

## Appendix #1

The following is the questionnaire used to elicit information from individual experts, to then use to draw the FCM diagrams:

### Questionnaire 1: Using expert information to understand Malawian bushmeat hunting

#### Explanation

We are aiming to use a technique called “Fuzzy cognitive mapping” to generate semi-quantitative maps of the bushmeat hunting and consumption systems. This method is a great way to visualise a complex system by understanding its key components, the relationships between those components and finally the strength of those relationships. We will then be able to use the system map to find out which management interventions work best to reduce hunting and consumption of bushmeat, and so this process will be able to provide participants with guidance for the future.

To do this we need your expertise. The way to generate such a map requires you to answer four simple questions about hunting and then about consumption. Based on your answers we will generate an individual system map which we can send back to you to look over. We will also combine everyone’s maps and present this group cognitive map at the workshop for discussion.

The four questions are:

- What variables/components are important to consider when thinking about illegal bushmeat hunting? This can be anything from habitat, budgets, enforcement levels, characteristics of communities or anything else you can think of.
- What is the relationship of these variables to hunting? I.e. is it positive or negatively related?
- What is the strength of these relationships to hunting? Is it strong, medium or weakly related?
- What are the relationships between all the different variables you think affect illegal hunting (positive or negative) , and what is the strength of this relationship (strong, medium, weak)?

#### Example

We have drawn up a simple example using just two components to show you the process.

1. **Think about what the key variables are that determine how much bushmeat is hunted.**  
**LIST THEM ALL**

- Poverty score of households surrounding park
- Availability of snare wire

2. Think about what relationship these variables have to how much bushmeat is illegally hunted.

**Is it positive (where as one increases so does the other) or negative (where as one increases the other decreases)?**

- As households get wealthier they may hunt less (answer= negative relationship)
- As availability of snare wire increases hunting will increase (answer= positive relationship)

3. Think about how strong the relationship is between the component and how much bushmeat is hunted.

**IS IT STRONG, MEDIUM OR WEAK?**

- I suspect a strong relationship between poverty and hunting (answer=strong)
- I think there will be a medium relationship between snare wire and hunting as there are other factors which are more important probably (answer=medium)

4. **PUT THIS INFORMATION INTO A TABLE LIKE BELOW**

VARIABLE/COMPONENT AFFECTING HUNTING	Relationship to hunting + =positive (as one increases so does the other) -- =negative (as one increases the other decreases)	How strong is this relationship to hunting (Strong, medium, weak)
Poverty score	-	strong
Availability of snare wire	+	medium

5. Think about the relationship between the different components (before, we were thinking about the component and hunting, now we are thinking about each component relative to another).

**Is it positive (where as one increases so does the other) or negative (where as one decreases the other increases)?**

I think that as households get wealthier they will be able to buy more snaring wire (a positive relationship)

6. Think about how strong is the relationship between the components.

**IS IT STRONG, MEDIUM OR WEAK?**

I think that the relationship between poverty score and availability of snare wire is strong because households would be able to purchase it if they have more money.

**7. PUT THIS INFORMATION INTO A SECOND TABLE LIKE BELOW:**

VARIABLE 1	VARIABLE 2	Relationship to each other (+ or -)	Strength of relationship (Strong, medium, weak)
Poverty score	Availability of snaring wire	+	strong

This information will be put together by the research team to generate a model like the one below based on your individual answers. This is an example model of an agricultural system, considering how factors such as climate change might impact the crop harvest.

