welfare (% of communities reporting, N=102)

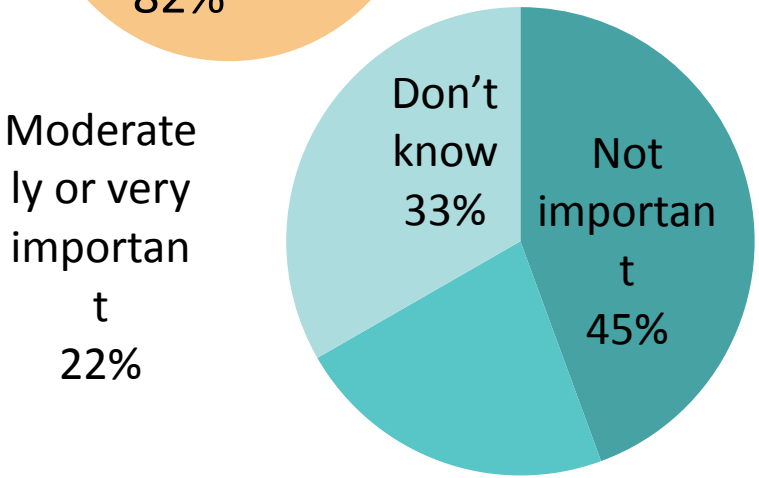
| | Ecosystem services | Not Important | Somehow Important | Very Important | Don't know |
|---|---|---|---|---|---|
| 1 | Crops | 0 | 1 | 80 | 0 |
| 2 | Wild foods | 0 | 19 | 51 | 0 |
| 3 | Aqua-cultural fish | 9 | 18 | 42 | 0 |
| 4 | Livestock | 0 | 7 | 61 | 2 |
| 5 | Livestock Feed | 33 | 4 | 27 | 9 |
| 6 | Fuel | 0 | 9 | 72 | 0 |
| 8 | Fresh Water | 0 | 35 | 43 | 0 |
| 9 | Ornamental resources | 33 | 8 | 2 | 2 |
| 10 | Natural/plant-derived medicines | 0 | 11 | 60 | 8 |
| 11 | Regulation of air quality | 0 | 16 | 16 | 37 |
| 17 | Natural hazard regulation | 0 | 7 | 11 | 41 |
| 22 | Spiritual values | 14 | 14 | 19 | 25 |
| 23 | Aesthetic values | 6 | 21 | 23 | 12 |
| 25 | Recreation | 7 | 17 | 2 | 33 |

# Huge knowledge gap (We focused on insects.)

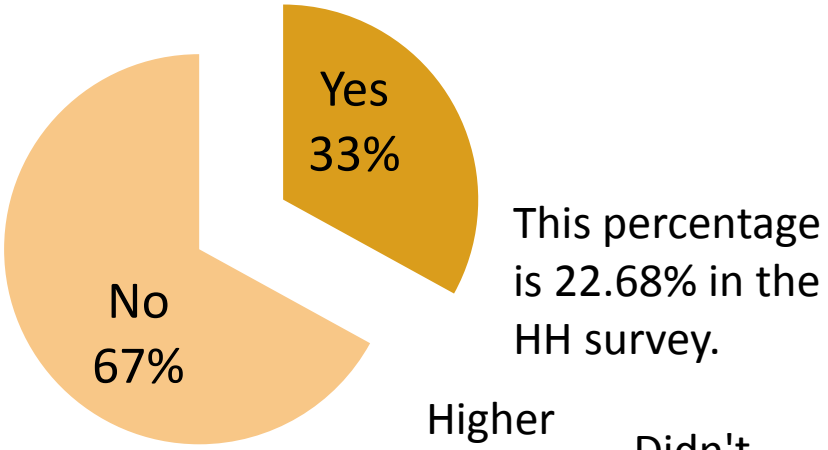
- Slightly biased upwards at this point of the survey but the level is still low

