Defining Purpose, Process, Partnerships, and Products in Participatory Socio-Environmental Modeling

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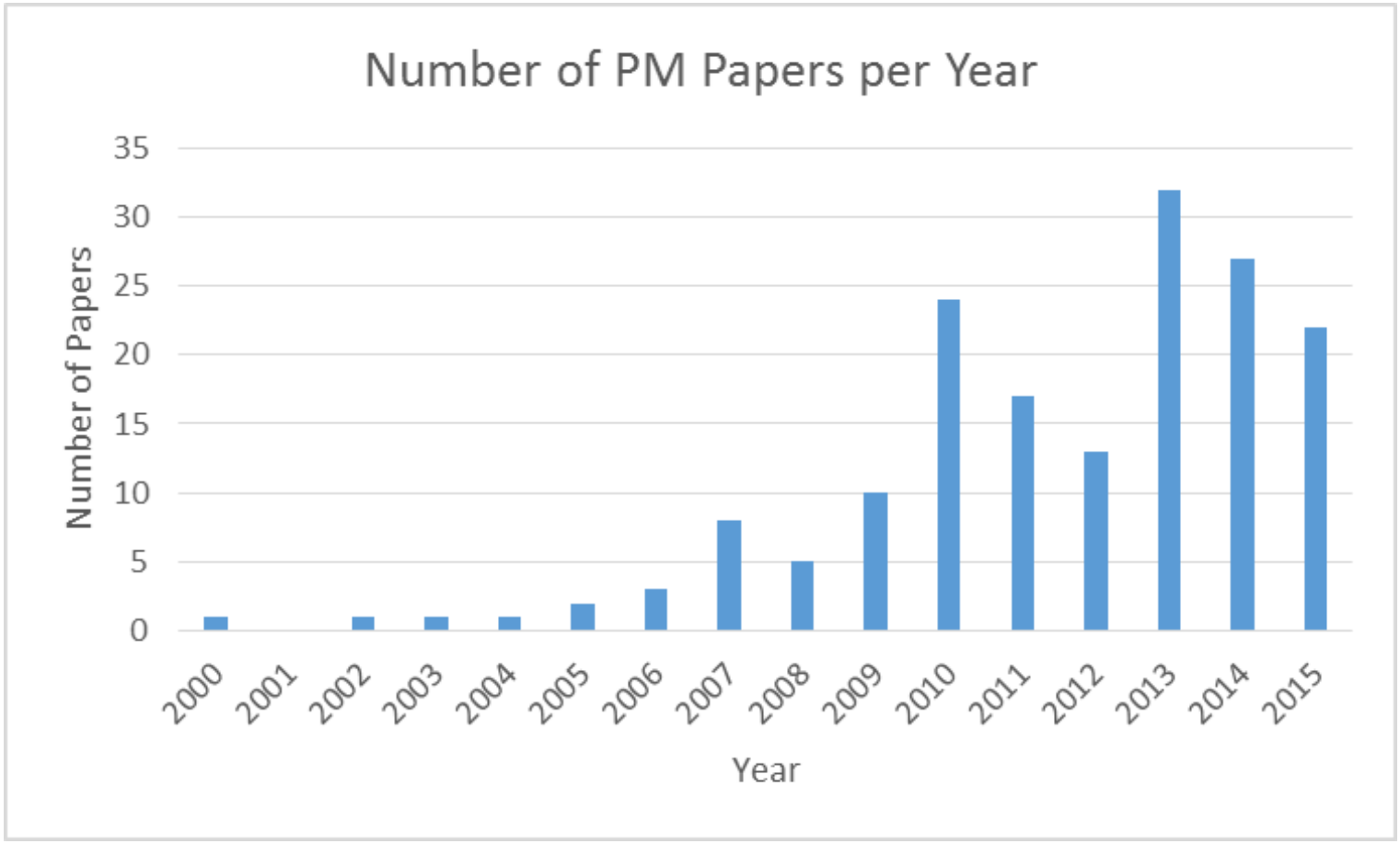
Participatory Modeling

- Popularity has increased in recent years



Why a New Framework?