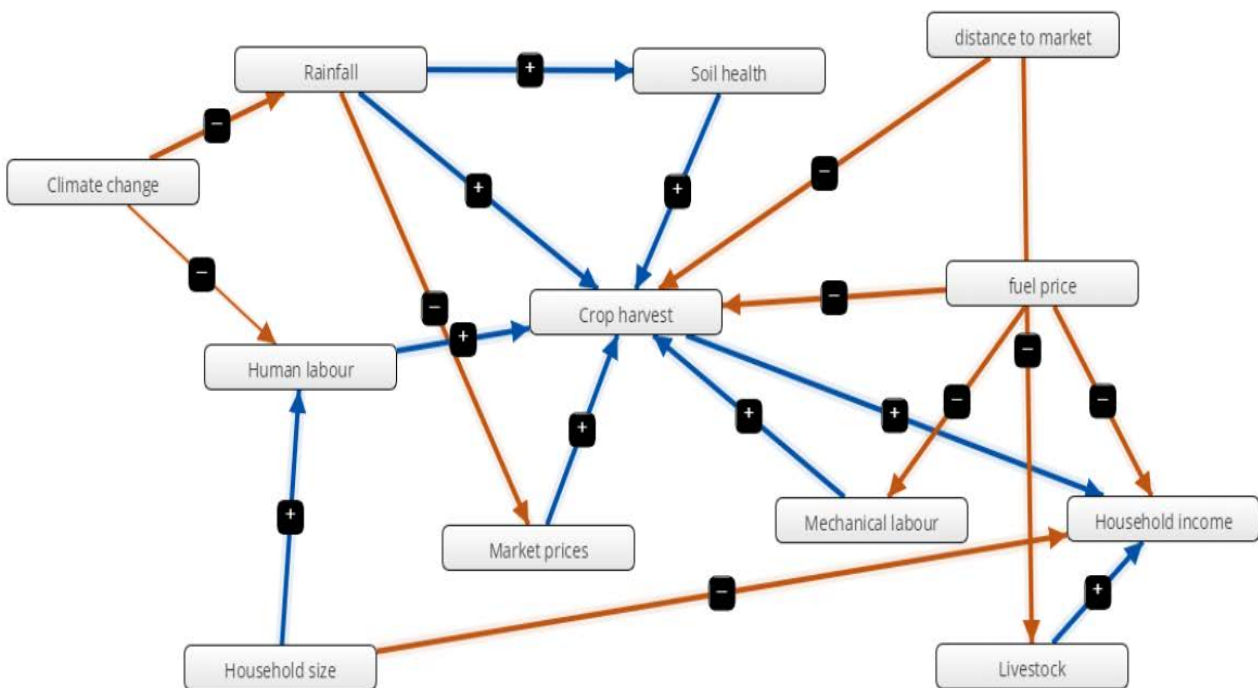


Figure 1: Example of a fuzzy cognitive map. The blocks indicate the important components of the model, the colour and sign of the arrows indicate whether the relationship between components is positive (+) or negative (-) and the thickness of the lines indicates the strength of the relationship.

## Now it's your turn

**1) Follow these steps, thinking about illegal HUNTING of bushmeat from protected areas in Malawi:**

a) List all the components that might be important to hunting in column 1. Add as many components as you would like. These can be any factor which might influence illegal bushmeat hunting from a Malawian protected area.

b) Put down what each component's relationship might be to hunting (+ or -) in column 2. Is it positive (where as one increases so does the other) or negative (where as one decreases the other increases)?

c) Put down how strong you think that relationship is (strong, medium or weak) in column 3.

### **Boundaries of thinking**

By ***hunting of bushmeat*** we mean any animal which is hunted specifically for the purpose of obtaining meat (either to sell for income or consume within the hunter's household), from a protected area in Malawi. We **do not** include hunting for body parts with the primary purpose of commercial export (e.g. ivory, rhino horn, pangolin scales), hunting for the pet trade or legal trophy hunting. We also ask you to think specifically about the factors influencing how much hunting occurs and **not** factors affecting how much consumption of bushmeat occurs. Consumption requires its own model (page 6)

The ***context*** we ask you to think about can be either at a national scale or specific to your experience at your protected area. If you think at a national scale be sure to keep in mind how this applies on the ground to Malawian protected areas.

The ***time scale*** we ask you to think about is the current state of affairs relating to bushmeat hunting. For example, even if legislative changes are planned or future programs are proposed, these do not currently affect the system so should not be included in your responses.




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**3) Repeat these steps but now think just about illegal CONSUMPTION of bushmeat from Malawian protected areas. Note you can repeat components that you mentioned above but consider how they might specifically relate to consumption.**

a) List all the components that might be important to consumption in column 1. Add as many components as you would like. These can be any factor which might influence illegal bushmeat consumption from a Malawian protected area.

b) Put down what each components relationship might be to consumption (+ or -) in column 2. Is it positive (where as one increases so does the other) or negative (where as one decreases the other increases)?

c) Put down how strong you think that relationship is (strong, medium or weak) in column 3.

**Boundaries of thinking**

By ***consumption of bushmeat*** we mean the practice of buying and consuming meat harvested from a wild animal, and in this case an animal caught inside a protected area in Malawi. We **do not** include meat from wild animals caught outside of protected areas.

The ***context*** we ask you to think about can be either at a national scale or specific to your experience at your protected area. If you think at a national scale be sure to keep in mind how this applies on the ground to Malawian protected areas.