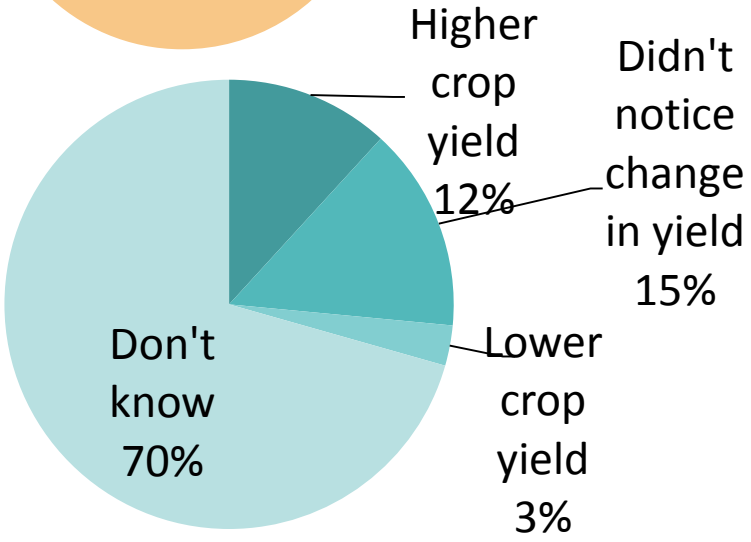
## Natural enemies




## Pollinators



# PES: Probing communities' openness to PES approach

- About 1/3 Yes:
  - Can help reduce natural resource conflict; can help improve natural resource management
- Hypothetical case regarding protecting the quality of the community's drinking water from pollutions from upstream communities
  - 15% of the communities reported that they would consider paying the upstream communities to change behavior
    - What kind of institutional arrangement is needed for you to consider entering such contract?
      - formation of committee involving stakeholders, involvement of all community members, stakeholders to meet and discuss issue, and community initiatives
    - who should lead setting up such PES mechanisms?
      - community leaders was the dominate choice, followed by local government
  - For those communities who are not willing to consider paying the upstream communities to change behavior,
    - negotiating with upstream communities (47 communities or 65%)
    - requesting government to intervene (20 communities or 28%)
    - buying clean water (only one community); don't know (4 communities)

# Exploratory regression on ES recognition index

# Censored Regression (Structural form model)

| | ALL ES | Provisioning | Regulating | Cultural |
|---|---|---|---|---|
| Ethnicity_Hausa | | | - | |
| Ethnicity_Fulani | +++ | ++ | | ++ |
| Ethnicity_Nupe | | | | |
| Ethnicity_Ibo | | | | |
| Ethnicity_Yoruba | | | | |
| Ethnicity_Ebera | | | | -- |
| Ethnicity_ibibio | | | | --- |
| Area%_unused | | | | +++ |
| Area%_residential | | | | |
| Area%_forest | | | | ++ |
| Area%_agroforestry | | | | |
| Area%_floodplains | | | | + |
| Area%_grazing | | | | |
| Area%_woodland | | | | |
| Area%_water | | | | |
| Distance to road | | | | |
| Number of conflicts | | | | |
| tenure_lease | | | | |
| tenure_customary | | | | ++ |
| tenure_rented | | | | |
| tenure_communal | | | | |
| tenure_freehold | | | | |
| tenure_other | ++ | +++ | | |
| Food insecure (% of popu) | | + | | |

**Not significant:**

Village population

Village population sq

Population migrated

Byelaw enactment

% of HHs involved in livestock

Agricultural Extension Program

Agricultural Extension Training

% of HHs with metal roof

% of HHs with grass wall

% of HHs with primary schooling

% of HHs with secondary schooling

# Censored Regression (reduced/exog form model)

| | All | Provisioning | Regulating | Cultural |
|---|---|---|---|---|
| Ethnicity_Hausa | | | - | |
| Ethnicity_Fulani | +++ | +++ | | + |
| Ethnicity_Nupe | | ++ | | |
| Ethnicity_Ibo | | | | -- |
| Ethnicity_Yoruba | + | ++ | | |
| Ethnicity_Ebera | --- | | --- | --- |
| Ethnicity_ibibio | --- | | --- | --- |
| Village Population | | | | |
| Village population sq | | | | - |
| area_unused | | | | + |
| area_residential | | | + | |
| area_forest | +++ | | +++ | +++ |
| area_agroforest | +++ | | +++ | |
| area_flooding | + | | | ++ |
| area_grazing | | | | |
| area_woodland | | | | |
| area_water | --- | --- | --- | |

# Censored Regression (reduced/exog form model) (Cont.)

| | All | Provisioning | Regulating | Cultural |
|---|---|---|---|---|
| Distance to road | - | --- | | |
| tenure_lease | | --- | | |
| tenure_customary | ++ | + | | + |
| tenure_rented | | | --- | |
| tenure_communal | | - | + | |
| tenure_freehold | | | | |
| tenure_other | | ++ | | |

# Preliminary conclusions

- Land use changes
  - Reported declining trend for unused, forest, lowland floodplain, and woodland; and increasing trend for cultivated and residential area
- Recognition of ES
  - Provisioning: high; and consistent with other studies
  - Regulating: low, especially ES at the field/farm level
  - Cultural: pretty high
- Ethnicity (correlated with AEZ and resource endowment) is important for explaining different levels of recognition of ES
- Existing natural resources (e.g., forest and lowland floodplain) affect how communities experience ES
- Access to market: positive correlation
- Types of land tenure system: more secure, higher recognition

Thank you for your attention!

# Land tenure (% of communities)

| | Leasehold or certificate of occupancy | Customary | Rented in | Borrowed | Common land or community land | Freehold |
|---|---|---|---|---|---|---|
| Cultivated | 2 | 82 | 2 | 1 | 6 | 4 |
| Unused land | 1 | 53 | | | 7 | 1 |
| Residential | 1 | 82 | 1 | | 8 | 5 |
| Forest | 1 | 26 | | | 32 | 1 |
| Agro-forest | | | | | 1 | |
| Lowland floodplain | 1 | 64 | 1 | 1 | 24 | 4 |
| Grazing land | | 1 | | | 16 | 1 |
| Woodland | | 13 | 2 | 1 | 26 | |
| Water | 2 | 5 | | | 46 | |