- It has been widely argued that there is a need to formally evaluate participatory modeling research (see Zellner et al. 2012; Radinsky et al. in review)
- Various frameworks have been developed and applied (e.g., Jones et al. 2009, Balci 2012)
- We took a participatory approach to framework development, and included modelers, evaluators, community members, and facilitators

Contributors/Co-authors









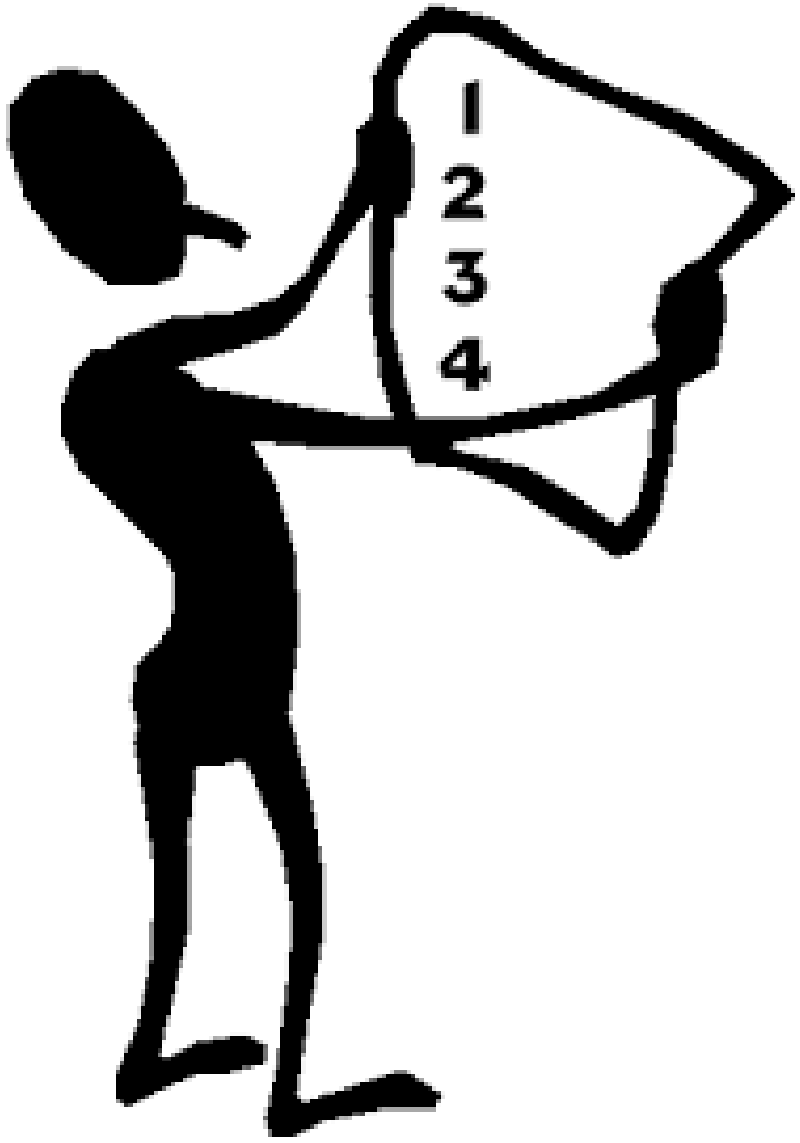






4P Framework

- Purpose
- Process
- Partnerships
- Products



4P Framework: Purpose

- Why was the PM approach selected?
  - Providing justification for why PM is used
  - Defining the issue and the purpose of the model

4P Framework: Process

- How were stakeholders involved?
  - Defining the characteristics of the interaction between the participants and the model
  - Describing the level of participation
  - Defining the relationship between the PM and a decision-making process