The ***time scale*** we ask you to think about is the current state of affairs relating to bushmeat consumption. For example, even if legislative changes are planned or future programs are proposed, these do not currently affect the system so should not be included in your responses.




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**5)** Do you have any comments about anything in the survey which you think needs to be considered?

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**THANK YOU FOR YOUR PARTICIPATION!**  
**We look forward to your attendance at the workshop**



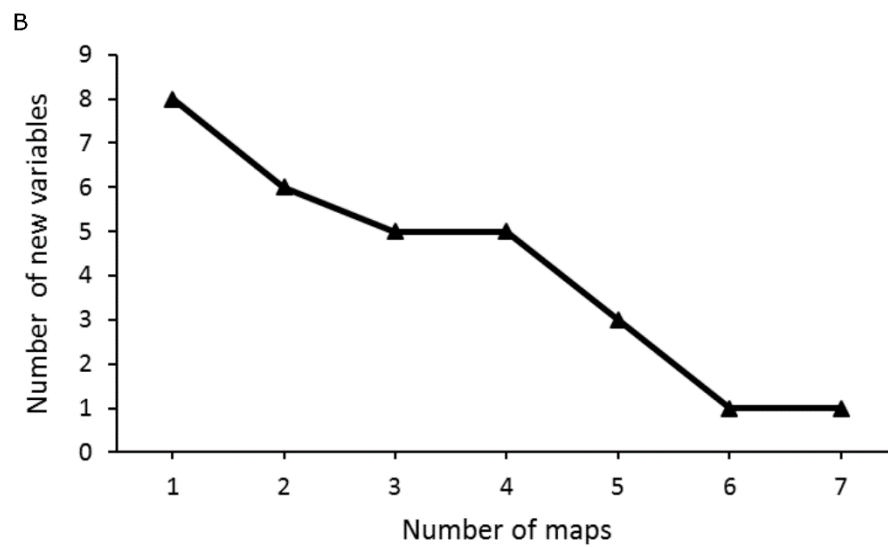
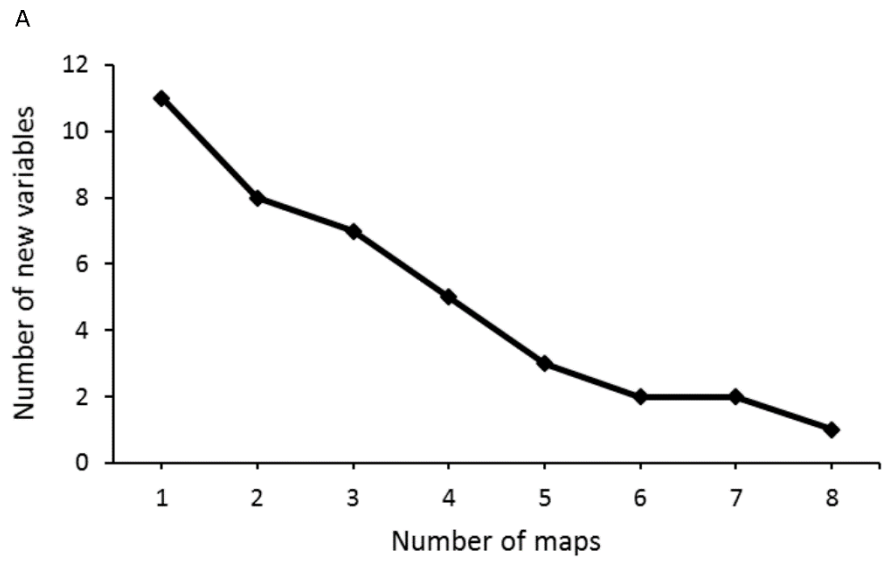


Figure A1.1: Accumulation of new variables for a) the bushmeat hunting and b) the bushmeat consumption Fuzzy cognitive maps, per individual map added.

Table A 1.1: The number of times that a component was listed by different individuals for hunting and consumption maps at the pre-workshop stage

<b>Component</b>	<b>Hunting</b>	<b>Consumption</b>
Poverty	6	6
Human population	3	2
Climate change	3	3
Cultural practices	3	3
Strength of law enforcement	2	N/A
Effective prosecution	2	3
Alternative livelihoods	2	2
Unemployment	N/A	2
Proximity to protected area	N/A	2
Availability of meat	N/A	2