4P Framework: Partnership

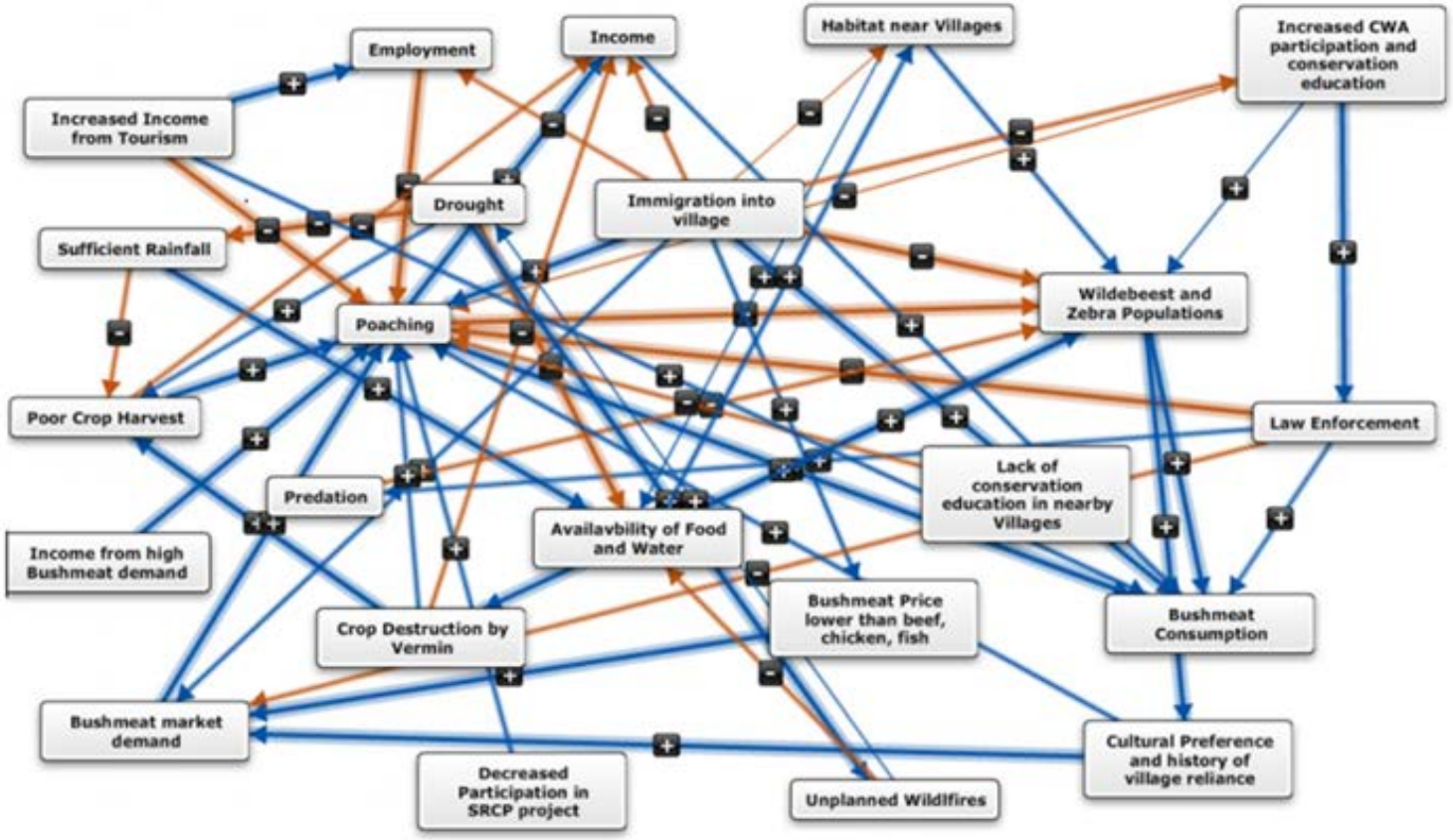
- Who participated and why?
  - Defining model, data, and process ownership
  - Describing the criteria for inclusion of participants
  - Describing the steps the participants are involved in

4P Framework: Products

- What was produced by the modeling process?
  - Defining characteristics of the PM tool produced
  - Defining the social outcomes of the process
  - Defining the policy, management, or scientific insights

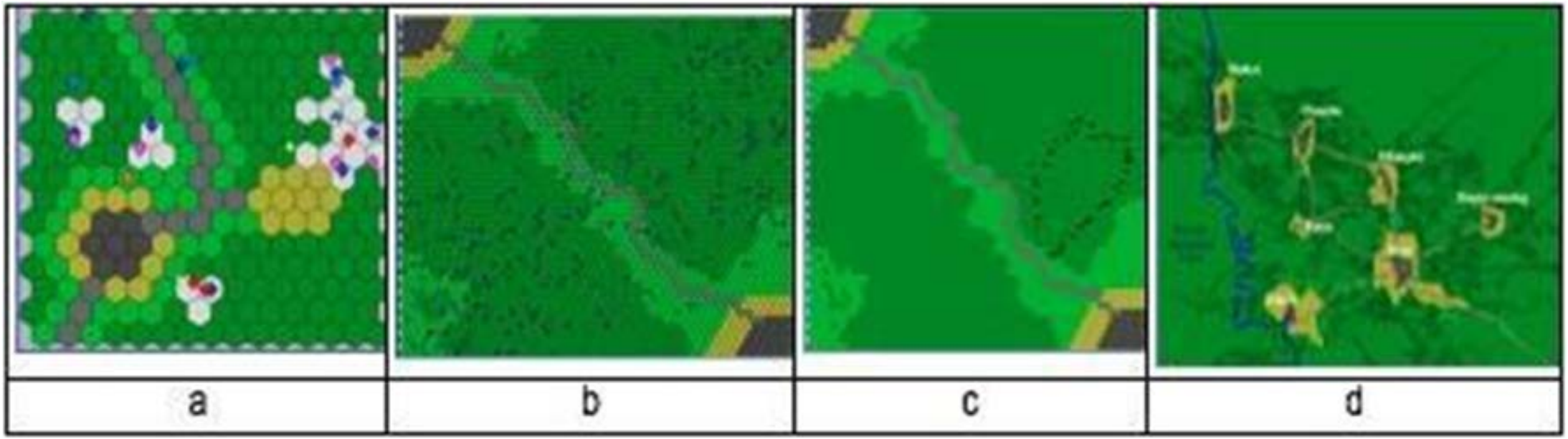
Case Study Analysis

- Fuzzy cognitive mapping (FCM) in Tanzania



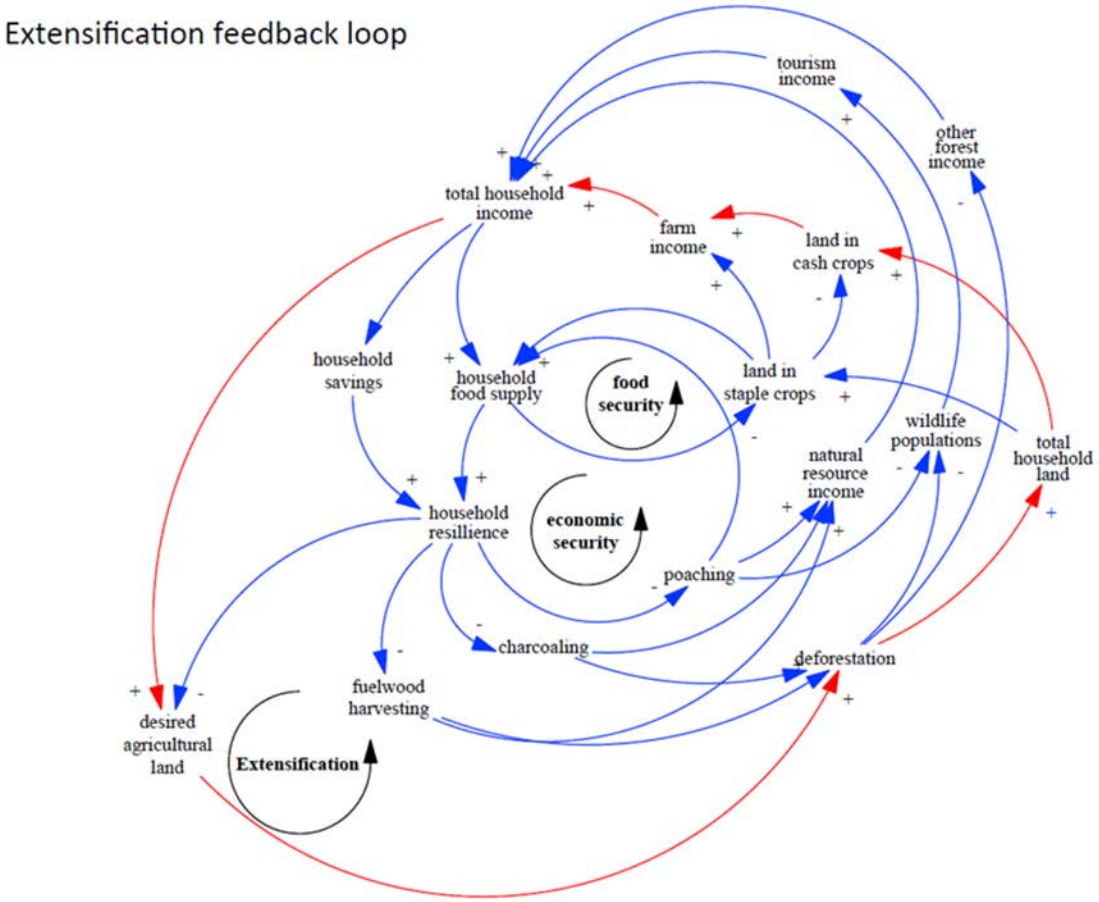
Case Study Analysis

- Agent-based modeling (ABM) in Cameroon



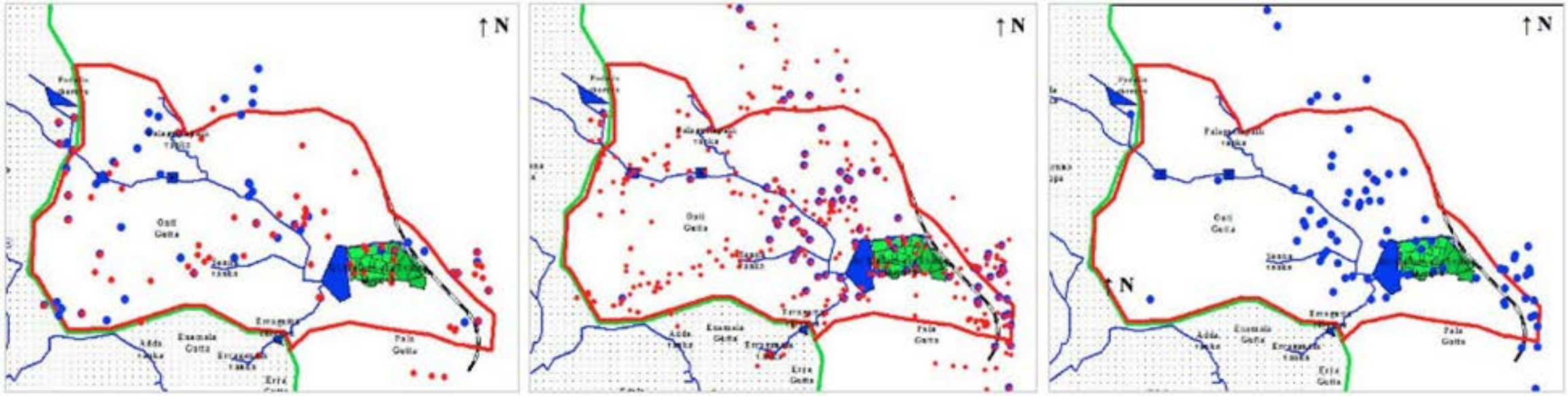
Case Study Analysis

- System dynamics (SD) in Zambia



Case Study Analysis

- Participatory GIS (P-GIS) in India



Case Study Analysis: Purpose

Purpose	FCM in Tanzania	ABM in Cameroon	SD in Zambia	P-GIS in India
Why participatory?				
Why model?				

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Why participatory?	Collect local knowledge			
Why model?	Understand social and ecological drivers of the bushmeat trade and compare them with current policy assumptions			

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Purpose	FCM in Tanzania	ABM in Cameroon	SD in Zambia	P-GIS in India
Why participatory?	Collect local knowledge	Collect local knowledge and raise local awareness of sustainable hunting		
Why model?	Understand social and ecological drivers of the bushmeat trade and compare them with current policy assumptions	Assess impacts of traditional bushmeat hunting and explore effects of various conservation programs		

Case Study Analysis: Purpose

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Why participatory?	Collect local knowledge	Collect local knowledge and raise local awareness of sustainable hunting	Collect local knowledge to parameterize model	
Why model?	Understand social and ecological drivers of the bushmeat trade and compare them with current policy assumptions	Assess impacts of traditional bushmeat hunting and explore effects of various conservation programs	Test alternative hypotheses about how USAID's investment may or may not counteract each other	

Case Study Analysis: Purpose

Purpose	FCM in Tanzania	ABM in Cameroon	SD in Zambia	P-GIS in India
Why participatory?	Collect local knowledge	Collect local knowledge and raise local awareness of sustainable hunting	Collect local knowledge to parameterize model	Inform and empower local decision-making
Why model?	Understand social and ecological drivers of the bushmeat trade and compare them with current policy assumptions	Assess impacts of traditional bushmeat hunting and explore effects of various conservation programs	Test alternative hypotheses about how USAID's investment may or may not counteract each other	Identify causes of groundwater shortage and identify solutions to the problem

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Participant-model interaction	Local facilitator with nine workshops over two months			
Level of participation	Helped construct the model			

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Level of participation	Helped construct the model	Helped construct the model	Helped parameterize, construct, and interpret model	

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Level of participation	Helped construct the model	Helped construct the model	Helped parameterize, construct, and interpret model	Performed transect walks with GPS units, helped construct GIS model, made plans to improve system

Case Study Analysis: Partnerships

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Model/process ownership	Owned by research team			
Participant selection process	Advertised by local NGO, and residents helped select participants			

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Participant selection process	Advertised by local NGO, no paid incentives, residents helped select participants	All villagers invited to workshop; in addition, 65 male hunters were monitored		

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Participant selection process	Advertised by local NGO, no paid incentives, residents helped select participants	All villagers invited to workshop; in addition, 65 male hunters were monitored	USAID recruited stakeholders, all of whom were professionals	Researchers selected stratified sample of residents, and had local school children help with transect walks and maps

Case Study Analysis: Products

Products	FCM in Tanzania	ABM in Cameroon	SD in Zambia	P-GIS in India
The PM tool	Nine group FCMs, aggregated into one FCM			
Social Outcomes	Participants enjoyed it			
Policy/management insights	System is more complex than assumed			

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Policy/management insights	System is more complex than assumed	Participants moved from skepticism of risks to acknowledgement of the problem		

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The PM tool	Nine group FCMs, aggregated into one FCM	One ABM	One SD model	
Social Outcomes	Participants enjoyed it	Participants enjoyed it, and expressed critical thinking and learning outcomes	Stakeholders expressed appreciation	
Policy/management insights	System is more complex than assumed	Participants moved from skepticism of risks to acknowledgement of the problem	Conservation agriculture does not promote landscape-scale conservation	

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The PM tool	Nine group FCMs, aggregated into one FCM	One ABM	One SD model	One water accounting and cropping model, and several GIS maps of wells and crops
Social outcomes	Participants enjoyed it	Participants enjoyed it, and expressed critical thinking and learning outcomes	Stakeholders expressed appreciation	Learning about system drivers
Policy/management insights	System is more complex than assumed	Participants moved from skepticism of risks to acknowledgement of the problem	Conservation agriculture does not promote landscape-scale conservation	Need to limit groundwater exploitation. Participants chose and implemented policy

So What?

- Facilitate communication between modelers
- Insights from other modeling approaches
- Reveal when one tool is more appropriate than another
- Structure PM databases

References

- Balci, O. 2012. A life cycle for modeling and simulation. Simulation, 88(7), 870-883.
- Jones, Natalie A., Pascal Perez, Thomas G. Measham, Gail J. Kelly, Patrick d'Aquino, Katherine A. Daniell, Anne Dray, and Nils Ferrand. 2009. Evaluating participatory modeling: developing a framework for cross-case analysis. *Environmental Management* 44, no. 6: 1180-1195.
- Radinsky, J., Milz, D., Zellner, M.L., Pudlock, K., Witek, C., Hoch, C., and L. Lyons. In review. How Planners and Stakeholders Learn With Visualization Tools: Using Learning Sciences Methods to Examine Planning Processes. Submitted to *Journal of Environmental Planning and Management*.
- Zellner, M.L., Lyons, L., Hoch, C. J., Weizeorick, J., Kunda, C., and D. Milz. 2012. Modeling, Learning and Planning Together: An Application of Participatory Agent-Based Modeling to Environmental Planning. *URISA Journal, GIS in Spatial Planning Issue* 24(1): 77-92.


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